Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from those representations.
GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.1	Know the different properties that hold in different number systems and recognize that the applicable properties change in the transition from the positive integers to all integers, to the rational numbers, and to Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Reason Using Properties from Algebra Subtracting Integers Subtracting Integers Subtracting Integers The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication What is the Meaning of Multiplication
EXPECTATION	L1.1.2	Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse Adding Integers

		Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Identity Elements and Inverses Identity Elements and Inverses Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers
EXPECTATION	L1.1.3	Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations. Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses Into Multiplying Integers Into Multiplying Integers Into Multiplying Integers Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication

		What is the Meaning of Multiplication
EXPECTATION	L1.1.4	Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number by a number less than 0, a number between 0 and 1, and a number greater than 1. EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS Fractional Parts of Powers of Rationals INVERSES Into Multiplying Integers Into Multiplying Integers Into Multiplying Integers Negative Exponents and Parentheses Worksheet (1) Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (2) Powerful RADICALS Rules with Negative Exponents Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents
EXPECTATION	L1.1.5	Justify numerical relationships Boundaries EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS FRACTIONS Finding Square Roots Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations INVERSES PERCENT PERCENT PUZSQC40

		RADICALS RADICALS RADICALS RADICALS RADICALS SEQPUZ08 SEQPUZ25 SEQUP13 Solving Percent Problems
EXPECTATION	L1.1.6	Explain the importance of the irrational numbers square root of 2 and square root of 3 in basic right triangle trigonometry, and the importance of pi because of its role in circle relationships. ANGLE04PZDH ANGLE04ZDH Am I Rational or Irrational Arc Resolution Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? Introduction to Radians Introduction to Radians Introduction to Radians Rational Number Explorer SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle The 30-60 Right Triangle The Circumference Function The Circumference Function The Circumference Function The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3)

		The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem
STRAND / STANDARD CATEGORY	**MI.L.**	**Quantitative Literacy and Logic (L)**
STANDARD	**L1:**	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from those representations.
GRADE LEVEL EXPECTATION	**L1.2**	Representations and Relationships
EXPECTATION	**L1.2.1**	Use mathematical symbols to represent quantitative relationships and situations. A Perfect Square Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Find the Number GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Graphing Linear Inequalities Laws Line Plot Multiplication by Adding Logs Multiplying Binomials QUADRATICSx Representing Inverse Variation Graphically

		Representing Inverse Variation Graphically Solve It Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities
EXPECTATION	L1.2.2	Interpret representations that reflect absolute value relationships in such contexts as error tolerance. BOUNDS BOUNDS BOUNDS Boundaries How Far is it PERCENT
EXPECTATION	L1.2.3	Use vectors to represent quantities that have magnitude and direction, interpret direction and magnitude of a vector numerically, and calculate the sum and difference of two vectors. Block on a Frictionless Inclined Plane CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Forces on a Simple Pendulum How to Add and Subtract Vectors How to Add and Subtract Vectors How to Add and Subtract Vectors Introduction to Vectors Introduction to Vectors Introduction to Vectors VECTORS VECTORS Vector Cross Product Vector Cross Product Vector Operations in Three Dimensions Vector Projections
EXPECTATION	L1.2.4	Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media.

		AVERAGE
		Analyzing Predictions (Easiteach)
		Box and Whisker
		C-FREQUENCY
		COMBINATIONS
		COMBINATIONS
		COMBINATIONS
		COMBINATIONS
		COMBINATIONS
		COMBINATIONS
		COMBINATIONS
		DEVIATION
		DEVIATION
		DISTRIBUTION
		DISTRIBUTION
		DISTRIBUTION
		DISTRIBUTION
		Determining Line of Fit
		Determining Line of Fit
		Determining Line of Fit
		Functional Geometry
		Functional Geometry
		Functions in A Triangle
		Functions in A Triangle
		Games Galore
		HISTOGRAMS
		Interpret Stem and Leaf, Histograms, and Box and Whisker Plots
		MEAN
		MOVING AV
		Modeling Linear Motion Using Parametric Equations
		Modeling Linear Motion Using Parametric Equations
		Modeling Linear Motion Using Parametric Equations
		Modeling Two-Variable Data Part 1
		Normal Distributions
		PROBABILITY
		PROBABILITY
		Pick and Mix Family
		QUARTILES
		QUARTILES
		QUARTILES
		QUARTILES
		Representing Direct Variation Algebraically and Graphically
		Representing Direct Variation Algebraically and graphically
		Representing Direct Variation Algebraically and graphically

		SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS TABLES D TABLES D The Circumference Function The Circumference Function The Circumference Function

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GRADE LEVEL EXPECTATION	L1.3	Counting and Probabilistic Reasoning
EXPECTATION	L1.3.1	Describe, explain, and apply various counting techniques; relate combinations to Pascal's triangle; know when Binomial Theorem COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS Christmas Stocking Identity Combinations and the Binomial Theorem Counting Principle Permutations DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Find Probabilities Using Permutations and Combinations Let's Count On Pascal's Triangle Pick and Mix Family

EXPECTATION	L1.3.2	Define and interpret commonly used expressions of probability. Experimental and Theoretical Probability

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STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the basic ideas of iteration and algorithms.
GRADE LEVEL EXPECTATION	L2.1	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.2	Calculate fluently with numerical expressions involving exponents; use the rules of exponents; evaluate numerical expressions involving rational and negative exponents; transition easily between roots and EXPONENTS EXPONENTS EXPONENTS Evaluate nth Roots Get In Lane Order of Operations Order of Operations Order of Operations Positive Exponents and Parentheses Worksheet (1) Switch - Calculations Software
EXPECTATION	L2.1.3	Explain the exponential relationship between a number and its base 10 logarithm and use it to relate rules of logarithms to those of exponents in expressions involving numbers. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Multiplication by Adding Logs Properties of Logarithms Solving Logarithmic and Exponential Equations

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STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the basic ideas of iteration and algorithms.
GRADE LEVEL EXPECTATION	L2.1	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.4	Know that the complex number i is one of two solutions to x^2 = -1. Game of Buried Treasure Game of Buried Treasure Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers Proving Identities -Disproving Non - Identities
EXPECTATION	L2.1.5	Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers. Complex Conjugates Expansion of a Polynomial Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers
STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the basic ideas of iteration and algorithms.
GRADE LEVEL EXPECTATION	L2.2	Sequences and Iteration
EXPECTATION	L2.2.1	Find the nth term in arithmetic, geometric, or other simple sequences. A Geometric Series Coil A Geometric Series Staircase

		A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series And So On Area Ratios - Squares Define and Use Sequences and Series EQUATIONS Ford Circles Generating Arithmetic and Geometric Sequences Geometric Series Coil Geometric Series Coil Gifts Galore & Phoning friends Haunted House - Generating Terms of a Sequence Software Limits of Infinite Sequences Models of Geometric Series Models of Geometric Series Models of Geometric Series Pyramids SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Use Recursive Rules with Sequences and Functions
EXPECTATION	L2.2.2	Compute sums of finite arithmetic and geometric sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS

		Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets

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STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the basic ideas of iteration and algorithms.
GRADE LEVEL EXPECTATION	L2.2	Sequences and Iteration
EXPECTATION	L2.2.3	Use iterative processes in such examples as computing compound interest or applying approximation ' A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set Compound Interest Compound Interests Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Functions involving e Geometric Series Coil Geometric Series Coil Geometric Square Root Construction IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series Models of Geometric Series PERCENT Ratio of Similarity

		Ratio of Similarity Ratio of Similarity Simple vs Compound Interest The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets

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STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the basic ideas of iteration and algorithms.
GRADE LEVEL EXPECTATION	L2.2	Sequences and Iteration
EXPECTATION	L2.2.4	Compute sums of infinite geometric sequences. (Recommended) A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets

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STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the basic ideas of iteration and algorithms.
GRADE LEVEL EXPECTATION	L2.3	Measurement Units, Calculations, and Scales
EXPECTATION	L2.3.1	Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly. Volume of Prisms and Cylinders
EXPECTATION	L2.3.2	Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Elementary Transcendental Functions and Their Inverses Exponential Decay Function Explorer 2D Functions Graphing Functions with Four Parameters Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Multiplication by Adding Logs Solving Logarithmic and Exponential Equations

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STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the basic ideas of iteration and algorithms.
GRADE LEVEL EXPECTATION	L2.4	Understanding Error

EXPECTATION	L2.4.1	Determine what degree of accuracy is reasonable for measurements in a given situation; express accuracy through use of significant digits, error tolerance, or percent of error; describe how errors in measurements are magnified by computation; recognize accumulated error in applied situations. BOUNDS BOUNDS BOUNDS Boundaries EXPONENTS How Far is it PERCENT
STRAND / STANDARD CATEGORY	**MI.L.**	**Quantitative Literacy and Logic (L)**
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false.
GRADE LEVEL EXPECTATION	L3.1	Mathematical Reasoning
EXPECTATION	L3.1.1	Distinguish between inductive and deductive reasoning, identifying and providing examples of each. Algebra Wipeout Software Number Pyramids - Algebra Software
EXPECTATION	L3.1.2	Differentiate between statistical arguments (statements verified empirically using examples or data) and logical arguments based on the rules of logic. Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)
EXPECTATION	L3.1.3	Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics. Identify and give examples of each. An IMO Triangle Problem Analyze Conditional Statements Appling Deductive Reasoning Coordinate Proof

		Coordinate Proof Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euler Line Game of Buried Treasure Game of Buried Treasure Lines and Angles Parallel and Perpendicular Line Proofs Polygon Proof - Interior Angle Sums of Polygons (GSP) Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Thales' Theorem Triangle Proofs Triangle Review - Interior and Exterior Angles (GSP) Using Postulates and Diagrams

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STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false.
GRADE LEVEL EXPECTATION	L3.2	Language and Laws of Logic
EXPECTATION	L3.2.1	Know and use the terms of basic logic. An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles

		Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams
EXPECTATION	L3.2.2	Use the connectives "not," "and," "or," and "if..., then," in mathematical and everyday settings. Know the truth table of each connective and how to logically negate statements involving these connectives. Analyze Conditional Statements Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs
EXPECTATION	L3.2.3	Use the quantifiers "there exists" and "all" in mathematical and everyday settings and know how to logically An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams

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STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false.
GRADE LEVEL EXPECTATION	L3.2	Language and Laws of Logic
EXPECTATION	L3.2.4	Write the converse, inverse, and contrapositive of an "if..., then..." statement. Use the fact, in mathematical and everyday settings, that the contrapositive is logically equivalent to the original, while the inverse and

		Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs
STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false.
GRADE LEVEL EXPECTATION	L3.3	Proof
EXPECTATION	L3.3.1	Know the basic structure for the proof of an "if..., then..." statement (assuming the hypothesis and ending with the conclusion) and that proving the contrapositive is equivalent. Analyze Conditional Statements
EXPECTATION	L3.3.2	Construct proofs by contradiction. Use counterexamples, when appropriate, to disprove a statement. Tilted Squares
EXPECTATION	L3.3.3	Explain the difference between a necessary and a sufficient condition within the statement of a theorem. Determine the correct conclusions based on interpreting a theorem in which necessary or sufficient conditions in the theorem or hypothesis are satisfied. Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)

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Grade 9

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)

STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas.
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.1	Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables. Balancing Act Part II Changing Formulas Codebreaker 2 - Simplification Software Constructing Simple Arguments (Easiteach) Escape the Cave - Using Letters to Represent Unknown Numbers Software Expression Machine FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Newton's Law of Cooling Reflecting Function Plots Write and Evaluate Expressions Writing and Solving Ratios and Proportions

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas.
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions

EXPECTATION	A1.1.2	Know the definitions and properties of exponents and roots transition fluently between them, and apply them EXPONENTS EXPONENTS EXPONENTS INDICES A Introduction to Exponents Introduction to Exponents Negative Exponents and Parentheses Worksheet (1) Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (1) Positive Exponents and Parentheses Worksheet (2) Powerful Roughly the Answer Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents

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STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas.
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.3	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product Algebra Quiz Difference of Squares EXPRESSIONS FACTORISE Factoring Binomials Factoring Polynomials Completely Factoring Trinomials Factoring Trinomials Using Algebra Tiles Integer Polynomial

		Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Operations with Polynomials (division) QUADRATICS QUADRATICS QUADRATICS QUADRATICSx What Expression

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas.
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.4	Add, subtract, multiply, and simplify polynomials and rational expressions. A Perfect Square Algebra Quiz Binomial Theorem Cube Conundrum Expansion of a Polynomial FRACTIONS A FRACTIONS A FRACTIONS A Intro to Multiplication of Binomials Introduction to Multiplication of Binomials Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Matrices

		Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Multiplying Binomials Number Pyramids - Algebra Software Operations with Polynomials Operations with Polynomials (addition and subtraction) Operations with Polynomials (division) Operations with Polynomials (multiplication) Polynomial Long Multiplication QUADRATICS Recognizing Quadratics
EXPECTATION	A1.1.6	Transform exponential and logarithmic expressions into equivalent forms using the properties of exponents and logarithms, including the inverse relationship between exponents and logarithms. Solving Logarithmic and Exponential Equations
EXPECTATION	A1.1.7	Transform trigonometric expressions into equivalent forms using basic identities such as sin^2 theta + cos^2 theta = 1 and tan^2 theta + 1 = sec^2 theta (Recommended) Analytic Trigonometry Analytic Trigonometry Analytic Trigonometry Apply Double-Angle and Half Angle Formulas Apply Sum and Difference Formulas Identities in Calculus Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Verify Trigonometric Identities

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)

STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas.
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.1	Write equations and inequalities with one or two variables to represent mathematical or applied situations, Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models EQUATIONS Find the Number GRAPHS A Graphing Linear Inequalities Inequalities and Absolute Value Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Line Plot QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically Solving Inequalities Using the Number Line Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas.
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities

EXPECTATION	A1.2.3	Solve linear and quadratic equations and inequalities including systems of up to three linear equations with three unknowns. Justify steps in the solution, and apply the quadratic formula appropriately. Algebra Quiz Algebraic Solutions to Polynomial Equations Annotated Quadratic Polynomial Balancing Act Part II Completing the Square Complex Conjugates Evaluate the Determinant and Apply Cramer's Rule Find the Number Finding Numbers that satisfy two or more equations Finding Numbers that satisfy two or more equations Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graph of Inequalities Graphing Linear Inequalities Inequalities and Absolute Value Intro to Equations Intro to Equations Intro to Equations Introduction to Equations Matrices Methods of Solving Linear Systems of Equations and Inequalities Methods of Solving Quadratic Multivariate Linear Systems and Row Operations QUADRATICS QUADRATICS QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx

		QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Reviewing Quadratic Roots Reviewing Quadratic Roots SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS Solve It Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Solving Inequalities Using the Number Line Solving Inequalities Worksheet (1) Solving Inequalities Worksheet (2) Solving Inequalities Worksheet (3) Solving Inequalities Worksheet (4) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Try Try Try Again Using Inverse Matrices to solve Linear Systems Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations Using the Quadratic Formula an Interpreting the Discriminant
EXPECTATION	A1.2.4	Solve absolute value equations and inequalities, and justify steps in the solution. Inequalities and Absolute Value Solving Absolute Equations and Inequalities Solving Inequalities Using the Number Line

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)

STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas.
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.5	Solve polynomial equations and equations involving rational expressions, and justify steps in the solution. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra Functions Functions Real Zeros of Polynomial Functions

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas.
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.6	Solve power equations and equations including radical expressions, justify steps in the solution, and explain End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Simplifying Radical Expressions and Equations
EXPECTATION	A1.2.7	Solve exponential and logarithmic equations, and justify steps in the solution.

		Carbon Dating Functions Functions Newton's Law of Cooling Solving Logarithmic and Exponential Equations
EXPECTATION	A1.2.8	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. CO-ORD GEOM CO-ORD GEOM Changing Formulas TRANSPOSITION
EXPECTATION	A1.2.9	Know common formulas and apply appropriately in contextual situations. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CUBITP22 Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs PERCENT Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters

		Triangle Area and Perimeters VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas.
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.10	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Elementary Transcendental Functions and Their Inverses Evaluate Inverse Trigonometric Functions Function Explorer 2D Functions Illustrating Cosine with the Unit Circle II Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem
STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.

GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and
		A Balanced View
		Composition of Functions
		Composition of Functions
		Composition of Functions
		Defining and Graphing Relations
		Difference of Squares
		Domain and Range of Dynagraphs & Cartesian Graphs
		Domain and Range of Dynagraphs & Cartesian Graphs
		Domain and Range of Dynagraphs & Cartesian Graphs
		FUNCTIONS
		FUNCTIONS
		FUNCTIONS
		FUNCTIONS
		FUNCTIONS
		Finding the Inverse of a Function and the Inverse Composition Rule
		Functional Geometry
		Functional Geometry
		Functions
		Functions and Relations
		Functions and Relations
		Functions and Relations
		Functions and Relations
		Functions in A Triangle
		Functions in A Triangle
		Horizontal Line Test, Vertical Line Test
		How do I look
		Increasing, Decreasing, and Constant Functions
		Introducing Functions as Dynagraphs
		Introducing Functions as Dynagraphs
		Introducing Functions as Dynagraphs
		Inverse Reflection Principle
		Iterations and functions
		Iterations and functions
		Mapping Diagrams
		Sum of Parts
		Tilted Squares
		Transition Between Dynagaphs to Cartesian Graphs
		Transition Between Dynagaphs to Cartesian Graphs
		Transition Between Dynagaphs to Cartesian Graphs

		Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.2	Read, interpret, and use function notation and evaluate a function at a value in its domain. FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Reflecting Function Plots Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs
EXPECTATION	A2.1.3	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations. A Balanced View A Perfect Square Analyze Arithmetic and Geometric Sequence and Series And So On Balancing Act Part II CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM

		Changing Formulas
		Comparing Linear, Exponential and Quadratic Models
		Complex Zeros and the Fundamental Theorem of Algebra
		Composition of Functions
		Composition of Functions
		Composition of Functions
		Define and Use Sequences and Series
		Defining and Graphing Relations
		Domain and Range of Dynagraphs & Cartesian Graphs
		Domain and Range of Dynagraphs & Cartesian Graphs
		Domain and Range of Dynagraphs & Cartesian Graphs
		EQUATIONS
		Exlploring odd and even functions
		Exlploring odd and even functions
		Exlploring odd and even functions
		Expression Machine
		Find the Number
		Finding Solutions by Undoing Steps
		Finding Solutions by Undoing Steps
		Finding Solutions by Undoing Steps
		Functions
		Functions
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		Gifts Galore & Phoning friends
		Graphing
		Graphing Growth and Decay Functions
		Graphing Linear Inequalities
		Graphing Square Root Functions
		How Slope is Measured
		How Slope is Measured
		How do I look
		Intro to Equations
		Intro to Equations
		Intro to Equations
		Introducing Functions as Dynagraphs
		Introducing Functions as Dynagraphs
		Introducing Functions as Dynagraphs
		Introduction to Equations
		Laws
		Mapping Diagrams

Modeling Num as Segments & Area
Modeling Num as Segments & Area
Modeling Number as Segments and Areas
Modeling Two-Variable Data Part 1
Modeling Two-Variable Data Part 2
Modeling Two-Variable Data Part 3
Multiplication by Adding Logs
Multiplying Binomials
Power Functions and Their Graphs
Pyramids
QUADRATICSx
Representing Direct Variation Algebraically and Graphically
Representing Direct Variation Algebraically and graphically
Representing Direct Variation Algebraically and graphically
Representing Inverse Variation Graphically
Representing Inverse Variation Graphically
SEQPUZ08
SEQPUZ25
SEQUENCES A
SEQUENCES A
SEQUENCES A
SEQUENCES Ax
Scientific Notation Worksheet (1)
Scientific Notation Worksheet (2)
Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R))
Solve It
Solving One-step, Two Step, And Multi Step equations
Sum 17
Systems of Equations Worksheet (10)
Systems of Equations Worksheet (7)
Systems of Equations Worksheet (8)
Systems of Equations Worksheet (9)
The Plot Thickens
This and That by Graph - Systems of Equations (Easiteach)
Transition Between Dynagaphs to Cartesian Graphs
Transition Between Dynagaphs to Cartesian Graphs
Transition Between Dynagaphs to Cartesian Graphs
Using Dynagaphs to Explore Function Composition
Using Dynagaphs to Explore Function Composition
Using Dynagaphs to Explore Function Composition
Using Points on the Coordinate Plane to Create Patterns
Using Points on the Coordinate Plane to Create Patterns
Using Points on the Coordinate Plane to Create Patterns
Using Rabbit Races to Solve Equations

		Using Rabbit Races to Solve Equations What Expression Write and Solve Equations and Inequalities
EXPECTATION	A2.1.4	Recognize that functions may be defined by different expressions over different intervals of their domains; Function Transformations Functions

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.5	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Geometric Series Coil Geometric Series Coil Geometric Square Root Construction IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series

		Models of Geometric Series Ratio of Similarity Ratio of Similarity Ratio of Similarity The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets Use Recursive Rules with Sequences and Functions

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.6	Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and graphical representations An Essential Singularity Complex Zeros and the Fundamental Theorem of Algebra Continuity Cubic Equation Defining the Limit Defining the Limit End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Exploring Derivatives: Slope of the Secant Line and Average Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change Exploring Derivatives: Slope of the secant line and average rate of change Filling Bottles Function Continuity Function Continuity Functions Functions

		Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Quadratic Equations Using Roots How do we find a Limit? Left hand/Right hand limits How doe we find a Limit? (Left hand/Right hand limits) Increasing, Decreasing, and Constant Functions Limits of Infinite Sequences Limits: Finite c, Finite L Limits: Finite c, Infinite L Limits: Infinite c, Finite L Limits: Infinite c, Infinite L Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Predicting a Velocity Plot Predicting a Velocity Plot QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Rational Functions Real Zeros of Polynomial Functions Reviewing Quadratic Roots Reviewing Quadratic Roots The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e). Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Filling Bottles Functions

		Functions Graph Classifier Software Increasing, Decreasing, and Constant Functions Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Predicting a Velocity Plot Predicting a Velocity Plot Rational Functions The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.2	Operations and Transformations
EXPECTATION	A2.2.2	Apply given transformations to basic functions and represent symbolically. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Derivatives Dilation of Functions Dilation of Functions Dilation of Functions Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A

		GRAPHS A GRAPHS A Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game
EXPECTATION	A2.2.3	Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse . A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations
EXPECTATION	A2.2.4	If a function has an inverse, find the expression(s) for the inverse. (Recommended) A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule

		Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.2	Operations and Transformations
EXPECTATION	A2.2.5	Write an expression for the composition of one function with another; recognize component functions when a function is a composition of other functions. (Recommended) Composition of Functions Composition of Functions Composition of Functions Composition of Functions Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.2	Operations and Transformations
EXPECTATION	A2.2.6	Know and interpret the function notation for inverses and verify that two functions are inverses using A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.

GRADE LEVEL EXPECTATION	A2.3	Representations of Functions
EXPECTATION	A2.3.2	Describe the tabular pattern associated with functions having constant rate of change (linear); or variable And So On Comparing Linear, Exponential and Quadratic Models Filling Bottles Graphing Growth and Decay Functions Inverse Proportion Worksheet (3) Modeling Two-Variable Data Part 2 The Laboratory - Relationship Between Two Variables (Software)

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.4	Models of Real-world Situations Using Families of Functions
EXPECTATION	A2.4.1	Identify the family of function best suited for modeling a given real-world situation. Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Modeling Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3
EXPECTATION	A2.4.2	Adapt the general symbolic form of a function to one that fits the specification of a given situation by using the information to replace arbitrary constants with numbers. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA

AREA
AREA
AREA
BOUNDS
BOUNDS
CIRCLESX
CO-ORD GEOM
CO-ORD GEOM
CO-ORD GEOM
Critical Thinking - Application of Area Formulas
Critical Thinking - Application of Area Formulas
Cylinder Hemisphere Cone
Demonstrating and Use of the Pythagorean Theorem
Demonstrating and Use of the Pythagorean Theorem
Demonstrating and Use of the Pythagorean Theorem
Derivation of Area of Circle Using Polygons
Derivation of Area of Circle using Polygons
Distance between 2 points
FORMULAE
Finding Volume of Cylinder and Sphere
Finding out about graphs
Functions
Methods of Solving Quadratic
PERCENT
QUADRATICSx
QUADRATICSx
Quadratic Formula and the Discriminant
Real Zeros of Polynomial Functions
Representing Direct Variation Algebraically and Graphically
Representing Direct Variation Algebraically and graphically
Representing Direct Variation Algebraically and graphically
Representing Inverse Variation Graphically
Representing Inverse Variation Graphically
Surface Area and Volumes of Spheres
Surface Area of Prisms and Cylinders
Surface Area of Pyramids and Cones
Triangle Area and Perimeters
Triangle Area and Perimeters
Using the Quadratic Formula an Interpreting the Discriminant
VOLUME 3D
VOLUME 3D
VOLUME 3D
VOLUME 3D
Volume of Prisms and Cylinders

		Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.4.3	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically

		Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.4	Models of Real-world Situations Using Families of Functions
EXPECTATION	A2.4.4	Use methods of linear programming to represent and solve simple real-life problems. (Recommended) Application of Graphing Inequalities Application of Graphing Inequalities

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.1	Lines and Linear Functions

EXPECTATION	A3.1.1	Write the symbolic forms of linear functions (standard, point-slope, and slope-intercept) given appropriate
		CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept GRAPHS A Graphing Absolute Value Functions Graphing Absolute Value Functions Graphing Linear Inequalities Iterations and functions Iterations and functions LINES Line Plot Line up Modeling Two-Variable Data Part 1 Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Circumference Function The Circumference Function The Circumference Function The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns

EXPECTATION	A3.1.2	Graph lines (including those of the form x = h and y = k) given appropriate information. A Balanced View Comparing Linear, Exponential and Quadratic Models Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Finding the Inverse of a Function and the Inverse Composition Rule Function Transformations Functions and Relations Functions and Relations Functions and Relations GRAPHS A GRAPHS A Graphing Functions with Four Parameters How do I look Interactive Slope Introduction to Slope - A measure of Steepness Introduction to Slope: A measure of steepness Inverse Reflection Principle Iterations and functions Iterations and functions Polynomial Roots Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-

GRADE LEVEL EXPECTATION	A3.1	Lines and Linear Functions
EXPECTATION	A3.1.3	Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph. Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Interactive Slope Line Plot Polynomial Roots Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)
EXPECTATION	A3.1.4	Find an equation of the line parallel or perpendicular to given line, through a given point; understand and use the facts that non-vertical parallel lines have equal slopes, and that non-vertical perpendicular lines have CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form LINES Line up

		Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.2	Exponential and Logarithmic Functions
EXPECTATION	A3.2.1	Write the symbolic form and sketch the graph of an exponential function given appropriate information. Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.2	Interpret the symbolic forms and recognize the graphs of exponential and logarithmic functions; recognize the logarithmic function as the inverse of the exponential function. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating

		Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.3	Apply properties of exponential and logarithmic functions. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions

		Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.4	Understand and use the fact that the base of an exponential function determines whether the function increases or decreases and understand how the base affects the rate of growth or decay. Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions involving e Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A.3.2.5	Relate exponential and logarithmic functions to real phenomena, including half-life and doubling time. Carbon Dating Compound Interest Compound Interests Exploration versus Consumption Exponential Decay Functions involving e Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond

		Modeling Two-Variable Data Part 3 PERCENT Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Simple vs Compound Interest Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.A.**	**Algebra and Functions (A)**
STANDARD	**A3:**	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	**A3.3**	Quadratic Functions
EXPECTATION	**A3.3.1**	Write the symbolic form and sketch the graph of a quadratic function given appropriate information. Animated Projectile Motion Annotated Quadratic Polynomial Ballistic Trajectories Comparing Linear, Exponential and Quadratic Models Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graph and Solving Quadratic Inequalities Graphing Functions with Four Parameters Graphing Quadratic Equations Graphing Quadratic Equations Graphing Quadratic Equations Using Roots How do I look

		Methods of Solving Quadratic Modeling Two-Variable Data Part 2 Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Reflecting Function Plots Review of Parabolas Review of Parabolas Review of Parabolas Reviewing Quadratic Roots Reviewing Quadratic Roots Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Sum 17 Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using the Quadratic Formula an Interpreting the Discriminant

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.3	Quadratic Functions
EXPECTATION	A3.3.2	Identify the elements of a parabola (vertex, axis of symmetry, direction of opening) given its symbolic form or its graph, and relate these elements to the coefficient(s) of the symbolic form of the function. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection

		Absolute Value of Functions Related to Reflection
		Annotated Quadratic Polynomial
		Dilation of Functions
		Dilation of Functions
		Dilation of Functions
		Exploring Parabolas in Vertex Form
		Exploring Parabolas in Vertex Form
		Exploring Parabolas in Vertex Form
		Function Transformations
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		Graph and Solving Quadratic Inequalities
		Graphing Functions with Four Parameters
		Introduction to Translating Functions
		Introduction to Translating Functions
		Introduction to Translating Functions
		Introduction to Translating Functions
		Parabolas in Factored Form
		Parabolas in Factored Form
		Parabolas in Factored Form
		Parabolas in Standard Form
		Parabolas in Standard Form
		Parabolas in Standard Form
		Polynomial Functions of Higher Degree (degrees greater than 2)
		Polynomial Roots
		Quadratic Equation
		Quadratic Practice
		Reflecting Function Plots
		Reflection of Functions
		Reflection of Functions
		Reflection of Functions
		Review of Parabolas
		Review of Parabolas
		Review of Parabolas
		Transformation Challenge - Group Game
		Transformation Challenge - Group Game
		Transformation Challenge - Group Game

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.3	Quadratic Functions
EXPECTATION	A3.3.4	Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function. GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Quadratic Equations Using Roots Polynomial Roots QUADRATICSx QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Reviewing Quadratic Roots Reviewing Quadratic Roots Using the Quadratic Formula an Interpreting the Discriminant

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.4	Power Functions
EXPECTATION	A3.4.1	Write the symbolic form and sketch the graph of power functions. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Polynomial Functions of Higher Degree (degrees greater than 2)

		Polynomial Roots Power Functions and Their Graphs

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.4	Power Functions
EXPECTATION	A3.4.2	Express direct and inverse relationships as functions and recognize their characteristics. Direct Proportion Worksheet (2) Finding out about graphs Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle How do I look Inverse Proportion Worksheet (3) Inverse Square Laws Rates and Ratios Rates and Ratios Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Sense of Proportion The Circumference Function

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-

GRADE LEVEL EXPECTATION	A3.4	Power Functions
EXPECTATION	A3.4.3	Analyze the graphs of power functions, noting reflectional or rotational symmetry. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Functions Functions Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Review of Parabolas Review of Parabolas Review of Parabolas
STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.5	Polynomial Functions
EXPECTATION	A3.5.1	Write the symbolic form and sketch the graph of simple polynomial functions. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots

		Power Functions and Their Graphs Real Zeros of Polynomial Functions

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.5	Polynomial Functions
EXPECTATION	A3.5.2	Understand the effects of degree, leading coefficient, and number of real zeros on the graphs of polynomial Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions
EXPECTATION	A3.5.3	Determine the maximum possible number of zeros of a polynomial function, and understand the relationship between the x-intercepts of the graph and the factored form of the function. Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A

		GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.6	Rational Functions
EXPECTATION	A3.6.1	Write the symbolic form and sketch the graph of simple rational functions. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically
EXPECTATION	A3.6.2	Analyze graphs of simple rational functions and understand the relationship between the zeros of the numerator and denominator and the function's intercepts, asymptotes, and domain. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.7	Trigonometric Functions
EXPECTATION	A3.7.1	Use the unit circle to define sine and cosine; approximate values of sine and cosine; use sine and cosine to define the remaining trigonometric functions; explain why the trigonometric functions are periodic. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
EXPECTATION	A3.7.2	Use the relationship between degree and radian measures to solve problems. Angles Measured in Degrees and Radians
EXPECTATION	A3.7.3	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of pi/6 and pi/4. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle

		Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
EXPECTATION	A3.7.4	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Continued Fraction Approximations of the Tangent Function Doppler Effect Elementary Transcendental Functions and Their Inverses Family of Curves, Tangents, and Intuition Function Explorer 2D Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle Inset Plot Magnifier Many Sine Curves Modeling Harmonic Motion

		Modeling Harmonic Motion Nested Trigonometric Function Plots Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP) Soil Temperature TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 Tetraviews of Elementary Functions The Cosecant Function (GSP) The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated Trigonometric Functions with Four Parameters
EXPECTATION	A3.7.5	Graph transformations of basic trigonometric functions (involving changes in period, amplitude, and midline) and understand the relationship between constants in the formula and the transformed graph. Doppler Effect Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Many Sine Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Products of Sinusoidal Functions

		Products of Sinusoidal Functions Products of Sinusoidal Functions Sinusoids and Transformations (GSP) Soil Temperature Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 The Cosecant Function (GSP) Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions with Four Parameters Wave Interference
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry and Trigonometry (G)**
STANDARD	**G1:**	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	**G1.1**	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	**G1.1.1**	Solve multistep problems and construct proofs involving vertical angles, linear pairs of angles supplementary angles, complementary angles, and right angles. Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet Circle Geometry Worksheet Golden Ratio 1 Line up Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP) Types of Angles

EXPECTATION	G1.1.2	Solve multistep problems and construct proofs involving corresponding angles, alternate interior angles, alternate exterior angles, and same-side (consecutive) interior angles. Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Pantograph Linkage Parallel and Perpendicular Line Proofs Properties of Parallel Lines Properties of Parallel Lines

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.3	Perform and justify constructions, including midpoint of a line segment and bisector of an angle, using A Rectangle with Maximum Area A Rectangle with Maximum Area A Triangle Area Problem A Triangle Area Problem Accurate Constructions - Animations Software Advanced Construction Napolean's Theorem Advanced Construction Napolean's Theorem Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Application of Parabolas Application of Parabolas Compass Animations - Constructions Using Straight Edge and Compasses Software Compass Animations Software Constructing Templates for the Platonic Solids Constructing Templates for the Platonic Solids Constructing Templates for the Platonic Solids Creating Complex Design's Creating Complex Design's Ellipse Ellipse Projects Ellipse Projects Ellipse Projects

		Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exploring the Euler Segment Exploring the Euler Segment Functions in A Triangle Functions in A Triangle Hyperbola Hyperbola Hyperbola Lines and Angles Morley's Triangle - Application of Angle Trisection Morley's Triangle - Application of Angle Trisection Off at a Tangent - Exploring the Tangent to a Circle (GSP) Parabola Parabola Parabola Parabola Properties of Parallel Lines Properties of Parallel Lines Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Some Ellipse Relationships Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals Trisecting an Angle Trisecting an Angle Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular Using the Equilateral Triangle - Surfer & Spotter Using the Equilateral Triangle - Surfer & Spotter

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)

STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.4	Given a line and a point, construct a line through the point that is parallel to the original line using straightedge and compass. Given a line and a point, construct a line through the point that is perpendicular to the original line. Justify the steps of the constructions. Accurate Constructions - Animations Software Compass Animations - Constructions Using Straight Edge and Compasses Software Off at a Tangent - Exploring the Tangent to a Circle (GSP) Properties of Parallel Lines Properties of Parallel Lines Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.5	Given a line segment in terms of its endpoints in the coordinate plane, determine its length and midpoint. Determining the Origin Determining the Origin AREA AREA AREA CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Cycle Ride Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Determining the Origin

		Distance between 2 points Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.6	Recognize Euclidean geometry as an axiom system. Know the key axioms and understand the meaning of and distinguish between undefined terms, axioms, definitions, and theorems. Lines and Angles Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Thales' Theorem Using Postulates and Diagrams
STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.2	Triangles and Their Properties
EXPECTATION	G1.2.1	Prove that the angle sum of a triangle is 180 degrees and that an exterior angle of a triangle is the sum of the ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet

		Calculating Exterior Angles of Triangles Worksheet Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles Polygon Problems - Exterior Angles of Polygons (GSP) Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP)

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.2	Triangles and Their Properties
EXPECTATION	G1.2.2	Construct and justify arguments and solve multistep problems involving angle measure, side length, perimeter, [illegible] ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA AREA AREA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software CIRCLES CIRCLESX Calculating Angles in Polygons Worksheet Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euclid's Proposition 1 - Equilateral Triangles

		Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles PERCENT Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Related Rates: Triangle Angle and Area TRIGONOMETRY Tilted Squares Triangle Area and Perimeters Triangle Area and Perimeters Write and Evaluate Expressions
EXPECTATION	G1.2.3	Know a proof of the Pythagorean Theorem, and use the Pythagorean Theorem and its converse to solve Coordinate Proof Coordinate Proof Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Divide and Rule - Dividing Line Segments in a Given Ratio (GSP). Pythagorean Theorem Pythagorean Theorem 3D Pythagorean Triples Round the Bend Sum of Parts TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3)

		Tilted Squares

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.2	Triangles and Their Properties
EXPECTATION	G1.2.4	Prove and use the relationships among the side lengths and the angles of 30 degrees - 60 degrees - 90 degrees triangles and 45 degrees - 45 degrees - 90 degrees triangles. ANGLE04PZDH ANGLE04ZDH The 30-60 Right Triangle The 30-60 Right Triangle

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.2	Triangles and Their Properties
EXPECTATION	G1.2.5	Solve multistep problems and construct proofs about the properties of medians, altitudes, perpendicular bisectors to the sides of a triangle, and the angle bisectors of a triangle. Using a straightedge and compass, construct these lines An IMO Triangle Problem Euler Line Investigating the Properties of Excircles of a Triangle Investigating the Properties of Excircles of a Triangle Morley's Triangle - Application of Angle Trisection Morley's Triangle - Application of Angle Trisection Triangle Inequalities

		Triangle Inequalities Using the Equilateral Triangle - Surfer & Spotter Using the Equilateral Triangle - Surfer & Spotter
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry and Trigonometry (G)**
STANDARD	**G1:**	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures.
GRADE LEVEL EXPECTATION	**G1.3**	Triangles and Trigonometry
EXPECTATION	**G1.3.1**	Define the sine, cosine, and tangent of acute angles in a right triangle as ratios of sides. Solve problems about angles, side lengths, or areas using trigonometric ratios in right triangles. ANGLE04PZDH ANGLE04ZDH Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle The 30-60 Right Triangle The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3)

		Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.3	Triangles and Trigonometry
EXPECTATION	G1.3.2	Know and use the Law of Sines and the Law of Cosines and use them to solve problems. Find the area of a triangle with sides a and b and included angle theta using the formula Area = (1/2) absin theta. ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA CIRCLES CIRCLESX Law of Cosines Law of Sines Related Rates: Triangle Angle and Area TRIGONOMETRY TRIGONOMETRY The Law of Cosines The Law of Cosines The Law of Sines The Law of Sines
EXPECTATION	G1.3.3	Determine the exact values of sine, cosine, and tangent for 0 degrees, 30 degrees, 45 degrees, 60 degrees, and their integer multiples and apply in various contexts. A Tangent Tracer Comparing Sine and Cosine

		Comparing Sine and Cosine Composing Trigonometric and Inverse Trigonometric Functions Continued Fraction Approximations of the Tangent Function How Far Can One See from a Height? Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Trigonometric Ratios Trigonometric Ratios Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)

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Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures.
GRADE LEVEL EXPECTATION	G1.4	Quadrilaterals and Their Properties
EXPECTATION	G1.4.1	Solve multistep problems and construct proofs involving angle measure, side length, diagonal length, perimeter, and area of squares, rectangles, parallelograms, kites, and trapezoids.

		A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA Area Review BOUNDS Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Exterior and Interior Angles of Regular Polygons Worksheet Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Tilted Squares Write and Evaluate Expressions

Michigan Curriculum Standards

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Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures.
GRADE LEVEL EXPECTATION	G1.4	Quadrilaterals and Their Properties
EXPECTATION	G1.4.2	Solve multistep problems and construct proofs involving quadrilaterals using Euclidean methods or coordinate Coordinate Proof Coordinate Proof
EXPECTATION	G1.4.3	Describe and justify hierarchical relationships among quadrilaterals. Analyze Conditional Statements Golden Ratio 1 Special Midpoint Quadrilaterals Special Midpoint Quadrilaterals Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals
EXPECTATION	G1.4.4	Prove theorems about the interior and exterior angle sums of a quadrilateral.

		ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA Calculating Angles in Polygons Worksheet Calculating Exterior Angles of Triangles Worksheet Exterior and Interior Angles of Regular Polygons Worksheet Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Polygon Problems - Exterior Angles of Polygons (GSP) Triangle Review - Interior and Exterior Angles (GSP)
EXPECTATION	G1.4.5	Understand the definition of a cyclic quadrilateral and know and use the basic properties of cyclic Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)
STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.5	Other Polygons and Their Properties
EXPECTATION	G1.5.1	Know and use subdivision or circumscription methods to find areas of polygons. Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Pick's Theorem

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)

STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.5	Other Polygons and Their Properties
EXPECTATION	G1.5.2	Know, justify, and use formulas for the perimeter and area of a regular n-gon and formulas to find interior and exterior angles of a regular n-gon and their sums. Calculating Angles in Polygons Worksheet Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Exterior and Interior Angles of Regular Polygons Worksheet Golden Ratio 1 Interior & Exterior Angles Polygon Proof - Interior Angle Sums of Polygons (GSP)

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.6	Circles and Their Properties
EXPECTATION	G1.6.1	Solve multistep problems involving circumference and area of circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) Arc Resolution Area of a Circle from Segments CIRCLESX Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Finding Volume of Cylinder and Sphere Introduction to Radians Introduction to Radians Introduction to Radians Keeping on Track Length of a Coiled Rope The Circumference Function

		The Circumference Function The Circumference Function The Cycloid The Cycloid Two Wheel Belt What's my surface? Write and Evaluate Expressions
EXPECTATION	G1.6.2	Solve problems and justify arguments about chords and lines tangent to circles. ANGLE ANGLE ANGLE Ford Circles Hyperbola Hyperbola Hyperbola Inscribed Angle Subtended Chord Intersecting Circles Off at a Tangent - Exploring the Tangent to a Circle (GSP) Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Thales' Theorem The Statue of Regiomontanus Two Wheel Belt
EXPECTATION	G1.6.3	Solve problems and justify arguments about central angles, inscribed angles, and triangles in circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) ANGLE ANGLE ANGLE ANGLE Circle Geometry Worksheet Inscribed Angle Subtended Chord Properties of Circles Part 2 (GSP) Thales' Theorem
EXPECTATION	G1.6.4	Know and use properties of arcs and sectors and find lengths of arcs and areas of sectors. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) Arc Resolution CIRCLES CIRCLESX

		CIRCLESX Circle Geometry Worksheet Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Thales' Theorem

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.7	Conic Sections and Their Properties
EXPECTATION	G.1.7.1	Find an equation of a circle given its center and radius; given the equation of a circle, find its center and Conic Sections - Writing Equations of Circles Defining and Graphing Relations
EXPECTATION	G1.7.2	Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones. Application of Parabolas Application of Parabolas Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition

		Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition
EXPECTATION	G1.7.3	Graph ellipses and hyperbolas with axes parallel to the x- and y-axes, given equations. Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations
EXPECTATION	G1.7.4	Know and use the relationship between the vertices and foci in and ellipse, the vertices and foci in a hyperbola, and the directrix and focus in a parabola, interpret these relationships in applied contexts. Application of Parabolas Application of Parabolas Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse

		Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Sum 17 Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry and Trigonometry (G)**
STANDARD	**G1:**	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	**G1.8**	Three- Dimensional Figures
EXPECTATION	**G1.8.1**	Solve multistep problems involving surface area and volume of pyramids, prisms, cones, cylinders, 3-D Shape Explorer - Surface Area of Rectangular Prisms Software 3D Shape Builder Software AREA AREA BOUNDS Cylinder Hemisphere Cone FORMULAE Finding Volume of Cylinder and Sphere Missing

		Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Unfolding Prism Nets Animation (Curved Shape) Unfolding Prism Nets Animation (L Shape) Unfolding Prism Nets Animation (T Shape) Unfolding a Cylinder (Animation) Unfolding a Rectangular Prism - W Shape (Animation) Unfolding a Rectangular Prism - T Shape (Animation) Unfolding a Square-based Pyramid (Animation) VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones What's my surface?

Michigan Curriculum Standards

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G2:	Relationships Between Figures: Students use and justify relationships between lines, angles, area and volume formulas, and 2- and 3-dimensional representations. They solve problems and provide proofs about congruence
GRADE LEVEL EXPECTATION	G2.1	Relationships Between Area and Volume Formulas
EXPECTATION	G2.1.1	Know and demonstrate the relationships between the area formula of a triangle, the area formula of a parallelogram, and the area formula of a trapezoid. Area of a Circle from Segments Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons
EXPECTATION	G2.1.2	Know and demonstrate the relationships between the area formulas of various quadrilaterals. Area of a Circle from Segments Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G2:	Relationships Between Figures: Students use and justify relationships between lines, angles, area and volume formulas, and 2- and 3-dimensional representations. They solve problems and provide proofs about congruence
GRADE LEVEL EXPECTATION	G2.2	Relationships Between Two-dimensional and Three-dimensional Representations
EXPECTATION	G2.2.1	Identify or sketch a possible three-dimensional figure, given two-dimensional views. Create a two-dimensional representation of a three-dimensional figure. 3-D Shape Explorer - Surface Area of Rectangular Prisms Software 3D Shape Builder Software
EXPECTATION	G2.2.2	Identify or sketch cross sections of three-dimensional figures. Identify or sketch solids formed by revolving two- 3-D Shape Explorer - Surface Area of Rectangular Prisms Software Which Model
STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G2:	Relationships Between Figures: Students use and justify relationships between lines, angles, area and volume formulas, and 2- and 3-dimensional representations. They solve problems and provide proofs about congruence
GRADE LEVEL EXPECTATION	G2.3	Congruence and Similarity
EXPECTATION	G2.3.1	Prove that triangles are congruent using the SSS, SAS, ASA, and AAS criteria, and that right triangles, are congruent using the hypotenuse-leg criterion. Appling Deductive Reasoning CONGRUENCE Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.2	Use theorems about congruent triangles to prove additional theorems and solve problems, with and without Appling Deductive Reasoning CONGRUENCE Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence

		Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.3	Prove that triangles are similar by using SSS, SAS, and AA conditions for similarity. Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.4	Use theorems about similar triangles to solve problems with and without use of coordinates. Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.5	Know and apply the theorem stating that the effect of a scale factor of k relating one two-dimensional figure to another or one three-dimensional figure to another, on the length, area, and volume of the figures is to AREA AREA Area and Volume of Similar Shapes Worksheet (2). Area and Volume of Similar Shapes Worksheet (1). Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Cube Conundrum Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle Surface Area and Volumes of Spheres Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)

		What is the Meaning of Multiplication What is the Meaning of Multiplication

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G3:	Transformations of Figures in the Plane: Students will solve problems about distance-preserving transformations and shape-preserving transformations. The transformations will be described synthetically
GRADE LEVEL EXPECTATION	G3.1	Distance-preserving Transformations: Isometries
EXPECTATION	G3.1.1	Define reflection, rotation, translation, and glide reflection and find the image of a figure under a given Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Reflection-Shortest Path Application of Reflection-Shortest Path Application of Translation - Block Design Application of Translation- Block Design Application of Translation- Block Design Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Critical Thinking - Shortest Path- Laser Critical Thinking - Shortest Path- Laser Fishy Transformations - Combined Transformations (GSP) Game of Buried Treasure Game of Buried Treasure Kaleidoscopic Polygons MATRICES Matrix Transformations: "F" Practice Shortest Path - Feed and Water Practice Shortest Path - Feed and Water Proportional Triangle Nesting Reflection in Geometry and Algebra Reflection in Geometry and Algebra Reflections over Intersecting Lines Reflections over Intersecting Lines

		Reflections over Intersecting Lines Reflections over Two Parallel lines Reflections over Two Parallel lines Reflections over Two Parallel lines Rotation in the Coordinate Plane Rotation in the Coordinate Plane Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations Transformations Transformations Translate to Enlarge - Dilation of 2-D Shapes (GSP) Translation in the Coordinate Plane Translation in the Coordinate Plane Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G3:	Transformations of Figures in the Plane: Students will solve problems about distance-preserving transformations and shape-preserving transformations. The transformations will be described synthetically
GRADE LEVEL EXPECTATION	G3.1	Distance-preserving Transformations: Isometries
EXPECTATION	G3.1.2	Given two figures that are images of each other under an isometry, find the isometry and describe it Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations
EXPECTATION	G3.1.3	Find the image of a figure under the composition of two or more isometries and determine whether the resulting figure is a reflection, rotation, translation, or glide reflection image of the original figure. Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP)

		Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry and Trigonometry (G)**
STANDARD	**G3:**	Transformations of Figures in the Plane: Students will solve problems about distance-preserving transformations and shape-preserving transformations. The transformations will be described synthetically
GRADE LEVEL EXPECTATION	**G3.2**	Shape-preserving Transformations: Dilations and Isometries
EXPECTATION	**G3.2.1**	Know the definition of dilation and find the image of a figure under a given dilation. AREA AREA Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP) Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects

		Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects
EXPECTATION	G3.2.2	Given two figures that are images of each other under some dilation, identify the center and magnitude of the [illegible] AREA AREA Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP) Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects What is the Meaning of Multiplication What is the Meaning of Multiplication
EXPECTATION	G3.2.3	Find the image of a figure under the composition of a dilation and an isometry. (Recommended)

		Application of Translation - Block Design Application of Translation- Block Design Application of Translation- Block Design Fishy Transformations - Combined Transformations (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.1	Producing and Interpreting Plots
EXPECTATION	S1.1.1	Construct and interpret dot plots, histograms, relative frequency histograms, bar graphs, basic control charts, and box plots with appropriate labels and scales; determine which kinds of plots are appropriate for different types of data; compare data sets and interpret differences based on graphs and summary statistics. Assumptions Box and Whisker HISTOGRAMS How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Relate

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.1	Producing and Interpreting Plots
EXPECTATION	S1.1.2	Given a distribution of a variable in a data set, describe its shape, including symmetry or skewness, and state how the shape is related to measures of center (mean and median) and measures of variation (range and standard deviation) with particular attention to the effects of outliers on these measures.

		Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION How Do They Compare Normal Distributions

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.2	Measures of Center and Variation
EXPECTATION	S1.2.1	Calculate and interpret measures of center including: mean, median, and mode; explain uses, advantages and disadvantages of each measure given a particular set of data and its context. AVERAGE Assumptions Box and Whisker C-FREQUENCY DEVIATION DEVIATION How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV QUARTILES QUARTILES QUARTILES QUARTILES TABLES D Use Measures of Central Tendency

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.2	Measures of Center and Variation
EXPECTATION	S1.2.3	Compute and interpret measures of variation, including percentiles, quartiles, interquartile range, variance, Box and Whisker C-FREQUENCY DEVIATION DEVIATION Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Normal Distributions QUARTILES QUARTILES QUARTILES QUARTILES TABLES D

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.3	The Normal Distribution
EXPECTATION	S1.3.1	Explain the concept of distribution and the relationship between summary statistics for a data set and Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Normal Distributions

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.3	The Normal Distribution
EXPECTATION	S1.3.2	Describe characteristics of the normal distribution, including its shape and the relationships among its mean, How Do They Compare Normal Distributions
EXPECTATION	S1.3.3	Know and use the fact that about 68%, 95%, and 99.7% of the data lie within one, two, and three standard deviations of the mean, respectively in a normal distribution. How Do They Compare Normal Distributions

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.3	The Normal Distribution
EXPECTATION	S1.3.4	Calculate z-scores, use z-scores to recognize outliers, and use z-scores to make informed decisions. Normal Distributions

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S2:	Bivariate Data - Examining Relationships: Students plot and interpret bivariate data by constructing scatterplots, recognizing linear and nonlinear patterns, and interpreting correlation coefficients; they fit and
GRADE LEVEL EXPECTATION	S2.1	Scatterplots and Correlation
EXPECTATION	S2.1.2	Given a scatterplot, identify patterns, clusters, and outliers. Recognize no correlation, weak correlation, and

		Analyzing Predictions (Easiteach) Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV Predicting with Linear Models Randomness in the Digits of Pi Randomness in the Digits of Square Roots Relate SCATTERGRAMS

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S2:	Bivariate Data - Examining Relationships: Students plot and interpret bivariate data by constructing scatterplots, recognizing linear and nonlinear patterns, and interpreting correlation coefficients; they fit and
GRADE LEVEL EXPECTATION	S2.1	Scatterplots and Correlation
EXPECTATION	S2.1.3	Estimate and interpret Pearson's correlation coefficient for a scatterplot of a bivariate data set. Recognize that correlation measures the strength of linear association. Analyzing Predictions (Easiteach) Predicting with Linear Models Relate SCATTERGRAMS

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S2:	Bivariate Data - Examining Relationships: Students plot and interpret bivariate data by constructing scatterplots, recognizing linear and nonlinear patterns, and interpreting correlation coefficients; they fit and
GRADE LEVEL EXPECTATION	S2.2	Linear Regression
EXPECTATION	S2.2.1	For bivariate data that appear to form a linear pattern, find the least squares regression line by estimating visually and by calculating the equation of the regression line. Interpret the slope of the equation for a Analyzing Predictions (Easiteach) Determining Line of Fit

		Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S2.2.2	Use the equation of the least squares regression line to make appropriate predictions. Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1

		Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 SCATTERGRAMS The Circumference Function The Circumference Function The Circumference Function

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S3:	Samples, Surveys, and Experiments: Students understand and apply sampling and various sampling methods, examine surveys and experiments, identify bias in methods of conducting surveys, and learn strategies to
GRADE LEVEL EXPECTATION	S3.1	Data Collection and Analysis
EXPECTATION	S3.1.1	Know the meanings of a sample from a population and a census of a population, and distinguish between Comparing Methods of Data Collection (Easiteach) TABLES D
EXPECTATION	S3.1.2	Identify possible sources of bias in data collection and sampling methods and simple experiments; describe how such bias can be reduced and controlled by random sampling; explain the impact of such bias on conclusions made from analysis of the data; and know the effect of replication on the precision of estimates. Comparing Methods of Data Collection (Easiteach) TABLES D
EXPECTATION	S3.1.3	Distinguish between an observational study and an experimental study, and identify, in context, the Determining Line of Fit Determining Line of Fit Determining Line of Fit Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S3.1.4	Design simple experiments or investigations to collect data to answer questions of interest; interpret and

		Determining Line of Fit Determining Line of Fit Determining Line of Fit Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S3.1.5	Understand methods of sampling, including random sampling, stratified sampling, and convenience samples, and be able to determine, in context, the advantages and disadvantages of each. (Recommended) Comparing Methods of Data Collection (Easiteach) TABLES D
EXPECTATION	S3.1.6	Explain the importance of randomization, double-blind protocols, replication, and the placebo effect in designing experiments and interpreting the results of studies. (Recommended) Comparing Methods of Data Collection (Easiteach) TABLES D
EXPECTATION	S3.1.7.	Explain the basic ideas of statistical process control, including recording data from a process over time. How Do They Compare Relate
EXPECTATION	S3.1.8.	Read and interpret basic control charts; detect patterns and departures from patterns. (Recommended) How Do They Compare Relate
STRAND / STANDARD CATEGORY	**MI.S.**	**Statistics and Probability (S)**
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting
GRADE LEVEL EXPECTATION	S4.1	Probability
EXPECTATION	S4.1.1	Understand and construct sample spaces in simple situations. Find Probabilities Using Permutations and Combinations Fractions Are Fun

		Sort It

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting
GRADE LEVEL EXPECTATION	S4.1	Probability
EXPECTATION	S4.1.2	Define mutually exclusive events, independent events, dependent events, compound events, complementary events and conditional probabilities; and use the definitions to compute probabilities. Chance It Construct and Interpret Binomial Distribution Counting Principle Permutations Dice Roller & Penny Flipper Find Probabilities and Odds Find Probabilities of Compound Events Finding Probabilities Disjoint and Overlapping Events Finding Probability of Independent and Dependent Events Leads in Coin Tossing PROBABILITY PROBABILITY Sort It The Birthday Problem Two Dice with Histogram What Chance Have I got
EXPECTATION	S4.1.3	Design and carry out an appropriate simulation using random digits to estimate answers to questions about probability; estimate probabilities using results of a simulation; compare results of simulations to theoretical Dice Roller & Penny Flipper Experimental and Theoretical Probability Forest Fire Simulation Using a Randomized Hexagonal Automaton Leads in Coin Tossing The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting
GRADE LEVEL EXPECTATION	S4.2	Application and Representation
EXPECTATION	S4.2.1	Compute probabilities of events using tree diagrams, formulas for combinations and permutations, Venn Adds to One Construct and Interpret Binomial Distribution Dice Roller & Penny Flipper Expectations for Roulette Find Probabilities and Odds Leads in Coin Tossing PROBABILITY PROBABILITY The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting
GRADE LEVEL EXPECTATION	S4.2	Application and Representation
EXPECTATION	S4.2.2	Apply probability concepts to practical situations, in such settings as finance, health, ecology, or Assumptions
STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.1	Know and use a definition of a function to decide if a given relation is a function. Defining and Graphing Relations

		Difference of Squares FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functional Geometry Functional Geometry Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test How do I look Increasing, Decreasing, and Constant Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Inverse Reflection Principle Iterations and functions Iterations and functions Sum of Parts Tilted Squares Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.2	Perform algebraic operations (including compositions) on functions and apply transformations (translations, Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Composition of Functions

		Composition of Functions Composition of Functions Composition of Functions Derivatives Dilation of Functions Dilation of Functions Dilation of Functions Finding the Inverse of a Function and the Inverse Composition Rule Function Transformations Functions and Relations Functions and Relations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.3	Write an expression for the composition of one given function with another and find the domain, range, and graph of the composite function. Recognize components when a function is composed of two or more elementary functions. Composition of Functions Composition of Functions

		Composition of Functions Composition of Functions Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.4	Determine whether a function (given symbolically or graphically) has an inverse and express the inverse (symbolically, if the function is given symbolically, or graphically, if given graphically) if it exists. Know and A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations
GRADE LEVEL EXPECTATION	P1.5	Determine whether two given functions are inverses, using composition. A Balanced View Composition of Functions Composition of Functions Composition of Functions

		FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.6	Identify and describe discontinuities of a function (e.g., greatest integer function, 1/x) and how these relate Cases of Discontiuity Continuity Function Continuity Function Continuity
GRADE LEVEL EXPECTATION	P1.8	Explain how the rates of change of functions in different families (e.g., linear functions, exponential functions, etc.) differ, referring to graphical representations. And So On Comparing Linear, Exponential and Quadratic Models Filling Bottles Graphing Growth and Decay Functions Inverse Proportion Worksheet (3) Modeling Two-Variable Data Part 2 The Laboratory - Relationship Between Two Variables (Software)

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.7	Understand the concept of limit of a function as x approaches a number or infinity. Use the idea of limit to analyze a graph as it approaches an asymptote. Compute limits of simple functions (e.g., find the limit as x approaches 0 of f(x) = 1/x) informally. An Essential Singularity Continuity Defining the Limit Defining the Limit Exploring Derivatives: Slope of the Secant Line and Average Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change Exploring Derivatives: Slope of the secant line and average rate of change Function Continuity Function Continuity How do we find a Limit? Left hand/Right hand limits How doe we find a Limit? (Left hand/Right hand limits) Limits of Infinite Sequences Limits: Finite c, Finite L Limits: Finite c, Infinite L Limits: Infinite c, Finite L Limits: Infinite c, Infinite L Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P2:	Exponential and Logarithmic Functions
GRADE LEVEL EXPECTATION	P2.1	Use the inverse relationship between exponential and logarithmic functions to solve equations and problems. Solving Logarithmic and Exponential Equations
GRADE LEVEL EXPECTATION	P2.2	Graph logarithmic functions. Graph translations and reflections of these functions. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Elementary Transcendental Functions and Their Inverses

		Exponential Decay Function Explorer 2D Functions Graphing Functions with Four Parameters Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Multiplication by Adding Logs Solving Logarithmic and Exponential Equations

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P2:	Exponential and Logarithmic Functions
GRADE LEVEL EXPECTATION	P2.3	Compare the large-scale behavior of exponential and logarithmic functions with different bases and recognize that different growth rates are visible in the graphs of the functions A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations

GRADE LEVEL EXPECTATION	P2.4	Solve exponential and logarithmic equations when possible, (e.g. 5^x=3^(x+1)). For those that cannot be solved analytically, use graphical methods to find approximate solutions. Carbon Dating Functions Functions Newton's Law of Cooling Solving Logarithmic and Exponential Equations
GRADE LEVEL EXPECTATION	P2.5	Explain how the parameters of an exponential or logarithmic model relate to the data set or situation being modeled. Find an exponential or logarithmic function to model a given data set or situation. Solve problems Carbon Dating Exploration versus Consumption Exponential Decay Functions Functions involving e GRAPHS A Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Representing Inverse Variation Graphically Representing Inverse Variation Graphically Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.P.**	**Precalculus**
STANDARD	P3:	Quadratic Functions
GRADE LEVEL EXPECTATION	P3.1	Solve quadratic-type equations (e.g. e^(2x) - 4 e^(x+4)=0) by substitution. Algebra Quiz Annotated Quadratic Polynomial Completing the Square Functions GRAPHS A GRAPHS A

		GRAPHS A GRAPHS A GRAPHS A Methods of Solving Quadratic QUADRATICS QUADRATICS QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Try Try Try Again Using the Quadratic Formula an Interpreting the Discriminant

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P3:	Quadratic Functions
GRADE LEVEL EXPECTATION	P3.2	Apply quadratic functions and their graphs in the context of motion under gravity and simple optimization ' ' Ballistic Trajectories Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form
GRADE LEVEL EXPECTATION	P3.3	Explain how the parameters of an exponential or logarithmic model relate to the data set or situation being modeled. Find a quadratic function to model a given data set or situation. Ballistic Trajectories Comparing Linear, Exponential and Quadratic Models Exponential Decay Functions GRAPHS A

		Graphing Growth and Decay Functions Lily Pond Newton's Law of Cooling Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P4:	Polynomial Functions
GRADE LEVEL EXPECTATION	P4.2	Solve polynomial equations and inequalities of degree greater than or equal to three. Graph polynomial functions given in factored form using zeros and their multiplicities, testing the sign-on intervals and analyzing the functions' large scale behavior. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Function Transformations Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters How do I look Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P5:	Rational Functions and Difference Quotients
GRADE LEVEL EXPECTATION	P5.1	Solve equations and inequalities involving rational functions. Graph rational functions given in factored form using zeros, identifying asymptotes, analyzing their behavior for large x values, and testing intervals. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P5:	Rational Functions and Difference Quotients
GRADE LEVEL EXPECTATION	P5.3	Know and apply the definition and geometric interpretation of difference quotient. Simplify difference quotients and interpret difference quotients as rates of change and slopes of secant lines. DIFFERENTIATION DIFFERENTIATION Exploring Derivatives: Slope of the Secant Line and Average Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change Exploring Derivatives: Slope of the secant line and average rate of change Rate of Change Rate of Change Secant Approximations Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Tangent to a Curve

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P6:	Trigonometric Functions
GRADE LEVEL EXPECTATION	P6.1	Define (using the unit circle), graph, and use all trigonometric functions of any angle. Convert between radian and degree measure. Calculate arc lengths in given circles. A Tangent Tracer Angles Measured in Degrees and Radians Comparing Sine and Cosine Comparing Sine and Cosine Continued Fraction Approximations of the Tangent Function Doppler Effect Elementary Transcendental Functions and Their Inverses Family of Curves, Tangents, and Intuition Function Explorer 2D Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle Inset Plot Magnifier Many Sine Curves Modeling Harmonic Motion Modeling Harmonic Motion Nested Trigonometric Function Plots Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP)

		Soil Temperature TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 Tetraviews of Elementary Functions The Cosecant Function (GSP) The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated Trigonometric Functions with Four Parameters Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
GRADE LEVEL EXPECTATION	P6.2	Graph transformations of the sine and cosine functions (involving changes in amplitude, period, midline, and phase) and explain the relationship between constants in the formula and transformed graph. Doppler Effect Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Many Sine Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Sinusoids and Transformations (GSP) Soil Temperature

		Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 The Cosecant Function (GSP) Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions with Four Parameters Wave Interference
GRADE LEVEL EXPECTATION	P6.3	Know basic properties of the inverse trigonometric functions sin^-1 x, cos^-1 x, tan^-1 x, including their domains and ranges. Recognize their graphs. Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Elementary Transcendental Functions and Their Inverses Evaluate Inverse Trigonometric Functions Function Explorer 2D Functions Illustrating Cosine with the Unit Circle II Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem
GRADE LEVEL EXPECTATION	P6.4	Know the basic trigonometric identities for sine, cosine, and tangent (e.g., the Pythagorean identities, sum and difference formulas, co-functions relationships, double-angle and half-angle formulas). Analytic Trigonometry Analytic Trigonometry Analytic Trigonometry Apply Double-Angle and Half Angle Formulas Apply Sum and Difference Formulas Identities in Calculus Verify Trigonometric Identities
GRADE LEVEL EXPECTATION	P6.5	Solve trigonometric equations using basic identities and inverse trigonometric functions. Composing Trigonometric and Inverse Trigonometric Functions

		Solve Trigonometric Equations Two Wheel Belt
GRADE LEVEL EXPECTATION	P6.6	Prove trigonometric identities and derive some of the basic ones (e.g., double-angle formula from sum and difference formulas, half-angle formula from double-angle formula, etc.). Analytic Trigonometry Analytic Trigonometry Analytic Trigonometry Apply Double-Angle and Half Angle Formulas Apply Sum and Difference Formulas Identities in Calculus Verify Trigonometric Identities
GRADE LEVEL EXPECTATION	P6.7	Find a sinusoidal function to model a given data set or situation and explain how the parameters of the model A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Doppler Effect Elementary Transcendental Functions and Their Inverses Family of Curves, Tangents, and Intuition Function Explorer 2D Function Transformations Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle Many Sine Curves Modeling Harmonic Motion Modeling Harmonic Motion

		Nested Trigonometric Function Plots Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP) Soil Temperature Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 The Cosecant Function (GSP) Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated Trigonometric Functions with Four Parameters
STRAND / STANDARD CATEGORY	**MI.P.**	**Precalculus**
STANDARD	**P7:**	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	**P7.1**	Perform operations (addition, subtraction, and multiplication by scalars) on vectors in the plane. Solve applied Block on a Frictionless Inclined Plane CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Forces on a Simple Pendulum How to Add and Subtract Vectors How to Add and Subtract Vectors How to Add and Subtract Vectors VECTORS VECTORS Vector Cross Product

		Vector Cross Product Vector Operations in Three Dimensions
GRADE LEVEL EXPECTATION	P7.2	Know and apply the algebraic and geometric definitions of the dot product of vectors. Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Vector Cross Product Vector Cross Product Vector Operations in Three Dimensions

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P7:	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	P7.3	Know the definitions of matrix addition and multiplication. Add, subtract, and multiply matrices. Multiply a Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Basic Matrix Operations MATRICES MATRICES MATRICES MATRICES MATRICES MATRICES MATRICES Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P7:	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	P7.5	Define the inverse of a matrix and compute the inverse of two-by-two and three-by-three matrices when they Using Inverse Matrices to solve Linear Systems
GRADE LEVEL EXPECTATION	P7.6	Explain the role of determinants in solving systems of linear equations using matrices and compute determinants of two-by-two and three-by-three matrices. EQUATIONS EQUATIONS Evaluate the Determinant and Apply Cramer's Rule Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Matrices Multivariate Linear Systems and Row Operations PUZSQC40 Using Inverse Matrices to solve Linear Systems

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P7:	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	P7.7	Write systems of two and three linear equations in matrix form. Solve such systems using Gaussian elimination EQUATIONS EQUATIONS Evaluate the Determinant and Apply Cramer's Rule Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Matrices Multivariate Linear Systems and Row Operations PUZSQC40 Using Inverse Matrices to solve Linear Systems
GRADE LEVEL EXPECTATION	P7.8	Represent and solve systems of inequalities in two variables and apply these methods in linear programming

		Application of Graphing Inequalities Application of Graphing Inequalities Graph of Inequalities Solving Inequalities Using the Number Line
STRAND / STANDARD CATEGORY	**MI.P.**	**Precalculus**
STANDARD	**P8:**	Sequences, Series, and Mathematical Induction
GRADE LEVEL EXPECTATION	**P8.1**	Know, explain, and use sigma and factorial notation. COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS Combinations and the Binomial Theorem Counting Principle Permutations DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Define and Use Sequences and Series Factorial Find Probabilities Using Permutations and Combinations Mathematical Induction Series: A Few Examples Series: Steps on a Number Line
GRADE LEVEL EXPECTATION	**P8.2**	Given an arithmetic, geometric, or recursively defined sequence, write an expression for the nth term when possible. Write a particular term of a sequence when given the nth term. And So On Define and Use Sequences and Series EQUATIONS Gifts Galore & Phoning friends Make a Difference Pyramids SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A

		SEQUENCES A SEQUENCES Ax
GRADE LEVEL EXPECTATION	P8.3	Understand, explain, and use the formulas for the sums of finite arithmetic and geometric sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets
GRADE LEVEL EXPECTATION	P8.4	Compute the sums of infinite geometric series. Understand and apply the convergence criterion for geometric A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples

		The Cantor Sequence with Bits The Sum of Two Cantor Sets
GRADE LEVEL EXPECTATION	P8.5	Understand and explain the principle of mathematical induction and prove statements using mathematical induction. A Visual Proof of Nicomachus' Theorem Discrete Mathematics Mathematical Induction PROOF RADICALS Sum of Three Triangular Numbers
GRADE LEVEL EXPECTATION	P8.6	Prove the binomial theorem using mathematical induction. Show its relationships to Pascal's triangle and to combinations. Use the binomial theorem to find terms in the expansion of a binomial to a power greater than 2. Binomial Theorem Binomial Theorem Christmas Stocking Identity Combinations and the Binomial Theorem Cube Conundrum DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Expansion of a Polynomial Pascal's Triangle
STRAND / STANDARD CATEGORY	**MI.P.**	**Precalculus**
STANDARD	P9:	Polar Coordinates, Parameterizations, and Conic Sections
GRADE LEVEL EXPECTATION	P9.1	Convert between polar and rectangular coordinates. Graph functions given in polar coordinates. Introduction to Polar Coordinates Introduction to Polar Coordinates Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Polar Coordinates
GRADE LEVEL EXPECTATION	P9.2	Write complex numbers in polar form. Know and use De Moivre's Theorem. De Moivre's Theorem and nth Roots Introduction to Polar Coordinates Introduction to Polar Coordinates

		Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Polar Coordinates Proving Identities -Disproving Non - Identities

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P9:	Polar Coordinates, Parameterizations, and Conic Sections
GRADE LEVEL EXPECTATION	P9.3	Evaluate parametric equations for given values of the parameter. Generalized Arrhenius Function Mbius Monorail Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.4	Convert between parametric and rectangular forms of equations. Generalized Arrhenius Function Mbius Monorail Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.5	Graph curves described by parametric equations and find parametric equations for a given graph. Generalized Arrhenius Function Mbius Monorail

		Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.6	Use parametric equations in applied contexts (e.g., orbits and projectiles) to model situations and solve Generalized Arrhenius Function Mbius Monorail Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.7	Know, explain, and apply the locus definitions of parabolas, ellipses, and hyperbolas and recognize these conic Application of Parabolas Application of Parabolas Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition

		Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Sum 17 Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition
GRADE LEVEL EXPECTATION	P9.8	Identify parabolas, ellipses, and hyperbolas from equations, write the equations in standard form, and sketch an appropriate graph of the conic section. Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations Interactive Conics
GRADE LEVEL EXPECTATION	P9.9	Derive the equation for a conic section from given geometric information (e.g., find the equation of an ellipse given its two axes). Identify key characteristics (e.g. foci and asymptotes) of a conic section from its equation Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations Interactive Conics

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Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S1:	Exploring Univariate and Bivariate Data
GRADE LEVEL EXPECTATION	S1.2	Compute and interpret the within-group and between-group variation when comparing two or more data sets. How Do They Compare Relate
GRADE LEVEL EXPECTATION	S1.3	Compute residuals and use plots of residuals to assess the adequacy of a simple linear regression model. How Do They Compare Relate
GRADE LEVEL EXPECTATION	S1.4	Identify influential points in a bivariate data set and predict and verify the effect of their removal on the least- Interpret Stem and Leaf, Histograms, and Box and Whisker Plots
GRADE LEVEL EXPECTATION	S1.5	When applicable, use logarithmic and power transformations to achieve linearity and use the transformed data Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs
GRADE LEVEL EXPECTATION	S1.6	Explore categorical data via contingency tables, computing and interpreting marginal, joint, and conditional relative frequencies and examining measures of association. C-FREQUENCY
STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S2:	Sampling and Study Design
GRADE LEVEL EXPECTATION	S2.1	Describe the strengths and weaknesses of sampling methods, including simple random sampling, stratified random sampling, convenience sampling, voluntary response, and cluster sampling. Recognize potential Comparing Methods of Data Collection (Easiteach) TABLES D

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S2:	Sampling and Study Design
GRADE LEVEL EXPECTATION	S2.2	Critically assess the validity of conclusions drawn from surveys such as political polls, recognizing possible biases such as size bias and non-response bias and understanding the role of question formulation. Comparing Methods of Data Collection (Easiteach) How Do They Compare Relate TABLES D

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S2:	Sampling and Study Design
GRADE LEVEL EXPECTATION	S2.3	Know and recognize in context the concepts of treatment group, control group, and experimental unit and demonstrate the importance of double-blind protocol, random assignment, experimental unit, and replication. Comparing Methods of Data Collection (Easiteach) TABLES D
GRADE LEVEL EXPECTATION	S2.4	Understand and describe how to implement completely randomized and randomized block designs (including matched-pair designs), recognizing when and how blocking can lower variability. How Do They Compare Relate

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Mathematics

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.1	Know the subjective and relative frequency interpretations of probabilities, including an informal Experimental and Theoretical Probability

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Mathematics

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.2	Use basic probability rules such as the addition rule, law of total probability, and complement rule to compute Chance It Counting Principle Permutations Find Probabilities of Compound Events Finding Probabilities Disjoint and Overlapping Events PROBABILITY PROBABILITY Sort It Two Dice with Histogram What Chance Have I got
GRADE LEVEL EXPECTATION	S3.3	Use Bayes' Theorem to solve conditional probability problems, with emphasis on the interpretation of results. Sort It

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Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.5	Compute the expected value and standard deviation of discrete random variables and know the effect of a linear transformation of a random variable on its mean and standard deviation. DEVIATION DEVIATION Expectations for Roulette Normal Distributions

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Mathematics

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability

STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.6	Apply standard discrete distributions, including the binomial, geometric, and hypergeometric. Christmas Stocking Identity Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Normal Distributions

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.8	Use tables and technology to determine probabilities and percentiles of normal distributions. How Do They Compare Normal Distributions
GRADE LEVEL EXPECTATION	S3.9	Use simulation methods to answer questions about probability models that are too complex for analytical treatment at this level, e.g., interacting particle system models. Dice Roller & Penny Flipper Forest Fire Simulation Using a Randomized Hexagonal Automaton Leads in Coin Tossing The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?

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Mathematics

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S4:	Sampling Distributions
GRADE LEVEL EXPECTATION	S4.1	Given the mean and standard deviation of each random variable in a set of random variables, compute the mean of the sum and, assuming independence, compute the variance and standard deviation of the sum.

		How Do They Compare Relate
GRADE LEVEL EXPECTATION	S4.6	Compute control limits for commonly used control charts and use these to assess whether a process is out of [illegible] How Do They Compare Relate

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Mathematics

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S5:	Point and Interval Estimation
GRADE LEVEL EXPECTATION	S5.1	Compute bias, variance, and mean squared error of estimators of the mean and proportion. Comparing Methods of Data Collection (Easiteach) TABLES D

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.1	Know the terminology and logic of significance testing, including null and alternative hypotheses, p-value, [illegible] How Do They Compare Relate

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.2	Assuming a normal model and known standard deviation, carry out a significance test for a single mean, with emphasis on understanding the computation and interpretation of the p-value, and compute the power curve [illegible] How Do They Compare Normal Distributions

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.3	Carry out (large sample) significance tests for one proportion and the difference of two proportions, with emphasis on proper interpretation of results. How Do They Compare Relate

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.6	Assuming a normal model and known standard deviation, compute the sample size necessary to achieve a pre-specified power at a pre-specified value of the population mean. How Do They Compare Normal Distributions

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Mathematics

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.7	Demonstrate, in the context of specific studies, the understanding that a result can be statistically significant while of insignificant practical importance and that a failure to reject a null hypothesis may be due to low power and does not necessarily imply the null hypothesis is true. How Do They Compare Relate

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Mathematics

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S7:	Inference for Regression
GRADE LEVEL EXPECTATION	S7.1	Know the statistical model for regression, including linearity, normality of errors, and constancy of error . Analyzing Predictions (Easiteach) Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S7:	Inference for Regression
GRADE LEVEL EXPECTATION	S7.3	Test hypotheses about the slope of a regression line, with emphasis on interpretation of results.

EXPECTATION		Analyzing Predictions (Easiteach) Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S8:	Assessing Assumptions of Statistical Models
GRADE LEVEL EXPECTATION	S8.2	In the context of specific studies, recognize aspects of study design that either support or offer evidence Comparing Methods of Data Collection (Easiteach)
GRADE LEVEL EXPECTATION	S8.3	Demonstrate knowledge of the possible effects of incorrect assumptions (i.e., improperly specified models) on inferential procedures and of the robustness of inferential procedures to departures from specified

		How Do They Compare Relate

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.1.	Know the different properties that hold in different number systems and recognize that the applicable properties change in the transition from the positive integers to all integers, to the rational numbers, and to the real numbers. Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Reason Using Properties from Algebra Subtracting Integers Subtracting Integers Subtracting Integers The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication What is the Meaning of Multiplication

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.2.	Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Identity Elements and Inverses Identity Elements and Inverses Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.3.	Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations. Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses

		Into Multiplying Integers Into Multiplying Integers Into Multiplying Integers Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication What is the Meaning of Multiplication
EXPECTATION	L1.1.4.	Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number by a number less than 0, a number between 0 and 1, and a number greater than 1. EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS Fractional Parts of Powers of Rationals INVERSES Into Multiplying Integers Into Multiplying Integers Into Multiplying Integers Negative Exponents and Parentheses Worksheet (1) Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (2) Powerful RADICALS Rules with Negative Exponents Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents

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Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.5.	Justify numerical relationships. Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.2.	Representations and Relationships
EXPECTATION	L1.2.2.	Interpret representations that reflect absolute value relationships. Inequalities and Absolute Value Solving Absolute Equations and Inequalities Solving Inequalities Using the Number Line
EXPECTATION	L1.2.4.	Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media. AVERAGE Analyzing Predictions (Easiteach) Box and Whisker C-FREQUENCY COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS

		COMBINATIONS
		COMBINATIONS
		COMBINATIONS
		DEVIATION
		DEVIATION
		DISTRIBUTION
		DISTRIBUTION
		DISTRIBUTION
		DISTRIBUTION
		Determining Line of Fit
		Determining Line of Fit
		Determining Line of Fit
		Functional Geometry
		Functional Geometry
		Functions in A Triangle
		Functions in A Triangle
		Games Galore
		HISTOGRAMS
		Interpret Stem and Leaf, Histograms, and Box and Whisker Plots
		MEAN
		MOVING AV
		Modeling Linear Motion Using Parametric Equations
		Modeling Linear Motion Using Parametric Equations
		Modeling Linear Motion Using Parametric Equations
		Modeling Two-Variable Data Part 1
		Normal Distributions
		PROBABILITY
		PROBABILITY
		Pick and Mix Family
		QUARTILES
		QUARTILES
		QUARTILES
		QUARTILES
		Representing Direct Variation Algebraically and Graphically
		Representing Direct Variation Algebraically and graphically
		Representing Direct Variation Algebraically and graphically
		SCATTERGRAMS
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		TABLES D
		TABLES D
		The Circumference Function
		The Circumference Function

		The Circumference Function

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.2.	Calculate fluently with numerical expressions involving exponents; use the rules of exponents; evaluate numerical expressions involving rational and negative exponents; transition easily between roots and exponents. EXPONENTS EXPONENTS EXPONENTS Evaluate nth Roots Get In Lane Order of Operations Order of Operations Order of Operations Positive Exponents and Parentheses Worksheet (1) Switch - Calculations Software

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.4.	Know that the imaginary number i is one of two solutions to x^2 = -1. Game of Buried Treasure Game of Buried Treasure Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers

		Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers Proving Identities -Disproving Non - Identities

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.1.	Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables. Balancing Act Part II Changing Formulas Codebreaker 2 - Simplification Software Constructing Simple Arguments (Easiteach) Escape the Cave - Using Letters to Represent Unknown Numbers Software Expression Machine FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Newton's Law of Cooling Reflecting Function Plots Write and Evaluate Expressions Writing and Solving Ratios and Proportions

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I

STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.2.	Know the properties of exponents and roots and apply them in algebraic expressions. EXPONENTS EXPONENTS EXPONENTS INDICES A Introduction to Exponents Introduction to Exponents Negative Exponents and Parentheses Worksheet (1) Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (1) Positive Exponents and Parentheses Worksheet (2) Powerful Roughly the Answer Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.3.	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product [illegible] Algebra Quiz Difference of Squares EXPRESSIONS FACTORISE Factoring Binomials Factoring Polynomials Completely Factoring Trinomials Factoring Trinomials Using Algebra Tiles Integer Polynomial

		Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Operations with Polynomials (division) QUADRATICS QUADRATICS QUADRATICS QUADRATICSx
STRAND / STANDARD CATEGORY	**MI.AI.**	**Algebra I**
STANDARD	**A1:**	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	**A1.2.**	Solutions of Equations and Inequalities
EXPECTATION	**A1.2.1.**	Write equations and inequalities with one or two variables to represent mathematical or applied situations, Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models EQUATIONS Find the Number GRAPHS A Graphing Linear Inequalities Inequalities and Absolute Value Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Line Plot QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically Solving Inequalities Using the Number Line Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.3.	Solve linear and quadratic equations and inequalities including systems of up to three linear equations with three unknowns. Justify steps in the solution, and apply the quadratic formula appropriately. Algebra Quiz Algebraic Solutions to Polynomial Equations Annotated Quadratic Polynomial Balancing Act Part II Completing the Square Complex Conjugates Evaluate the Determinant and Apply Cramer's Rule Find the Number Finding Numbers that satisfy two or more equations Finding Numbers that satisfy two or more equations Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graph of Inequalities Graphing Linear Inequalities Inequalities and Absolute Value Intro to Equations Intro to Equations Intro to Equations Introduction to Equations Matrices Methods of Solving Linear Systems of Equations and Inequalities Methods of Solving Quadratic Multivariate Linear Systems and Row Operations QUADRATICS QUADRATICS QUADRATICSx QUADRATICSx QUADRATICSx

		QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Reviewing Quadratic Roots Reviewing Quadratic Roots SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS Solve It Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Solving Inequalities Using the Number Line Solving Inequalities Worksheet (1) Solving Inequalities Worksheet (2) Solving Inequalities Worksheet (3) Solving Inequalities Worksheet (4) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Try Try Try Again Using Inverse Matrices to solve Linear Systems Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations Using the Quadratic Formula an Interpreting the Discriminant
EXPECTATION	A1.2.4.	Solve absolute value equations and inequalities and justify steps in the solution. Inequalities and Absolute Value Solving Absolute Equations and Inequalities Solving Inequalities Using the Number Line
EXPECTATION	A1.2.6.	Solve power equations and equations including radical expressions; justify steps in the solution, and explain

		End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Simplifying Radical Expressions and Equations
EXPECTATION	A1.2.8.	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. CO-ORD GEOM CO-ORD GEOM Changing Formulas TRANSPOSITION

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1.	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and A Balanced View Composition of Functions Composition of Functions Composition of Functions Defining and Graphing Relations Difference of Squares Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS

		Finding the Inverse of a Function and the Inverse Composition Rule Functional Geometry Functional Geometry Functions Functions and Relations Functions and Relations Functions and Relations Functions and Relations Functions in A Triangle Functions in A Triangle Horizontal Line Test, Vertical Line Test How do I look Increasing, Decreasing, and Constant Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Inverse Reflection Principle Iterations and functions Iterations and functions Mapping Diagrams Sum of Parts Tilted Squares Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation and evaluate a function at a value in its domain. FUNCTIONS FUNCTIONS FUNCTIONS

		FUNCTIONS Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Reflecting Function Plots Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations. A Perfect Square Analyze Arithmetic and Geometric Sequence and Series And So On Balancing Act Part II CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Changing Formulas Comparing Linear, Exponential and Quadratic Models Composition of Functions Composition of Functions Composition of Functions Define and Use Sequences and Series Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs EQUATIONS Find the Number Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Gifts Galore & Phoning friends Graphing Graphing Linear Inequalities How Slope is Measured How Slope is Measured

How do I look
Intro to Equations
Intro to Equations
Intro to Equations
Introducing Functions as Dynagraphs
Introducing Functions as Dynagraphs
Introducing Functions as Dynagraphs
Introduction to Equations
Laws
Modeling Num as Segments & Area
Modeling Num as Segments & Area
Modeling Number as Segments and Areas
Modeling Two-Variable Data Part 1
Multiplication by Adding Logs
Multiplying Binomials
Pyramids
QUADRATICSx
Representing Direct Variation Algebraically and Graphically
Representing Direct Variation Algebraically and graphically
Representing Direct Variation Algebraically and graphically
Representing Inverse Variation Graphically
Representing Inverse Variation Graphically
SEQPUZ08
SEQPUZ25
SEQUENCES A
SEQUENCES A
SEQUENCES A
SEQUENCES Ax
Scientific Notation Worksheet (1)
Scientific Notation Worksheet (2)
Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R))
Solve It
Solving One-step, Two Step, And Multi Step equations
Sum 17
Transition Between Dynagaphs to Cartesian Graphs
Transition Between Dynagaphs to Cartesian Graphs
Transition Between Dynagaphs to Cartesian Graphs
Using Dynagaphs to Explore Function Composition
Using Dynagaphs to Explore Function Composition
Using Dynagaphs to Explore Function Composition
Using Points on the Coordinate Plane to Create Patterns
Using Points on the Coordinate Plane to Create Patterns
Using Points on the Coordinate Plane to Create Patterns
Using Rabbit Races to Solve Equations

		Using Rabbit Races to Solve Equations What Expression Write and Solve Equations and Inequalities
EXPECTATION	A2.1.4.	Recognize that functions may be defined by different expressions over different intervals of their domains; Function Transformations Functions

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.5.	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Geometric Series Coil Geometric Series Coil Geometric Square Root Construction IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series Models of Geometric Series Ratio of Similarity Ratio of Similarity

		Ratio of Similarity The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets Use Recursive Rules with Sequences and Functions

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.6.	Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and graphical representations An Essential Singularity Complex Zeros and the Fundamental Theorem of Algebra Continuity Cubic Equation Defining the Limit Defining the Limit End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Exploring Derivatives: Slope of the Secant Line and Average Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change Exploring Derivatives: Slope of the secant line and average rate of change Filling Bottles Function Continuity Function Continuity Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Quadratic Equations Using Roots

		How do we find a Limit? Left hand/Right hand limits How doe we find a Limit? (Left hand/Right hand limits) Increasing, Decreasing, and Constant Functions Limits of Infinite Sequences Limits: Finite c, Finite L Limits: Finite c, Infinite L Limits: Infinite c, Finite L Limits: Infinite c, Infinite L Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Predicting a Velocity Plot Predicting a Velocity Plot QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Rational Functions Real Zeros of Polynomial Functions Reviewing Quadratic Roots Reviewing Quadratic Roots The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.1.7.	Identify and interpret the key features of a function from its graph or its formula(s). Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Filling Bottles Functions Functions Graph Classifier Software Increasing, Decreasing, and Constant Functions Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Predicting a Velocity Plot Predicting a Velocity Plot

		Rational Functions The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.2.	Apply given transformations to parent functions and represent symbolically. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Derivatives Dilation of Functions Dilation of Functions Dilation of Functions Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game

		Transformation Challenge - Group Game Transformation Challenge - Group Game
EXPECTATION	A2.2.3.	Determine whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.3.	Representations of Functions
EXPECTATION	A2.3.2.	Describe the tabular pattern associated with functions having a constant rate of change (linear); or variable And So On Comparing Linear, Exponential and Quadratic Models Filling Bottles Graphing Growth and Decay Functions Inverse Proportion Worksheet (3) Modeling Two-Variable Data Part 2 The Laboratory - Relationship Between Two Variables (Software)

Michigan Curriculum Standards

Mathematics

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.4.	Models of Real-World Situations Using Families of Functions
EXPECTATION	A2.4.1.	Identify the family of function best suited for modeling a given real-world situation. Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Modeling Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3
EXPECTATION	A2.4.2.	Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons

		Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.4.3.	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS

		CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.1.	Lines and Linear Functions
EXPECTATION	A3.1.1.	Write the symbolic forms of linear functions (standard, point-slope, and slope-intercept) given appropriate
		CO-ORD GEOM
		CO-ORD GEOM
		CO-ORD GEOM
		CO-ORD GEOM
		CO-ORD GEOM
		CO-ORD GEOM
		CO-ORD GEOM
		Determine Equation Using y = mx + b
		Determine Equation Using y=mx +b
		Determine Equation Using y=mx +b
		Determining Equation of a Line Using Point Slope Form
		Determining Equation of a Line Using Point Slope Form
		Determining Equation of a Line Using Point Slope Form
		Determining Equation of a Line Using the Slope Intercept
		Determining Equation of a Line Using the Slope Intercept
		Determining Equation of a Line Using the Slope Intercept
		GRAPHS A
		Graphing Absolute Value Functions
		Graphing Absolute Value Functions
		Graphing Linear Inequalities
		Iterations and functions
		Iterations and functions
		LINES
		Line Plot
		Line up
		Modeling Two-Variable Data Part 1
		Reflecting Without the Reflect Command: The Algebra of Reflection
		Reflecting Without the Reflect Command: The Algebra of Reflection
		Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R))
		Systems of Equations Worksheet (10)
		Systems of Equations Worksheet (7)
		Systems of Equations Worksheet (8)
		Systems of Equations Worksheet (9)
		The Circumference Function
		The Circumference Function
		The Circumference Function

		The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns
EXPECTATION	A3.1.2.	Graph lines (including those of the form x = h and y = k) given appropriate information. A Balanced View Comparing Linear, Exponential and Quadratic Models Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Finding the Inverse of a Function and the Inverse Composition Rule Function Transformations Functions and Relations Functions and Relations Functions and Relations GRAPHS A GRAPHS A Graphing Functions with Four Parameters How do I look Interactive Slope Introduction to Slope - A measure of Steepness Introduction to Slope: A measure of steepness Inverse Reflection Principle Iterations and functions Iterations and functions Polynomial Roots Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.1.	Lines and Linear Functions
EXPECTATION	A3.1.3.	Relate the coefficients in a linear function to the slope and x- and y- intercepts of its graph. Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Interactive Slope Line Plot Polynomial Roots Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)
EXPECTATION	A3.1.4.	Find an equation of the line parallel or perpendicular to given line, through a given point; understand and use the facts that non-vertical parallel lines have equal slopes, and that non-vertical perpendicular lines have slopes that multiply to give -1. CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Determining Equation of a Line Using Point Slope Form

		Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form LINES Line up Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.2.	Exponential and Logarithmic Functions
EXPECTATION	A3.2.1.	Write the symbolic form and sketch the graph of an exponential function given appropriate information. Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.4.	Understand and use the fact that the base of an exponential function determines whether the function increases or decreases and how base affects the rate of growth or decay.

		Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions involving e Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.5.	Relate exponential functions to real phenomena, including half-life and doubling time. Carbon Dating Compound Interest Compound Interests Exploration versus Consumption Exponential Decay Functions involving e Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 PERCENT Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Simple vs Compound Interest

		Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.AI.**	**Algebra I**
STANDARD	**A3:**	Families of Functions
GRADE LEVEL EXPECTATION	**A3.3.**	Quadratic Functions
EXPECTATION	**A3.3.1.**	Write the symbolic form and sketch the graph of a quadratic function given appropriate information. Animated Projectile Motion Annotated Quadratic Polynomial Ballistic Trajectories Comparing Linear, Exponential and Quadratic Models Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graph and Solving Quadratic Inequalities Graphing Functions with Four Parameters Graphing Quadratic Equations Graphing Quadratic Equations Graphing Quadratic Equations Using Roots How do I look Methods of Solving Quadratic Modeling Two-Variable Data Part 2 Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form Parabolas in Standard Form Parabolas in Standard Form

		Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Reflecting Function Plots Review of Parabolas Review of Parabolas Review of Parabolas Reviewing Quadratic Roots Reviewing Quadratic Roots Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Sum 17 Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using the Quadratic Formula an Interpreting the Discriminant

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.3.	Quadratic Functions
EXPECTATION	A3.3.2.	Identify the elements of a parabola (vertex, axis of symmetry, direction of opening) given its symbolic form or its graph, and relate these elements to the coefficient(s) of the symbolic form of the function. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Annotated Quadratic Polynomial Dilation of Functions Dilation of Functions Dilation of Functions Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form

		Exploring Parabolas in Vertex Form Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graph and Solving Quadratic Inequalities Graphing Functions with Four Parameters Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Quadratic Equation Quadratic Practice Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Review of Parabolas Review of Parabolas Review of Parabolas Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I

STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.3.	Quadratic Functions
EXPECTATION	A3.3.4.	Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function. GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Quadratic Equations Using Roots Polynomial Roots QUADRATICSx QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Reviewing Quadratic Roots Reviewing Quadratic Roots Using the Quadratic Formula an Interpreting the Discriminant

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.4.	Power Functions
EXPECTATION	A3.4.1.	Write the symbolic form and sketch the graph of power functions. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.4.	Power Functions
EXPECTATION	A3.4.2.	Express directly and inversely proportional relationships as functions and recognize their characteristics. Direct Proportion Worksheet (2) Finding out about graphs Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle How do I look Inverse Proportion Worksheet (3) Inverse Square Laws Rates and Ratios Rates and Ratios Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Sense of Proportion The Circumference Function

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.4.	Power Functions
EXPECTATION	A3.4.3.	Analyze the graphs of power functions, noting reflectional or rotational symmetry. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Functions

		Functions Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Review of Parabolas Review of Parabolas Review of Parabolas
STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.5.	Polynomial Functions
EXPECTATION	A3.5.1.	Write the symbolic form and sketch the graph of simple polynomial functions. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions

GRADE LEVEL EXPECTATION	A3.5.	Polynomial Functions
EXPECTATION	A3.5.2.	Understand the effects of degree, leading coefficient, and number of real zeros on the graphs of polynomial functions of degree greater than 2. Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions
EXPECTATION	A3.5.3.	Determine the maximum possible number of zeroes of a polynomial function and understand the relationship between the x-intercepts of the graph and the factored form of the function. Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions
STRAND / STANDARD CATEGORY	MI.AI.	Algebra I

STANDARD	S2:	Bivariate Data-Examining Relationships
GRADE LEVEL EXPECTATION	S2.1.	Scatter plots and Correlation
EXPECTATION	S2.1.2.	Given a scatter plot, identify patterns, clusters, and outliers. Recognize no correlation, weak correlation, and Analyzing Predictions (Easiteach) Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV Predicting with Linear Models Randomness in the Digits of Pi Randomness in the Digits of Square Roots Relate SCATTERGRAMS

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	S2:	Bivariate Data-Examining Relationships
GRADE LEVEL EXPECTATION	S2.1.	Scatter plots and Correlation
EXPECTATION	S2.1.3.	Estimate and interpret Pearson's correlation coefficient for a scatter plot of a bivariate data set. Recognize that correlation measures the strength of linear association. Analyzing Predictions (Easiteach) Predicting with Linear Models Relate SCATTERGRAMS

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	S2:	Bivariate Data-Examining Relationships
GRADE LEVEL EXPECTATION	S2.2.	Linear Regression
EXPECTATION	S2.2.1.	For bivariate data that appear to form a linear pattern, find the least squares regression line by estimating visually and by calculating the equation of the regression line. Interpret the slope of the equation for a

		Analyzing Predictions (Easiteach) Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S2.2.2.	Use the equation of the least squares regression line to make appropriate predictions. Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression

		Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 SCATTERGRAMS The Circumference Function The Circumference Function The Circumference Function
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	**L1:**	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	**L1.2.**	Representations and Relationships
EXPECTATION	**L1.2.1.**	Use mathematical symbols to represent quantitative relationships and situations. A Perfect Square Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Find the Number GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Graphing Linear Inequalities Laws Line Plot Multiplication by Adding Logs Multiplying Binomials QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically Solve It Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.3.	Counting and Probabilistic Reasoning
EXPECTATION	L1.3.1.	Describe, explain, and apply various counting techniques; relate combinations to Pascal's triangle; know when Binomial Theorem COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS Christmas Stocking Identity Combinations and the Binomial Theorem Counting Principle Permutations DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Find Probabilities Using Permutations and Combinations Let's Count On Pascal's Triangle Pick and Mix Family
EXPECTATION	L1.3.2.	Define and interpret commonly used expressions of probability. Experimental and Theoretical Probability

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation

GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.3.	Explain the exponential relationship between a number and its base 10 logarithm, and use it to relate rules of logarithms to those of exponents in expressions involving numbers. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Multiplication by Adding Logs Properties of Logarithms Solving Logarithmic and Exponential Equations

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.5.	Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers. Complex Conjugates Expansion of a Polynomial Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.2.	Sequences and Iteration
EXPECTATION	L2.2.1.	Find the nth term in arithmetic, geometric, or other simple sequences. A Geometric Series Coil A Geometric Series Staircase

		A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series And So On Area Ratios - Squares Define and Use Sequences and Series EQUATIONS Ford Circles Generating Arithmetic and Geometric Sequences Geometric Series Coil Geometric Series Coil Gifts Galore & Phoning friends Haunted House - Generating Terms of a Sequence Software Limits of Infinite Sequences Models of Geometric Series Models of Geometric Series Models of Geometric Series Pyramids SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Use Recursive Rules with Sequences and Functions
EXPECTATION	L2.2.2.	Compute sums of finite arithmetic and geometric sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS

		Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.2.	Sequences and Iteration
EXPECTATION	L2.2.3.	Use iterative processes in such examples as computing compound interest or applying approximation . A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set Compound Interest Compound Interests Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Functions involving e Geometric Series Coil Geometric Series Coil Geometric Square Root Construction IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series Models of Geometric Series PERCENT Ratio of Similarity Ratio of Similarity Ratio of Similarity

		Simple vs Compound Interest The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	**L2:**	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	**L2.3.**	Measurement Units, Calculations, and Scales
EXPECTATION	**L2.3.2.**	Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Elementary Transcendental Functions and Their Inverses Exponential Decay Function Explorer 2D Functions Graphing Functions with Four Parameters Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Multiplication by Adding Logs Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	**L2:**	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	**L2.4.**	Understanding Error
EXPECTATION	**L2.4.1.**	Determine what degree of accuracy is reasonable for measurements in a given situation; express accuracy through use of significant digits, error tolerance, or percent of error; describe how errors in measurements are magnified by computation; recognize accumulated error in applied situations. BOUNDS BOUNDS BOUNDS Boundaries

		EXPONENTS How Far is it PERCENT

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.1.	Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables. Balancing Act Part II Changing Formulas Codebreaker 2 - Simplification Software Constructing Simple Arguments (Easiteach) Escape the Cave - Using Letters to Represent Unknown Numbers Software Expression Machine FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Newton's Law of Cooling Reflecting Function Plots Write and Evaluate Expressions Writing and Solving Ratios and Proportions

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II

STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.4.	Add, subtract, multiply, and simplify polynomials and rational expressions. A Perfect Square Algebra Quiz Binomial Theorem Cube Conundrum Expansion of a Polynomial FRACTIONS A FRACTIONS A FRACTIONS A Intro to Multiplication of Binomials Introduction to Multiplication of Binomials Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Matrices Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Multiplying Binomials Number Pyramids - Algebra Software Operations with Polynomials Operations with Polynomials (addition and subtraction) Operations with Polynomials (division) Operations with Polynomials (multiplication) Polynomial Long Multiplication QUADRATICS Recognizing Quadratics
EXPECTATION	A1.1.6.	Transform exponential and logarithmic expressions into equivalent forms using the properties of exponents and logarithms, including the inverse relationship between exponents and logarithms. Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II

STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.5.	Solve polynomial equations and equations involving rational expressions and justify steps in the solution. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra Functions Functions Real Zeros of Polynomial Functions

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Mathematics

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.7.	Solve exponential and logarithmic equations and justify steps in the solution. Carbon Dating Functions Functions Newton's Law of Cooling Solving Logarithmic and Exponential Equations
EXPECTATION	A1.2.8.	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable, CO-ORD GEOM CO-ORD GEOM Changing Formulas TRANSPOSITION
EXPECTATION	A1.2.9.	Know common formulas and apply appropriately in contextual situations. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA

		AREA AREA BOUNDS BOUNDS CIRCLESX CUBITP22 Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs PERCENT Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A1:	Expressions, Equations and Inequalities

GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.10.	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Elementary Transcendental Functions and Their Inverses Evaluate Inverse Trigonometric Functions Function Explorer 2D Functions Illustrating Cosine with the Unit Circle II Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1.	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function, and A Balanced View Composition of Functions Composition of Functions Composition of Functions Defining and Graphing Relations Difference of Squares Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functional Geometry Functional Geometry Functions Functions and Relations Functions and Relations Functions and Relations

		Functions and Relations Functions in A Triangle Functions in A Triangle Horizontal Line Test, Vertical Line Test How do I look Increasing, Decreasing, and Constant Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Inverse Reflection Principle Iterations and functions Iterations and functions Mapping Diagrams Sum of Parts Tilted Squares Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

Michigan Curriculum Standards

Mathematics

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation, and evaluate a function at a value in its domain. FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Reflecting Function Plots Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection

		Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words, and translate among representations. A Perfect Square Analyze Arithmetic and Geometric Sequence and Series And So On Balancing Act Part II CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Changing Formulas Comparing Linear, Exponential and Quadratic Models Composition of Functions Composition of Functions Composition of Functions Define and Use Sequences and Series Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs EQUATIONS Find the Number Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Gifts Galore & Phoning friends Graphing Graphing Linear Inequalities How Slope is Measured How Slope is Measured How do I look Intro to Equations Intro to Equations Intro to Equations Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs

		Introduction to Equations Laws Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Modeling Two-Variable Data Part 1 Multiplication by Adding Logs Multiplying Binomials Pyramids QUADRATICSx Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Scientific Notation Worksheet (1) Scientific Notation Worksheet (2) Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Solve It Solving One-step, Two Step, And Multi Step equations Sum 17 Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations What Expression Write and Solve Equations and Inequalities
EXPECTATION	A2.1.6.	Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and graphical representations.

		An Essential Singularity
		Complex Zeros and the Fundamental Theorem of Algebra
		Continuity
		Cubic Equation
		Defining the Limit
		Defining the Limit
		End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem
		Exploring Derivatives: Slope of the Secant Line and Average Rate of Change
		Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change
		Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change
		Exploring Derivatives: Slope of the secant line and average rate of change
		Filling Bottles
		Function Continuity
		Function Continuity
		Functions
		Functions
		Functions
		Functions
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		Graphing Quadratic Equations Using Roots
		How do we find a Limit? Left hand/Right hand limits
		How doe we find a Limit? (Left hand/Right hand limits)
		Increasing, Decreasing, and Constant Functions
		Limits of Infinite Sequences
		Limits: Finite c, Finite L
		Limits: Finite c, Infinite L
		Limits: Infinite c, Finite L
		Limits: Infinite c, Infinite L
		Polynomial Fitter
		Polynomial Functions of Higher Degree (degrees greater than 2)
		Polynomial Roots
		Predicting a Velocity Plot
		Predicting a Velocity Plot
		QUADRATICSx
		Quadratic Equation
		Quadratic Formula and the Discriminant
		Rational Functions
		Real Zeros of Polynomial Functions
		Reviewing Quadratic Roots
		Reviewing Quadratic Roots
		The Laboratory - Relationship Between Two Variables (Software)

		Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.1.7.	Identify and interpret the key features of a function from its graph or its formula(s). Cycle Ride Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Filling Bottles Functions Functions Graph Classifier Software Increasing, Decreasing, and Constant Functions Interactive Slope Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Predicting a Velocity Plot Predicting a Velocity Plot Projectile Motion Rational Functions Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Laboratory - Relationship Between Two Variables (Software) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.2.	Apply given transformations to parent functions, and represent symbolically. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Derivatives Dilation of Functions Dilation of Functions Dilation of Functions Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game
EXPECTATION	A2.2.3.	Recognize whether a function (given in tabular or graphical form) has an inverse, and recognize simple inverse . A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule

		Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.4.	Models of Real-World Situations Using Families of Functions
EXPECTATION	A2.4.1.	Identify the family of functions best suited for modeling a given real-world situation. Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Modeling Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3
EXPECTATION	A2.4.2.	Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM

		CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.4.3.	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. A Rectangle with Maximum Area

A Rectangle with Maximum Area
AREA
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BOUNDS
BOUNDS
CIRCLESX
CO-ORD GEOM
CO-ORD GEOM
CO-ORD GEOM
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Critical Thinking - Application of Area Formulas
Cylinder Hemisphere Cone
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Demonstrating and Use of the Pythagorean Theorem
Demonstrating and Use of the Pythagorean Theorem
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Derivation of Area of Circle using Polygons
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QUADRATICSx
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Real Zeros of Polynomial Functions
Representing Direct Variation Algebraically and Graphically
Representing Direct Variation Algebraically and graphically
Representing Direct Variation Algebraically and graphically
Representing Inverse Variation Graphically
Representing Inverse Variation Graphically
Surface Area and Volumes of Spheres
Surface Area of Prisms and Cylinders
Surface Area of Pyramids and Cones
Triangle Area and Perimeters
Triangle Area and Perimeters
Using the Quadratic Formula an Interpreting the Discriminant
VOLUME 3D
VOLUME 3D

		VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.2.	Exponential and Logarithmic Functions
EXPECTATION	A3.2.2.	Interpret the symbolic forms and recognize the graphs of exponential and logarithmic functions. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.3.	Apply properties of exponential and logarithmic functions.

		A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.6.	Rational Functions
EXPECTATION	A3.6.1.	Write the symbolic form and sketch the graph of simple rational functions. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions

		Representing Inverse Variation Graphically Representing Inverse Variation Graphically
EXPECTATION	A3.6.2.	Analyze graphs of simple rational functions and understand the relationship between the zeros of the numerator and denominator, and the function's intercepts, asymptotes, and domain. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.7.	Trigonometric Functions
EXPECTATION	A3.7.1.	Use the unit circle to define sine and cosine; approximate values of sine and cosine; use sine and cosine to define the remaining trigonometric functions; explain why the trigonometric functions are periodic. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)

EXPECTATION	A3.7.2.	Use the relationship between degree and radian measures to solve problems. Angles Measured in Degrees and Radians
EXPECTATION	A3.7.3.	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of pi/6 and pi/4. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
EXPECTATION	A3.7.4.	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Continued Fraction Approximations of the Tangent Function Doppler Effect Elementary Transcendental Functions and Their Inverses Family of Curves, Tangents, and Intuition Function Explorer 2D Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A

		GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle Inset Plot Magnifier Many Sine Curves Modeling Harmonic Motion Modeling Harmonic Motion Nested Trigonometric Function Plots Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP) Soil Temperature TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 Tetraviews of Elementary Functions The Cosecant Function (GSP) The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated Trigonometric Functions with Four Parameters
EXPECTATION	A3.7.5.	Graph transformations of basic trigonometric functions (involving changes in period, amplitude, phase, and midline) and understand the relationship between constants in the formula and the transformed graph. Doppler Effect Function Transformations Functions Functions

		GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Many Sine Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Sinusoids and Transformations (GSP) Soil Temperature Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 The Cosecant Function (GSP) Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions with Four Parameters Wave Interference

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	G1:	Figures and Their Properties

GRADE LEVEL EXPECTATION	G1.7.	Conic Sections and Their Properties
EXPECTATION	G1.7.1.	Find an equation of a circle given its center and radius; given the equation of a circle, find its center and Conic Sections - Writing Equations of Circles Defining and Graphing Relations
EXPECTATION	G1.7.2.	Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones. Application of Parabolas Application of Parabolas Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Using Geometry to Create Parabolas by Definition

		Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition
EXPECTATION	G1.7.3.	Graph ellipses and hyperbolas with axes parallel to the x- and y-axes, given equations. Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.1.	Producing and Interpreting Plots
EXPECTATION	S1.1.1.	Construct and interpret dot plots, histograms, relative frequency histograms, bar graphs, basic control charts, and box plots with appropriate labels and scales; determine which kinds of plots are appropriate for different types of data; compare data sets and interpret differences based on graphs and summary statistics. Assumptions Box and Whisker HISTOGRAMS How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Relate
EXPECTATION	S1.1.2.	Given a distribution of a variable in a data set, describe its shape, including symmetry or skewness, and state how the shape is related to measures of center (mean and median) and measures of variation (range and standard deviation) with particular attention to the effects of outliers on these measures. Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION How Do They Compare Normal Distributions

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.2.	Measures of Center and Variation
EXPECTATION	S1.2.1.	Calculate and interpret measures of center including: mean, median, and mode; explain uses, advantages and disadvantages of each measure given a particular set of data and its context. AVERAGE Assumptions Box and Whisker C-FREQUENCY DEVIATION DEVIATION How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV QUARTILES QUARTILES QUARTILES QUARTILES TABLES D Use Measures of Central Tendency

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.2.	Measures of Center and Variation
EXPECTATION	S1.2.3.	Compute and interpret measures of variation, including percentiles, quartiles, interquartile range, variance, Box and Whisker C-FREQUENCY DEVIATION DEVIATION Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Normal Distributions

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.3.	The Normal Distribution
EXPECTATION	S1.3.1.	Explain the concept of distribution and the relationship between summary statistics for a data set and Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Normal Distributions

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.3.	The Normal Distribution
EXPECTATION	S1.3.2.	Describe characteristics of the normal distribution, including its shape and the relationships among its mean, How Do They Compare Normal Distributions
EXPECTATION	S1.3.3.	Know and use the fact that about 68%, 95%, and 99.7% of the data lie within one, two, and three standard deviations of the mean, respectively in a normal distribution. How Do They Compare

		Normal Distributions

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.3.	The Normal Distribution
EXPECTATION	S1.3.4.	Calculate z-scores, use z-scores to recognize outliers, and use z-scores to make informed decisions. Normal Distributions
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S3:	Samples, Surveys and Experiments
GRADE LEVEL EXPECTATION	S3.1.	Data Collection and Analysis
EXPECTATION	S3.1.1.	Know the meanings of a sample from a population and a census of a population, and distinguish between Comparing Methods of Data Collection (Easiteach) TABLES D

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S3:	Samples, Surveys and Experiments
GRADE LEVEL EXPECTATION	S3.1.	Data Collection and Analysis
EXPECTATION	S3.1.2.	Identify possible sources of bias in data collection, sampling methods and simple experiments; describe how such bias can be reduced and controlled by random sampling; explain the impact of such bias on conclusions made from analysis of the data; and know the effect of replication on the precision of estimates. Comparing Methods of Data Collection (Easiteach) TABLES D

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S3:	Samples, Surveys and Experiments
GRADE LEVEL EXPECTATION	S3.1.	Data Collection and Analysis
EXPECTATION	S3.1.3.	Distinguish between an observational study and an experimental study, and identify, in context, the Determining Line of Fit Determining Line of Fit Determining Line of Fit Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle The Circumference Function The Circumference Function The Circumference Function
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations
GRADE LEVEL EXPECTATION	S4.1.	Probability
EXPECTATION	S4.1.1.	Understand and construct sample spaces in simple situations Find Probabilities Using Permutations and Combinations Fractions Are Fun Sort It

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations

GRADE LEVEL EXPECTATION	S4.1.	Probability
EXPECTATION	S4.1.2.	Define mutually exclusive events, independent events, dependent events, compound events, complementary events, and conditional probabilities; and use the definitions to compute probabilities. Chance It Construct and Interpret Binomial Distribution Counting Principle Permutations Dice Roller & Penny Flipper Find Probabilities and Odds Find Probabilities of Compound Events Finding Probabilities Disjoint and Overlapping Events Finding Probability of Independent and Dependent Events Leads in Coin Tossing PROBABILITY PROBABILITY Sort It The Birthday Problem Two Dice with Histogram What Chance Have I got
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations
GRADE LEVEL EXPECTATION	S4.2.	Application and Representation
EXPECTATION	S4.2.1.	Compute probabilities of events using tree diagrams, formulas for combinations and permutations, Venn Adds to One Construct and Interpret Binomial Distribution Dice Roller & Penny Flipper Expectations for Roulette Find Probabilities and Odds Leads in Coin Tossing PROBABILITY PROBABILITY The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations
GRADE LEVEL EXPECTATION	S4.2.	Application and Representation
EXPECTATION	S4.2.2.	Apply probability concepts to practical situations, in such settings as finance, health, ecology, or epidemiology Assumptions

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.6.	Explain the importance of the irrational numbers square root of 2 an square root of 3 in basic right triangle trigonometry, and the importance of pi because of its role in circle relationships. ANGLE04PZDH ANGLE04ZDH Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle

		The 30-60 Right Triangle The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.2.	Representations and Relationships
EXPECTATION	L1.2.3.	Use vectors to represent quantities that have magnitude and direction, interpret direction and magnitude of a vector numerically, and calculate the sum and difference of two vectors. Block on a Frictionless Inclined Plane CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Forces on a Simple Pendulum How to Add and Subtract Vectors How to Add and Subtract Vectors How to Add and Subtract Vectors Introduction to Vectors Introduction to Vectors

		Introduction to Vectors VECTORS VECTORS Vector Cross Product Vector Cross Product Vector Operations in Three Dimensions Vector Projections

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.3.	Measurement Units, Calculations, and Scales
EXPECTATION	L2.3.1.	Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly. Volume of Prisms and Cylinders

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof
GRADE LEVEL EXPECTATION	L3.1.	Mathematical Reasoning
EXPECTATION	L3.1.1.	Distinguish between inductive and deductive reasoning, identifying and providing examples of each. Appling Deductive Reasoning Boundaries Critical Thinking - Dividing Land Critical Thinking - Dividing Land Cube Conundrum Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason

		Short cut to Finding Areas of dot-paper polygons Short cut to finding areas of dot-paper polygons Tilted Squares Triangle Proofs Using Inductive Reasoning
EXPECTATION	L3.1.2.	Differentiate between statistical arguments (statements verified empirically using examples or data) and logical arguments based on the rules of logic. Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)
EXPECTATION	L3.1.3.	Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics. Identify and give examples of each. An IMO Triangle Problem Analyze Conditional Statements Appling Deductive Reasoning Coordinate Proof Coordinate Proof Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euler Line Game of Buried Treasure Game of Buried Treasure Lines and Angles Parallel and Perpendicular Line Proofs Polygon Proof - Interior Angle Sums of Polygons (GSP) Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Thales' Theorem Triangle Proofs Triangle Review - Interior and Exterior Angles (GSP) Using Postulates and Diagrams

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof
GRADE LEVEL EXPECTATION	L3.2.	Language and Laws of Logic
EXPECTATION	L3.2.1.	Know and use the terms of basic logic. An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams
EXPECTATION	L3.2.2.	Use the connectives "not," "and," "or," and "if..., then," in mathematical and everyday settings. Know the truth table of each connective and how to logically negate statements involving these connectives. Analyze Conditional Statements Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs
EXPECTATION	L3.2.3.	Use the quantifiers "there exists" and "all" in mathematical and everyday settings and know how to logically An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams

EXPECTATION	L3.2.4.	Write the converse, inverse, and contrapositive of an "If..., then..." statement. Use the fact, in mathematical and everyday settings, that the contrapositive is logically equivalent to the original while the inverse and converse are not. Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof
GRADE LEVEL EXPECTATION	L3.3.	Proof
EXPECTATION	L3.3.1.	Know the basic structure for the proof of an "If..., then..." statement (assuming the hypothesis and ending with the conclusion) and that proving the contrapositive is equivalent. Analyze Conditional Statements
EXPECTATION	L3.3.2.	Construct proofs by contradiction. Use counter-examples, when appropriate, to disprove a statement. Tilted Squares
EXPECTATION	L3.3.3.	Explain the difference between a necessary and a sufficient condition within the statement of a theorem. Determine the correct conclusions based on interpreting a theorem in which necessary or sufficient conditions in the theorem or hypothesis are satisfied. Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.1.	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.1.	Solve multistep problems and construct proofs involving vertical angles, linear pairs of angles, supplementary angles, complementary angles, and right angles.

		Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet Circle Geometry Worksheet Golden Ratio 1 Line up Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP) Types of Angles
EXPECTATION	G1.1.2.	Solve multistep problems and construct proofs involving corresponding angles, alternate interior angles, alternate exterior angles, and same-side (consecutive) interior angles. Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Pantograph Linkage Parallel and Perpendicular Line Proofs Properties of Parallel Lines Properties of Parallel Lines

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.1.	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.3.	Perform and justify constructions, including midpoint of a line segment and bisector of an angle, using A Rectangle with Maximum Area A Rectangle with Maximum Area A Triangle Area Problem A Triangle Area Problem Accurate Constructions - Animations Software Advanced Construction Napolean's Theorem Advanced Construction Napolean's Theorem Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Application of Parabolas Application of Parabolas Compass Animations - Constructions Using Straight Edge and Compasses Software Compass Animations Software

Constructing Templates for the Platonic Solids
Constructing Templates for the Platonic Solids
Constructing Templates for the Platonic Solids
Creating Complex Design's
Creating Complex Design's
Ellipse
Ellipse Projects
Ellipse Projects
Ellipse Projects
Ellipse Projects
Ellipse- Check for understanging the definition
Ellipse- Check for understanging the definition
Ellipse- Check for understanging the definition
Ellipse- Check for understanging the definition
Ellispse -Eccentricty
Euclid's Proposition 1 - Equilateral Triangles
Euclid's Proposition 1 - Equilateral Triangles
Exploring the Euler Segment
Exploring the Euler Segment
Functions in A Triangle
Functions in A Triangle
Hyperbola
Hyperbola
Hyperbola
Lines and Angles
Morley's Triangle - Application of Angle Trisection
Morley's Triangle - Application of Angle Trisection
Off at a Tangent - Exploring the Tangent to a Circle (GSP)
Parabola
Parabola
Parabola
Parabola
Properties of Parallel Lines
Properties of Parallel Lines
Reflecting Without the Reflect Command: The Algebra of Reflection
Reflecting Without the Reflect Command: The Algebra of Reflection
Some Ellipse Relationships
Summarizing Properties of Quadrilaterals
Summarizing Properties of Quadrilaterals
Trisecting an Angle
Trisecting an Angle
Using Slope to Determine if Lines are Parallel or Perpendicular
Using Slope to Determine if lines are Parallel or Perpendicular
Using the Equilateral Triangle - Surfer & Spotter

		Using the Equilateral Triangle - Surfer & Spotter
EXPECTATION	G1.1.4.	Given a line and a point, construct a line through the point that is parallel to the original line using straightedge and compass. Given a line and a point, construct a line through the point that is perpendicular to the original line. Justify the steps of the constructions. Accurate Constructions - Animations Software Compass Animations - Constructions Using Straight Edge and Compasses Software Off at a Tangent - Exploring the Tangent to a Circle (GSP) Properties of Parallel Lines Properties of Parallel Lines Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular
EXPECTATION	G1.1.5.	Given a line segment in terms of its endpoints in the coordinate plane, determine its length and midpoint. Determining the Origin Determining the Origin AREA AREA AREA CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Cycle Ride Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Determining the Origin Distance between 2 points Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.1.	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.6.	Recognize Euclidean geometry as an axiom system. Know the key axioms and understand the meaning of and distinguish between undefined terms, axioms, definitions, and theorems.

		Lines and Angles Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Thales' Theorem Using Postulates and Diagrams
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties
EXPECTATION	G1.2.1.	Prove that the angle sum of a triangle is 180 degrees and that an exterior angle of a triangle is the sum of the ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet Calculating Exterior Angles of Triangles Worksheet Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles Polygon Problems - Exterior Angles of Polygons (GSP) Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP)

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties
EXPECTATION	G1.2.2.	Construct and justify arguments and solve multistep problems involving angle measure, side length, perimeter, ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA AREA AREA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software CIRCLES CIRCLESX Calculating Angles in Polygons Worksheet Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles PERCENT Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Related Rates: Triangle Angle and Area TRIGONOMETRY Tilted Squares Triangle Area and Perimeters Triangle Area and Perimeters Write and Evaluate Expressions
EXPECTATION	G1.2.3.	Know a proof of the Pythagorean Theorem, and use the Pythagorean Theorem and its converse to solve multi-

		Coordinate Proof Coordinate Proof Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Divide and Rule - Dividing Line Segments in a Given Ratio (GSP). Pythagorean Theorem Pythagorean Theorem 3D Pythagorean Triples Round the Bend Sum of Parts TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties
EXPECTATION	G1.2.4.	Prove and use the relationships among the side lengths and the angles of 30 degree - 60 degree - 90 degrees triangles and 45 degree - 45 degree - 90 degree triangles. ANGLE04PZDH ANGLE04ZDH The 30-60 Right Triangle The 30-60 Right Triangle

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties
EXPECTATION	G1.2.5.	Solve multistep problems and construct proofs about the properties of medians, altitudes and perpendicular bisectors to the sides of a triangle, and the angle bisectors of a triangle. Using a straightedge and compass, construct these lines. Advanced Construction Napolean's Theorem Advanced Construction Napolean's Theorem An IMO Triangle Problem Euler Line Exploring the Euler Segment Exploring the Euler Segment Investigating the Properties of Excircles of a Triangle Investigating the Properties of Excircles of a Triangle Morley's Triangle - Application of Angle Trisection Morley's Triangle - Application of Angle Trisection Triangle Inequalities Triangle Inequalities Using the Equilateral Triangle - Surfer & Spotter Using the Equilateral Triangle - Surfer & Spotter

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.3.	Triangles and Trigonometry
EXPECTATION	G1.3.1.	Define the sine, cosine, and tangent of acute angles in a right triangle as ratios of sides. Solve problems about angles, side lengths, or areas using trigonometric ratios in right triangles. ANGLE04PZDH ANGLE04ZDH Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem

		Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle The 30-60 Right Triangle The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem

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Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.3.	Triangles and Trigonometry
EXPECTATION	G1.3.2.	Know and use the Law of Sines and the Law of Cosines and use them to solve problems. Find the area of a triangle with sides a and b and included angle theta using the formula Area = (1/2) absin theta. ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH

		ANGLE04XAHB ANGLE04ZDA CIRCLES CIRCLESX Law of Cosines Law of Sines Related Rates: Triangle Angle and Area TRIGONOMETRY TRIGONOMETRY The Law of Cosines The Law of Cosines The Law of Sines The Law of Sines
EXPECTATION	G1.3.3.	Determine the exact values of sine, cosine, and tangent for 0 degrees, 30 degrees, 45 degrees, 60 degrees, and their integer multiples and apply in various contexts. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Composing Trigonometric and Inverse Trigonometric Functions Continued Fraction Approximations of the Tangent Function How Far Can One See from a Height? Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions

		Trigonometric Functions Illustrated Trigonometric Ratios Trigonometric Ratios Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.4.	Quadrilaterals and Their Properties
EXPECTATION	G1.4.1.	Solve multistep problems and construct proofs involving angle measure, side length, diagonal length, perimeter, and area of squares, rectangles, parallelograms, kites, and trapezoids. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA Area Review BOUNDS Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Exterior and Interior Angles of Regular Polygons Worksheet Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Tilted Squares Write and Evaluate Expressions

Michigan Curriculum Standards

Mathematics

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.4.	Quadrilaterals and Their Properties
EXPECTATION	G1.4.2.	Solve multistep problems and construct proofs involving quadrilaterals using Euclidean methods or coordinate

		Coordinate Proof Coordinate Proof
EXPECTATION	G1.4.3.	Describe and justify hierarchical relationships among quadrilaterals. Analyze Conditional Statements Golden Ratio 1 Special Midpoint Quadrilaterals Special Midpoint Quadrilaterals Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals
EXPECTATION	G1.4.4.	Prove theorems about the interior and exterior angle sums of a quadrilateral. ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA Calculating Angles in Polygons Worksheet Calculating Exterior Angles of Triangles Worksheet Exterior and Interior Angles of Regular Polygons Worksheet Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Polygon Problems - Exterior Angles of Polygons (GSP) Triangle Review - Interior and Exterior Angles (GSP)
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.5.	Other Polygons and Their Properties
EXPECTATION	G1.5.1.	Know and use subdivision or circumscription methods to find areas of polygons. Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Pick's Theorem

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.5.	Other Polygons and Their Properties
EXPECTATION	G1.5.2.	Know, justify, and use formulas for the perimeter and area of a regular n-gon and formulas to find interior and exterior angles of a regular n-gon and their sums. Calculating Angles in Polygons Worksheet Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Exterior and Interior Angles of Regular Polygons Worksheet Golden Ratio 1 Interior & Exterior Angles Polygon Proof - Interior Angle Sums of Polygons (GSP)

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.6.	Circles and Their Properties
EXPECTATION	G1.6.1.	Solve multistep problems involving circumference and area of circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) Arc Resolution Area of a Circle from Segments CIRCLESX Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Finding Volume of Cylinder and Sphere Introduction to Radians Introduction to Radians Introduction to Radians Keeping on Track Length of a Coiled Rope The Circumference Function The Circumference Function The Circumference Function

		The Cycloid The Cycloid Two Wheel Belt What's my surface? Write and Evaluate Expressions
EXPECTATION	G1.6.2.	Solve problems and justify arguments about chords and lines tangent to circles. ANGLE ANGLE ANGLE Ford Circles Hyperbola Hyperbola Hyperbola Inscribed Angle Subtended Chord Intersecting Circles Off at a Tangent - Exploring the Tangent to a Circle (GSP) Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Thales' Theorem The Statue of Regiomontanus Two Wheel Belt
EXPECTATION	G1.6.3.	Solve problems and justify arguments about central angles, inscribed angles, and triangles in circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) ANGLE ANGLE ANGLE ANGLE Circle Geometry Worksheet Inscribed Angle Subtended Chord Properties of Circles Part 2 (GSP) Thales' Theorem
EXPECTATION	G1.6.4.	Know and use properties of arcs and sectors, and find lengths of arcs and areas of sectors. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) Arc Resolution CIRCLES CIRCLESX CIRCLESX Circle Geometry Worksheet

		Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Thales' Theorem

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.8.	Three-dimensional Figures
EXPECTATION	G1.8.1.	Solve multistep problems involving surface area and volume of pyramids, prisms, cones, cylinders, AREA AREA BOUNDS Cylinder Hemisphere Cone FORMULAE Finding Volume of Cylinder and Sphere Missing Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones What's my surface?

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G2:	Relationships Between Figures
GRADE LEVEL EXPECTATION	G2.1.	Relationships Between Area and Volume Formulas

EXPECTATION	G2.1.1.	Know and demonstrate the relationships between the area formula of a triangle, the area formula of a parallelogram, and the area formula of a trapezoid. Area of a Circle from Segments Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons
EXPECTATION	G2.1.2.	Know and demonstrate the relationships between the area formulas of various quadrilaterals. Area of a Circle from Segments Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry**
STANDARD	G2:	Relationships Between Figures
GRADE LEVEL EXPECTATION	G2.2.	Relationships Between Two-dimensional and Three-dimensional Representations
EXPECTATION	G2.2.1.	Identify or sketch a possible three-dimensional figure, given two-dimensional views. Create a two-dimensional representation of a three-dimensional figure. 3-D Shape Explorer - Surface Area of Rectangular Prisms Software 3D Shape Builder Software
EXPECTATION	G2.2.2.	Identify or sketch cross sections of three-dimensional figures. Identify or sketch solids formed by revolving two- 3-D Shape Explorer - Surface Area of Rectangular Prisms Software Which Model
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry**
STANDARD	G2:	Relationships Between Figures
GRADE LEVEL EXPECTATION	G2.3.	Congruence and Similarity
EXPECTATION	G2.3.1.	Prove that triangles are congruent using the SSS, SAS, ASA, and AAS criteria and that right triangles are congruent using the hypotenuse-leg criterion.

		Appling Deductive Reasoning CONGRUENCE Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.2.	Use theorems about congruent triangles to prove additional theorems and solve problems, with and without use of coordinates. Appling Deductive Reasoning CONGRUENCE Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.3.	Prove that triangles are similar by using SSS, SAS, and AA conditions for similarity. Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.4.	Use theorems about similar triangles to solve problems with and without use of coordinates. Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.5.	Know and apply the theorem stating that the effect of a scale factor of k relating one two-dimensional figure to another or one three-dimensional figure to another, on the length, area, and volume of the figures, is to multiply each by k, k^2, and k^3, respectively. AREA AREA Area and Volume of Similar Shapes Worksheet (2). Area and Volume of Similar Shapes Worksheet (1). Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Cube Conundrum Global Warming Zoom

		Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle Surface Area and Volumes of Spheres Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) What is the Meaning of Multiplication What is the Meaning of Multiplication

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G3:	Transformations of Figures in the Plane
GRADE LEVEL EXPECTATION	G3.1.	Distance-preserving Transformations Isometries
EXPECTATION	G3.1.1.	Define reflection, rotation, translation, and glide reflection and find the image of a figure under a given Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Reflection-Shortest Path Application of Reflection-Shortest Path Application of Translation - Block Design Application of Translation- Block Design Application of Translation- Block Design Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Critical Thinking - Shortest Path- Laser

		Critical Thinking - Shortest Path- Laser Fishy Transformations - Combined Transformations (GSP) Game of Buried Treasure Game of Buried Treasure Kaleidoscopic Polygons MATRICES Matrix Transformations: "F" Practice Shortest Path - Feed and Water Practice Shortest Path - Feed and Water Proportional Triangle Nesting Reflection in Geometry and Algebra Reflection in Geometry and Algebra Reflections over Intersecting Lines Reflections over Intersecting Lines Reflections over Intersecting Lines Reflections over Two Parallel lines Reflections over Two Parallel lines Reflections over Two Parallel lines Rotation in the Coordinate Plane Rotation in the Coordinate Plane Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations Transformations Transformations Translate to Enlarge - Dilation of 2-D Shapes (GSP) Translation in the Coordinate Plane Translation in the Coordinate Plane Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects

Michigan Curriculum Standards

Mathematics

Grade 9

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G3:	Transformations of Figures in the Plane
GRADE LEVEL EXPECTATION	G3.1.	Distance-preserving Transformations Isometries
EXPECTATION	G3.1.2.	Given two figures that are images of each other under an isometry, find the isometry and describe it

		Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations
EXPECTATION	G3.1.3.	Find the image of a figure under the composition of two or more isometries and determine whether the resulting figure is a reflection, rotation, translation, or glide reflection image of the original figure. Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G3:	Transformations of Figures in the Plane
GRADE LEVEL EXPECTATION	G3.2.	Shape-preserving Transformations: Dilations and Isometries
EXPECTATION	G3.2.1.	Know the definition of dilation and find the image of a figure under a given dilation. AREA AREA Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Introducing Proportion Introducing Proportion

		Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP) Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects
EXPECTATION	G3.2.2 .	Given two figures that are images of each other under some dilation, identify the center and magnitude of the [illegible] AREA AREA Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle

		Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP) Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects What is the Meaning of Multiplication What is the Meaning of Multiplication

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from
GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.1	Know the different properties that hold in different number systems and recognize that the applicable properties change in the transition from the positive integers to all integers, to the rational numbers, and to Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Reason Using Properties from Algebra Subtracting Integers Subtracting Integers Subtracting Integers

		The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication What is the Meaning of Multiplication

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Grade 10

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from
GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.2	Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Identity Elements and Inverses Identity Elements and Inverses Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers

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Grade 10

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from

GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.3	Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations. Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses Into Multiplying Integers Into Multiplying Integers Into Multiplying Integers Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication What is the Meaning of Multiplication
EXPECTATION	L1.1.4	Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number by a number less than 0, a number between 0 and 1, and a number greater than 1. EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS Fractional Parts of Powers of Rationals

		INVERSES Into Multiplying Integers Into Multiplying Integers Into Multiplying Integers Negative Exponents and Parentheses Worksheet (1) Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (2) Powerful RADICALS Rules with Negative Exponents Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from these representations
GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.5	Justify numerical relationships Boundaries EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS FRACTIONS Finding Square Roots Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations INVERSES PERCENT PERCENT PUZSQC40

		RADICALS RADICALS RADICALS RADICALS RADICALS SEQPUZ08 SEQPUZ25 SEQUP13 Solving Percent Problems

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from these representations
GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.6	Explain the importance of the irrational numbers square root of 2 and square root of 3 in basic right triangle trigonometry, and the importance of pi because of its role in circle relationships. ANGLE04PZDH ANGLE04ZDH Am I Rational or Irrational Arc Resolution Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? Introduction to Radians Introduction to Radians Introduction to Radians Rational Number Explorer SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY

		TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle The 30-60 Right Triangle The Circumference Function The Circumference Function The Circumference Function The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem
STRAND / STANDARD CATEGORY	**MI.L.**	**Quantitative Literacy and Logic (L)**
STANDARD	**L1:**	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from these representations
GRADE LEVEL EXPECTATION	**L1.2**	Representations and Relationships
EXPECTATION	**L1.2.1**	Use mathematical symbols to represent quantitative relationships and situations. A Perfect Square Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Find the Number GRAPHS A GRAPHS A GRAPHS A

		GRAPHS A GRAPHS A Graphing Graphing Linear Inequalities Laws Line Plot Multiplication by Adding Logs Multiplying Binomials QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically Solve It Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from
GRADE LEVEL EXPECTATION	L1.2	Representations and Relationships
EXPECTATION	L1.2.2	Interpret representations that reflect absolute value relationships in such contexts as error tolerance. BOUNDS BOUNDS BOUNDS Boundaries How Far is it PERCENT
EXPECTATION	L1.2.3	Use vectors to represent quantities that have magnitude and direction, interpret direction and magnitude of a vector numerically, and calculate the sum and difference of two vectors. Block on a Frictionless Inclined Plane CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM

		CO-ORD GEOM Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Forces on a Simple Pendulum How to Add and Subtract Vectors How to Add and Subtract Vectors How to Add and Subtract Vectors Introduction to Vectors Introduction to Vectors Introduction to Vectors VECTORS VECTORS Vector Cross Product Vector Cross Product Vector Operations in Three Dimensions Vector Projections

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from these representations
GRADE LEVEL EXPECTATION	L1.2	Representations and Relationships
EXPECTATION	L1.2.4	Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media. AVERAGE Analyzing Predictions (Easiteach) Box and Whisker C-FREQUENCY COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS DEVIATION

		DEVIATION DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Determining Line of Fit Determining Line of Fit Determining Line of Fit Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Games Galore HISTOGRAMS Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MEAN MOVING AV Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Two-Variable Data Part 1 Normal Distributions PROBABILITY PROBABILITY Pick and Mix Family QUARTILES QUARTILES QUARTILES QUARTILES Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS TABLES D TABLES D The Circumference Function The Circumference Function The Circumference Function

Grade 10

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from
GRADE LEVEL EXPECTATION	L1.3	Counting and Probabilistic Reasoning
EXPECTATION	L1.3.1	Describe, explain, and apply various counting techniques; relate combinations to Pascal's triangle; know when Binomial Theorem COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS Christmas Stocking Identity Combinations and the Binomial Theorem Counting Principle Permutations DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Find Probabilities Using Permutations and Combinations Let's Count On Pascal's Triangle Pick and Mix Family
EXPECTATION	L1.3.2	Define and interpret commonly used expressions of probability. Experimental and Theoretical Probability

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the

GRADE LEVEL EXPECTATION	L2.1	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.2	Calculate fluently with numerical expressions involving exponents; use the rules of exponents; evaluate numerical expressions involving rational and negative exponents; transition easily between roots and EXPONENTS EXPONENTS EXPONENTS Evaluate nth Roots Get In Lane Order of Operations Order of Operations Order of Operations Positive Exponents and Parentheses Worksheet (1) Switch - Calculations Software
EXPECTATION	L2.1.3	Explain the exponential relationship between a number and its base 10 logarithm and use it to relate rules of logarithms to those of exponents in expressions involving numbers. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Multiplication by Adding Logs Properties of Logarithms Solving Logarithmic and Exponential Equations

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.1	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.4	Know that the complex number i is one of two solutions to x^2 = -1. Game of Buried Treasure Game of Buried Treasure Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers

		Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers Proving Identities -Disproving Non - Identities
EXPECTATION	L2.1.5	Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers. Complex Conjugates Expansion of a Polynomial Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers
STRAND / STANDARD CATEGORY	**MI.L.**	**Quantitative Literacy and Logic (L)**
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.2	Sequences and Iteration
EXPECTATION	L2.2.1	Find the nth term in arithmetic, geometric, or other simple sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series And So On Area Ratios - Squares Define and Use Sequences and Series EQUATIONS Ford Circles Generating Arithmetic and Geometric Sequences Geometric Series Coil Geometric Series Coil Gifts Galore & Phoning friends Haunted House - Generating Terms of a Sequence Software Limits of Infinite Sequences Models of Geometric Series Models of Geometric Series Models of Geometric Series

		Pyramids SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Use Recursive Rules with Sequences and Functions
EXPECTATION	L2.2.2	Compute sums of finite arithmetic and geometric sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.2	Sequences and Iteration
EXPECTATION	L2.2.3	Use iterative processes in such examples as computing compound interest or applying approximation

		A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set Compound Interest Compound Interests Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Functions involving e Geometric Series Coil Geometric Series Coil Geometric Square Root Construction IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series Models of Geometric Series PERCENT Ratio of Similarity Ratio of Similarity Ratio of Similarity Simple vs Compound Interest The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the

GRADE LEVEL EXPECTATION	L2.2	Sequences and Iteration
EXPECTATION	L2.2.4	Compute sums of infinite geometric sequences. (Recommended) A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.3	Measurement Units, Calculations, and Scales
EXPECTATION	L2.3.1	Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly. Volume of Prisms and Cylinders
EXPECTATION	L2.3.2	Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel A Sequence Approach to Logs A Sequence Approach to Logs

		A Sequence Approach to Logs Elementary Transcendental Functions and Their Inverses Exponential Decay Function Explorer 2D Functions Graphing Functions with Four Parameters Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Multiplication by Adding Logs Solving Logarithmic and Exponential Equations

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.4	Understanding Error
EXPECTATION	L2.4.1	Determine what degree of accuracy is reasonable for measurements in a given situation; express accuracy through use of significant digits, error tolerance, or percent of error; describe how errors in measurements are magnified by computation; recognize accumulated error in applied situations. BOUNDS BOUNDS BOUNDS Boundaries EXPONENTS How Far is it PERCENT
STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false
GRADE LEVEL EXPECTATION	L3.1	Mathematical Reasoning
EXPECTATION	L3.1.1	Distinguish between inductive and deductive reasoning, identifying and providing examples of each.

		Algebra Wipeout Software Number Pyramids - Algebra Software
EXPECTATION	L3.1.2	Differentiate between statistical arguments (statements verified empirically using examples or data) and logical arguments based on the rules of logic. Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)
EXPECTATION	L3.1.3	Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics. Identify and give examples of each. An IMO Triangle Problem Analyze Conditional Statements Appling Deductive Reasoning Coordinate Proof Coordinate Proof Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euler Line Game of Buried Treasure Game of Buried Treasure Lines and Angles Parallel and Perpendicular Line Proofs Polygon Proof - Interior Angle Sums of Polygons (GSP) Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Thales' Theorem Triangle Proofs Triangle Review - Interior and Exterior Angles (GSP) Using Postulates and Diagrams

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false.
GRADE LEVEL EXPECTATION	L3.2	Language and Laws of Logic
EXPECTATION	L3.2.1	Know and use the terms of basic logic. An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams
EXPECTATION	L3.2.2	Use the connectives "not," "and," "or," and "if..., then," in mathematical and everyday settings. Know the truth table of each connective and how to logically negate statements involving these connectives. Analyze Conditional Statements Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs
EXPECTATION	L3.2.3	Use the quantifiers "there exists" and "all" in mathematical and everyday settings and know how to logically An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false
GRADE LEVEL EXPECTATION	L3.2	Language and Laws of Logic
EXPECTATION	L3.2.4	Write the converse, inverse, and contrapositive of an "if..., then..." statement. Use the fact, in mathematical and everyday settings, that the contrapositive is logically equivalent to the original, while the inverse and Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs
STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false
GRADE LEVEL EXPECTATION	L3.3	Proof
EXPECTATION	L3.3.1	Know the basic structure for the proof of an "if..., then..." statement (assuming the hypothesis and ending with the conclusion) and that proving the contrapositive is equivalent. Analyze Conditional Statements
EXPECTATION	L3.3.2	Construct proofs by contradiction. Use counterexamples, when appropriate, to disprove a statement. Tilted Squares
EXPECTATION	L3.3.3	Explain the difference between a necessary and a sufficient condition within the statement of a theorem. Determine the correct conclusions based on interpreting a theorem in which necessary or sufficient conditions Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP)

		Inside Space Transform - Combined Transformations (GSP)

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.1	Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables. Balancing Act Part II Changing Formulas Codebreaker 2 - Simplification Software Constructing Simple Arguments (Easiteach) Escape the Cave - Using Letters to Represent Unknown Numbers Software Expression Machine FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Newton's Law of Cooling Reflecting Function Plots Write and Evaluate Expressions Writing and Solving Ratios and Proportions

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)

STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.2	Know the definitions and properties of exponents and roots transition fluently between them, and apply them EXPONENTS EXPONENTS EXPONENTS INDICES A Introduction to Exponents Introduction to Exponents Negative Exponents and Parentheses Worksheet (1) Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (1) Positive Exponents and Parentheses Worksheet (2) Powerful Roughly the Answer Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.3	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product Algebra Quiz Difference of Squares EXPRESSIONS FACTORISE

		Factoring Binomials Factoring Polynomials Completely Factoring Trinomials Factoring Trinomials Using Algebra Tiles Integer Polynomial Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Operations with Polynomials (division) QUADRATICS QUADRATICS QUADRATICS QUADRATICSx What Expression

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas.
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.4	Add, subtract, multiply, and simplify polynomials and rational expressions. A Perfect Square Algebra Quiz Binomial Theorem Cube Conundrum Expansion of a Polynomial FRACTIONS A FRACTIONS A FRACTIONS A Intro to Multiplication of Binomials Introduction to Multiplication of Binomials Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software

		Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Matrices Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Multiplying Binomials Number Pyramids - Algebra Software Operations with Polynomials Operations with Polynomials (addition and subtraction) Operations with Polynomials (division) Operations with Polynomials (multiplication) Polynomial Long Multiplication QUADRATICS Recognizing Quadratics
EXPECTATION	A1.1.6	Transform exponential and logarithmic expressions into equivalent forms using the properties of exponents and logarithms, including the inverse relationship between exponents and logarithms. Solving Logarithmic and Exponential Equations
EXPECTATION	A1.1.7	Transform trigonometric expressions into equivalent forms using basic identities such as sin^2 theta + cos^2 theta = 1 and tan^2 theta + 1 = sec^2 theta (Recommended) Analytic Trigonometry Analytic Trigonometry Analytic Trigonometry Apply Double-Angle and Half Angle Formulas Apply Sum and Difference Formulas Identities in Calculus Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Verify Trigonometric Identities

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)

STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.1	Write equations and inequalities with one or two variables to represent mathematical or applied situations, Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models EQUATIONS Find the Number GRAPHS A Graphing Linear Inequalities Inequalities and Absolute Value Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Line Plot QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically Solving Inequalities Using the Number Line Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.3	Solve linear and quadratic equations and inequalities including systems of up to three linear equations with three unknowns. Justify steps in the solution, and apply the quadratic formula appropriately.

		Algebra Quiz
		Algebraic Solutions to Polynomial Equations
		Annotated Quadratic Polynomial
		Balancing Act Part II
		Completing the Square
		Complex Conjugates
		Evaluate the Determinant and Apply Cramer's Rule
		Find the Number
		Finding Numbers that satisfy two or more equations
		Finding Numbers that satisfy two or more equations
		Finding Solutions by Undoing Steps
		Finding Solutions by Undoing Steps
		Finding Solutions by Undoing Steps
		Functions
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		Graph of Inequalities
		Graphing Linear Inequalities
		Inequalities and Absolute Value
		Intro to Equations
		Intro to Equations
		Intro to Equations
		Introduction to Equations
		Matrices
		Methods of Solving Linear Systems of Equations and Inequalities
		Methods of Solving Quadratic
		Multivariate Linear Systems and Row Operations
		QUADRATICS
		QUADRATICS
		QUADRATICSx
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		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		Quadratic Formula and the Discriminant
		Real Zeros of Polynomial Functions

		Reviewing Quadratic Roots Reviewing Quadratic Roots SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS Solve It Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Solving Inequalities Using the Number Line Solving Inequalities Worksheet (1) Solving Inequalities Worksheet (2) Solving Inequalities Worksheet (3) Solving Inequalities Worksheet (4) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Try Try Try Again Using Inverse Matrices to solve Linear Systems Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations Using the Quadratic Formula an Interpreting the Discriminant
EXPECTATION	A1.2.4	Solve absolute value equations and inequalities, and justify steps in the solution. Inequalities and Absolute Value Solving Absolute Equations and Inequalities Solving Inequalities Using the Number Line

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas

GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.5	Solve polynomial equations and equations involving rational expressions, and justify steps in the solution. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra Functions Functions Real Zeros of Polynomial Functions

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.6	Solve power equations and equations including radical expressions, justify steps in the solution, and explain End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Simplifying Radical Expressions and Equations
EXPECTATION	A1.2.7	Solve exponential and logarithmic equations, and justify steps in the solution. Carbon Dating Functions Functions Newton's Law of Cooling Solving Logarithmic and Exponential Equations

EXPECTATION	A1.2.8	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. CO-ORD GEOM CO-ORD GEOM Changing Formulas TRANSPOSITION
EXPECTATION	A1.2.9	Know common formulas and apply appropriately in contextual situations. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CUBITP22 Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs PERCENT Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders

		Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.10	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Elementary Transcendental Functions and Their Inverses Evaluate Inverse Trigonometric Functions Function Explorer 2D Functions Illustrating Cosine with the Unit Circle II Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem
STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so
GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and A Balanced View Composition of Functions Composition of Functions Composition of Functions

		Defining and Graphing Relations Difference of Squares Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functional Geometry Functional Geometry Functions Functions and Relations Functions and Relations Functions and Relations Functions and Relations Functions in A Triangle Functions in A Triangle Horizontal Line Test, Vertical Line Test How do I look Increasing, Decreasing, and Constant Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Inverse Reflection Principle Iterations and functions Iterations and functions Mapping Diagrams Sum of Parts Tilted Squares Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.2	Read, interpret, and use function notation and evaluate a function at a value in its domain. FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Reflecting Function Plots Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs
EXPECTATION	A2.1.3	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations. A Balanced View A Perfect Square Analyze Arithmetic and Geometric Sequence and Series And So On Balancing Act Part II CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Changing Formulas Comparing Linear, Exponential and Quadratic Models Complex Zeros and the Fundamental Theorem of Algebra Composition of Functions Composition of Functions Composition of Functions Define and Use Sequences and Series Defining and Graphing Relations Domain and Range of Dynagraphs & Cartesian Graphs

Domain and Range of Dynagraphs & Cartesian Graphs
Domain and Range of Dynagraphs & Cartesian Graphs
EQUATIONS
Exlploring odd and even functions
Exlploring odd and even functions
Exlploring odd and even functions
Expression Machine
Find the Number
Finding Solutions by Undoing Steps
Finding Solutions by Undoing Steps
Finding Solutions by Undoing Steps
Functions
Functions
GRAPHS A
GRAPHS A
GRAPHS A
GRAPHS A
GRAPHS A
Gifts Galore & Phoning friends
Graphing
Graphing Growth and Decay Functions
Graphing Linear Inequalities
Graphing Square Root Functions
How Slope is Measured
How Slope is Measured
How do I look
Intro to Equations
Intro to Equations
Intro to Equations
Introducing Functions as Dynagraphs
Introducing Functions as Dynagraphs
Introducing Functions as Dynagraphs
Introduction to Equations
Laws
Mapping Diagrams
Modeling Num as Segments & Area
Modeling Num as Segments & Area
Modeling Number as Segments and Areas
Modeling Two-Variable Data Part 1
Modeling Two-Variable Data Part 2
Modeling Two-Variable Data Part 3
Multiplication by Adding Logs
Multiplying Binomials
Power Functions and Their Graphs

		Pyramids QUADRATICSx Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Scientific Notation Worksheet (1) Scientific Notation Worksheet (2) Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Solve It Solving One-step, Two Step, And Multi Step equations Sum 17 Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations What Expression Write and Solve Equations and Inequalities
EXPECTATION	A2.1.4	Recognize that functions may be defined by different expressions over different intervals of their domains; Function Transformations Functions

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.5	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Geometric Series Coil Geometric Series Coil Geometric Square Root Construction IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series Models of Geometric Series Ratio of Similarity Ratio of Similarity Ratio of Similarity The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets Use Recursive Rules with Sequences and Functions

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.6	Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and

An Essential Singularity
Complex Zeros and the Fundamental Theorem of Algebra
Continuity
Cubic Equation
Defining the Limit
Defining the Limit
End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem
Exploring Derivatives: Slope of the Secant Line and Average Rate of Change
Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change
Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change
Exploring Derivatives: Slope of the secant line and average rate of change
Filling Bottles
Function Continuity
Function Continuity
Functions
Functions
Functions
Functions
GRAPHS A
GRAPHS A
GRAPHS A
GRAPHS A
Graphing Quadratic Equations Using Roots
How do we find a Limit? Left hand/Right hand limits
How doe we find a Limit? (Left hand/Right hand limits)
Increasing, Decreasing, and Constant Functions
Limits of Infinite Sequences
Limits: Finite c, Finite L

		Limits: Finite c, Infinite L Limits: Infinite c, Finite L Limits: Infinite c, Infinite L Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Predicting a Velocity Plot Predicting a Velocity Plot QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Rational Functions Real Zeros of Polynomial Functions Reviewing Quadratic Roots Reviewing Quadratic Roots The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e). Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Filling Bottles Functions Functions Graph Classifier Software Increasing, Decreasing, and Constant Functions Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Predicting a Velocity Plot Predicting a Velocity Plot Rational Functions The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Velocity

		Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.2	Operations and Transformations
EXPECTATION	A2.2.2	Apply given transformations to basic functions and represent symbolically. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Derivatives Dilation of Functions Dilation of Functions Dilation of Functions Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game

EXPECTATION	A2.2.3	Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse . A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations
EXPECTATION	A2.2.4	If a function has an inverse, find the expression(s) for the inverse. (Recommended) A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.2	Operations and Transformations
EXPECTATION	A2.2.5	Write an expression for the composition of one function with another; recognize component functions when a function is a composition of other functions. (Recommended) Composition of Functions Composition of Functions Composition of Functions Composition of Functions Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.2	Operations and Transformations
EXPECTATION	A2.2.6	Know and interpret the function notation for inverses and verify that two functions are inverses using A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS

		FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so
GRADE LEVEL EXPECTATION	A2.3	Representations of Functions
EXPECTATION	A2.3.2	Describe the tabular pattern associated with functions having constant rate of change (linear); or variable And So On Comparing Linear, Exponential and Quadratic Models Filling Bottles Graphing Growth and Decay Functions Inverse Proportion Worksheet (3) Modeling Two-Variable Data Part 2 The Laboratory - Relationship Between Two Variables (Software)

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)

STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.4	Models of Real-world Situations Using Families of Functions
EXPECTATION	A2.4.1	Identify the family of function best suited for modeling a given real-world situation. Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Modeling Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3
EXPECTATION	A2.4.2	Adapt the general symbolic form of a function to one that fits the specification of a given situation by using the information to replace arbitrary constants with numbers. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere

		Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.4.3	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM

		Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.4	Models of Real-world Situations Using Families of Functions
EXPECTATION	A2.4.4	Use methods of linear programming to represent and solve simple real-life problems. (Recommended) Application of Graphing Inequalities Application of Graphing Inequalities

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.1	Lines and Linear Functions
EXPECTATION	A3.1.1	Write the symbolic forms of linear functions (standard, point-slope, and slope-intercept) given appropriate CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept GRAPHS A

		Graphing Absolute Value Functions Graphing Absolute Value Functions Graphing Linear Inequalities Iterations and functions Iterations and functions LINES Line Plot Line up Modeling Two-Variable Data Part 1 Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Circumference Function The Circumference Function The Circumference Function The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns
EXPECTATION	A3.1.2	Graph lines (including those of the form x = h and y = k) given appropriate information. A Balanced View Comparing Linear, Exponential and Quadratic Models Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Finding the Inverse of a Function and the Inverse Composition Rule Function Transformations Functions and Relations Functions and Relations Functions and Relations GRAPHS A

		GRAPHS A Graphing Functions with Four Parameters How do I look Interactive Slope Introduction to Slope - A measure of Steepness Introduction to Slope: A measure of steepness Inverse Reflection Principle Iterations and functions Iterations and functions Polynomial Roots Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.1	Lines and Linear Functions
EXPECTATION	A3.1.3	Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph. Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A

		GRAPHS A Graphing Functions with Four Parameters Interactive Slope Line Plot Polynomial Roots Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)
EXPECTATION	A3.1.4	Find an equation of the line parallel or perpendicular to given line, through a given point; understand and use the facts that non-vertical parallel lines have equal slopes, and that non-vertical perpendicular lines have CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form LINES Line up Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.2	Exponential and Logarithmic Functions
EXPECTATION	A3.2.1	Write the symbolic form and sketch the graph of an exponential function given appropriate information. Carbon Dating Comparing Linear, Exponential and Quadratic Models

		Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.2	Interpret the symbolic forms and recognize the graphs of exponential and logarithmic functions; recognize the logarithmic function as the inverse of the exponential function. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions

		Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.3	Apply properties of exponential and logarithmic functions. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.4	Understand and use the fact that the base of an exponential function determines whether the function increases or decreases and understand how the base affects the rate of growth or decay. Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions involving e Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function

		Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A.3.2.5	Relate exponential and logarithmic functions to real phenomena, including half-life and doubling time. Carbon Dating Compound Interest Compound Interests Exploration versus Consumption Exponential Decay Functions involving e Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 PERCENT Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Simple vs Compound Interest Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.A.**	**Algebra and Functions (A)**
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.3	Quadratic Functions
EXPECTATION	A3.3.1	Write the symbolic form and sketch the graph of a quadratic function given appropriate information. Animated Projectile Motion

		Annotated Quadratic Polynomial
		Ballistic Trajectories
		Comparing Linear, Exponential and Quadratic Models
		Exploring Parabolas in Vertex Form
		Exploring Parabolas in Vertex Form
		Exploring Parabolas in Vertex Form
		Function Transformations
		Functions
		Functions
		GRAPHS A
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		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		Graph and Solving Quadratic Inequalities
		Graphing Functions with Four Parameters
		Graphing Quadratic Equations
		Graphing Quadratic Equations
		Graphing Quadratic Equations Using Roots
		How do I look
		Methods of Solving Quadratic
		Modeling Two-Variable Data Part 2
		Parabolas in Factored Form
		Parabolas in Factored Form
		Parabolas in Factored Form
		Parabolas in Standard Form
		Parabolas in Standard Form
		Parabolas in Standard Form
		Polynomial Functions of Higher Degree (degrees greater than 2)
		Polynomial Roots
		Power Functions and Their Graphs
		QUADRATICSx
		Quadratic Equation
		Quadratic Formula and the Discriminant
		Real Zeros of Polynomial Functions
		Reflecting Function Plots
		Review of Parabolas
		Review of Parabolas
		Review of Parabolas

		Reviewing Quadratic Roots Reviewing Quadratic Roots Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Sum 17 Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using the Quadratic Formula an Interpreting the Discriminant

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Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.3	Quadratic Functions
EXPECTATION	A3.3.2	Identify the elements of a parabola (vertex, axis of symmetry, direction of opening) given its symbolic form or its graph, and relate these elements to the coefficient(s) of the symbolic form of the function. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Annotated Quadratic Polynomial Dilation of Functions Dilation of Functions Dilation of Functions Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graph and Solving Quadratic Inequalities

		Graphing Functions with Four Parameters Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Quadratic Equation Quadratic Practice Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Review of Parabolas Review of Parabolas Review of Parabolas Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.3	Quadratic Functions
EXPECTATION	A3.3.4	Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function. GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Quadratic Equations Using Roots

		Polynomial Roots QUADRATICSx QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Reviewing Quadratic Roots Reviewing Quadratic Roots Using the Quadratic Formula an Interpreting the Discriminant

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Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.4	Power Functions
EXPECTATION	A3.4.1	Write the symbolic form and sketch the graph of power functions. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.4	Power Functions
EXPECTATION	A3.4.2	Express direct and inverse relationships as functions and recognize their characteristics. Direct Proportion Worksheet (2) Finding out about graphs Functional Geometry

		Functional Geometry Functions in A Triangle Functions in A Triangle How do I look Inverse Proportion Worksheet (3) Inverse Square Laws Rates and Ratios Rates and Ratios Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Sense of Proportion The Circumference Function

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.4	Power Functions
EXPECTATION	A3.4.3	Analyze the graphs of power functions, noting reflectional or rotational symmetry. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Functions Functions Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Review of Parabolas Review of Parabolas Review of Parabolas

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.5	Polynomial Functions
EXPECTATION	A3.5.1	Write the symbolic form and sketch the graph of simple polynomial functions. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.5	Polynomial Functions
EXPECTATION	A3.5.2	Understand the effects of degree, leading coefficient, and number of real zeros on the graphs of polynomial Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions

		Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions
EXPECTATION	A3.5.3	Determine the maximum possible number of zeros of a polynomial function, and understand the relationship between the x-intercepts of the graph and the factored form of the function. Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.6	Rational Functions
EXPECTATION	A3.6.1	Write the symbolic form and sketch the graph of simple rational functions.

		Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically
EXPECTATION	A3.6.2	Analyze graphs of simple rational functions and understand the relationship between the zeros of the numerator and denominator and the function's intercepts, asymptotes, and domain. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically
STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.7	Trigonometric Functions
EXPECTATION	A3.7.1	Use the unit circle to define sine and cosine; approximate values of sine and cosine; use sine and cosine to define the remaining trigonometric functions; explain why the trigonometric functions are periodic. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle

		Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
EXPECTATION	A3.7.2	Use the relationship between degree and radian measures to solve problems. Angles Measured in Degrees and Radians
EXPECTATION	A3.7.3	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of pi/6 and pi/4. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
EXPECTATION	A3.7.4	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Continued Fraction Approximations of the Tangent Function Doppler Effect Elementary Transcendental Functions and Their Inverses

		Family of Curves, Tangents, and Intuition Function Explorer 2D Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle Inset Plot Magnifier Many Sine Curves Modeling Harmonic Motion Modeling Harmonic Motion Nested Trigonometric Function Plots Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP) Soil Temperature TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 Tetraviews of Elementary Functions The Cosecant Function (GSP) The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated

		Trigonometric Functions with Four Parameters
EXPECTATION	A3.7.5	Graph transformations of basic trigonometric functions (involving changes in period, amplitude, and midline) and understand the relationship between constants in the formula and the transformed graph. Doppler Effect Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Many Sine Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Sinusoids and Transformations (GSP) Soil Temperature Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 The Cosecant Function (GSP) Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions with Four Parameters Wave Interference

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.1	Solve multistep problems and construct proofs involving vertical angles, linear pairs of angles supplementary angles, complementary angles, and right angles. Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet Circle Geometry Worksheet Golden Ratio 1 Line up Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP) Types of Angles
EXPECTATION	G1.1.2	Solve multistep problems and construct proofs involving corresponding angles, alternate interior angles, alternate exterior angles, and same-side (consecutive) interior angles. Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Pantograph Linkage Parallel and Perpendicular Line Proofs Properties of Parallel Lines Properties of Parallel Lines

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry

EXPECTATION	G1.1.3	Perform and justify constructions, including midpoint of a line segment and bisector of an angle, using
		A Rectangle with Maximum Area
		A Rectangle with Maximum Area
		A Triangle Area Problem
		A Triangle Area Problem
		Accurate Constructions - Animations Software
		Advanced Construction Napolean's Theorem
		Advanced Construction Napolean's Theorem
		Animation of Angle Properties - Angles on a Straight Line and in Triangles Software
		Application of Parabolas
		Application of Parabolas
		Compass Animations - Constructions Using Straight Edge and Compasses Software
		Compass Animations Software
		Constructing Templates for the Platonic Solids
		Constructing Templates for the Platonic Solids
		Constructing Templates for the Platonic Solids
		Creating Complex Design's
		Creating Complex Design's
		Ellipse
		Ellipse Projects
		Ellipse Projects
		Ellipse Projects
		Ellipse Projects
		Ellipse- Check for understanging the definition
		Ellipse- Check for understanging the definition
		Ellipse- Check for understanging the definition
		Ellipse- Check for understanging the definition
		Ellispse -Eccentricty
		Euclid's Proposition 1 - Equilateral Triangles
		Euclid's Proposition 1 - Equilateral Triangles
		Exploring the Euler Segment
		Exploring the Euler Segment
		Functions in A Triangle
		Functions in A Triangle
		Hyperbola
		Hyperbola
		Hyperbola
		Lines and Angles
		Morley's Triangle - Application of Angle Trisection
		Morley's Triangle - Application of Angle Trisection
		Off at a Tangent - Exploring the Tangent to a Circle (GSP)
		Parabola
		Parabola

		Parabola Parabola Properties of Parallel Lines Properties of Parallel Lines Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Some Ellipse Relationships Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals Trisecting an Angle Trisecting an Angle Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular Using the Equilateral Triangle - Surfer & Spotter Using the Equilateral Triangle - Surfer & Spotter

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures.
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.4	Given a line and a point, construct a line through the point that is parallel to the original line using straightedge and compass. Given a line and a point, construct a line through the point that is perpendicular to the original line. Justify the steps of the constructions. Accurate Constructions - Animations Software Compass Animations - Constructions Using Straight Edge and Compasses Software Off at a Tangent - Exploring the Tangent to a Circle (GSP) Properties of Parallel Lines Properties of Parallel Lines Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.5	Given a line segment in terms of its endpoints in the coordinate plane, determine its length and midpoint. Determining the Origin Determining the Origin AREA AREA AREA CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Cycle Ride Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Determining the Origin Distance between 2 points Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.6	Recognize Euclidean geometry as an axiom system. Know the key axioms and understand the meaning of and distinguish between undefined terms, axioms, definitions, and theorems. Lines and Angles

		Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Thales' Theorem Using Postulates and Diagrams
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry and Trigonometry (G)**
STANDARD	**G1:**	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures.
GRADE LEVEL EXPECTATION	**G1.2**	Triangles and Their Properties
EXPECTATION	**G1.2.1**	Prove that the angle sum of a triangle is 180 degrees and that an exterior angle of a triangle is the sum of the [illegible] ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet Calculating Exterior Angles of Triangles Worksheet Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles Polygon Problems - Exterior Angles of Polygons (GSP) Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP)

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.2	Triangles and Their Properties
EXPECTATION	G1.2.2	Construct and justify arguments and solve multistep problems involving angle measure, side length, perimeter,
		ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA AREA AREA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software CIRCLES CIRCLESX Calculating Angles in Polygons Worksheet Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles PERCENT Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Related Rates: Triangle Angle and Area TRIGONOMETRY Tilted Squares Triangle Area and Perimeters Triangle Area and Perimeters Write and Evaluate Expressions

EXPECTATION	G1.2.3	Know a proof of the Pythagorean Theorem, and use the Pythagorean Theorem and its converse to solve Coordinate Proof Coordinate Proof Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Divide and Rule - Dividing Line Segments in a Given Ratio (GSP). Pythagorean Theorem Pythagorean Theorem 3D Pythagorean Triples Round the Bend Sum of Parts TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.2	Triangles and Their Properties
EXPECTATION	G1.2.4	Prove and use the relationships among the side lengths and the angles of 30 degrees - 60 degrees - 90 degrees triangles and 45 degrees - 45 degrees - 90 degrees triangles. ANGLE04PZDH

		ANGLE04ZDH The 30-60 Right Triangle The 30-60 Right Triangle

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.2	Triangles and Their Properties
EXPECTATION	G1.2.5	Solve multistep problems and construct proofs about the properties of medians, altitudes, perpendicular bisectors to the sides of a triangle, and the angle bisectors of a triangle. Using a straightedge and compass, An IMO Triangle Problem Euler Line Investigating the Properties of Excircles of a Triangle Investigating the Properties of Excircles of a Triangle Morley's Triangle - Application of Angle Trisection Morley's Triangle - Application of Angle Trisection Triangle Inequalities Triangle Inequalities Using the Equilateral Triangle - Surfer & Spotter Using the Equilateral Triangle - Surfer & Spotter
STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.3	Triangles and Trigonometry
EXPECTATION	G1.3.1	Define the sine, cosine, and tangent of acute angles in a right triangle as ratios of sides. Solve problems about angles, side lengths, or areas using trigonometric ratios in right triangles. ANGLE04PZDH ANGLE04ZDH

		Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle The 30-60 Right Triangle The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.3	Triangles and Trigonometry

EXPECTATION	G1.3.2	Know and use the Law of Sines and the Law of Cosines and use them to solve problems. Find the area of a triangle with sides a and b and included angle theta using the formula Area = (1/2) absin theta. ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA CIRCLES CIRCLESX Law of Cosines Law of Sines Related Rates: Triangle Angle and Area TRIGONOMETRY TRIGONOMETRY The Law of Cosines The Law of Cosines The Law of Sines The Law of Sines
EXPECTATION	G1.3.3	Determine the exact values of sine, cosine, and tangent for 0 degrees, 30 degrees, 45 degrees, 60 degrees, and their integer multiples and apply in various contexts. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Composing Trigonometric and Inverse Trigonometric Functions Continued Fraction Approximations of the Tangent Function How Far Can One See from a Height? Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY

		TRIGONOMETRY The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Trigonometric Ratios Trigonometric Ratios Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures.
GRADE LEVEL EXPECTATION	G1.4	Quadrilaterals and Their Properties
EXPECTATION	G1.4.1	Solve multistep problems and construct proofs involving angle measure, side length, diagonal length, perimeter, and area of squares, rectangles, parallelograms, kites, and trapezoids. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA Area Review BOUNDS Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Exterior and Interior Angles of Regular Polygons Worksheet Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Tilted Squares Write and Evaluate Expressions

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.4	Quadrilaterals and Their Properties
EXPECTATION	G1.4.2	Solve multistep problems and construct proofs involving quadrilaterals using Euclidean methods or coordinate Coordinate Proof Coordinate Proof
EXPECTATION	G1.4.3	Describe and justify hierarchical relationships among quadrilaterals. Analyze Conditional Statements Golden Ratio 1 Special Midpoint Quadrilaterals Special Midpoint Quadrilaterals Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals
EXPECTATION	G1.4.4	Prove theorems about the interior and exterior angle sums of a quadrilateral. ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA Calculating Angles in Polygons Worksheet Calculating Exterior Angles of Triangles Worksheet Exterior and Interior Angles of Regular Polygons Worksheet Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Polygon Problems - Exterior Angles of Polygons (GSP) Triangle Review - Interior and Exterior Angles (GSP)
EXPECTATION	G1.4.5	Understand the definition of a cyclic quadrilateral and know and use the basic properties of cyclic Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space

		Transform - Combined Transformations (GSP)
STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.5	Other Polygons and Their Properties
EXPECTATION	G1.5.1	Know and use subdivision or circumscription methods to find areas of polygons. Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Pick's Theorem

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.5	Other Polygons and Their Properties
EXPECTATION	G1.5.2	Know, justify, and use formulas for the perimeter and area of a regular n-gon and formulas to find interior and exterior angles of a regular n-gon and their sums. Calculating Angles in Polygons Worksheet Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Exterior and Interior Angles of Regular Polygons Worksheet Golden Ratio 1 Interior & Exterior Angles Polygon Proof - Interior Angle Sums of Polygons (GSP)

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.6	Circles and Their Properties
EXPECTATION	G1.6.1	Solve multistep problems involving circumference and area of circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) Arc Resolution Area of a Circle from Segments CIRCLESX Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Finding Volume of Cylinder and Sphere Introduction to Radians Introduction to Radians Introduction to Radians Keeping on Track Length of a Coiled Rope The Circumference Function The Circumference Function The Circumference Function The Cycloid The Cycloid Two Wheel Belt What's my surface? Write and Evaluate Expressions
EXPECTATION	G1.6.2	Solve problems and justify arguments about chords and lines tangent to circles. ANGLE ANGLE ANGLE Ford Circles Hyperbola Hyperbola Hyperbola Inscribed Angle Subtended Chord Intersecting Circles Off at a Tangent - Exploring the Tangent to a Circle (GSP)

		Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Thales' Theorem The Statue of Regiomontanus Two Wheel Belt
EXPECTATION	G1.6.3	Solve problems and justify arguments about central angles, inscribed angles, and triangles in circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) ANGLE ANGLE ANGLE ANGLE Circle Geometry Worksheet Inscribed Angle Subtended Chord Properties of Circles Part 2 (GSP) Thales' Theorem
EXPECTATION	G1.6.4	Know and use properties of arcs and sectors and find lengths of arcs and areas of sectors. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) Arc Resolution CIRCLES CIRCLESX CIRCLESX Circle Geometry Worksheet Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Thales' Theorem

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures.
GRADE LEVEL EXPECTATION	G1.7	Conic Sections and Their Properties
EXPECTATION	G.1.7.1	Find an equation of a circle given its center and radius; given the equation of a circle, find its center and

		Conic Sections - Writing Equations of Circles Defining and Graphing Relations
EXPECTATION	G1.7.2	Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones. Application of Parabolas Application of Parabolas Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition
EXPECTATION	G1.7.3	Graph ellipses and hyperbolas with axes parallel to the x- and y-axes, given equations.

		Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations
EXPECTATION	G1.7.4	Know and use the relationship between the vertices and foci in and ellipse, the vertices and foci in a hyperbola, and the directrix and focus in a parabola, interpret these relationships in applied contexts. (Recommended) Application of Parabolas Application of Parabolas Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Sum 17

		Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry and Trigonometry (G)**
STANDARD	**G1:**	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures.
GRADE LEVEL EXPECTATION	**G1.8**	Three- Dimensional Figures
EXPECTATION	**G1.8.1**	Solve multistep problems involving surface area and volume of pyramids, prisms, cones, cylinders,
		3-D Shape Explorer - Surface Area of Rectangular Prisms Software 3D Shape Builder Software AREA AREA BOUNDS Cylinder Hemisphere Cone FORMULAE Finding Volume of Cylinder and Sphere Missing Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Unfolding Prism Nets Animation (Curved Shape) Unfolding Prism Nets Animation (L Shape) Unfolding Prism Nets Animation (T Shape) Unfolding a Cylinder (Animation) Unfolding a Rectangular Prism - W Shape (Animation) Unfolding a Rectangular Prism - T Shape (Animation) Unfolding a Square-based Pyramid (Animation) VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones What's my surface?

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G2:	Relationships Between Figures: Students use and justify relationships between lines, angles, area and volume formulas, and 2- and 3-dimensional representations. They solve problems and provide proofs about congruence
GRADE LEVEL EXPECTATION	G2.1	Relationships Between Area and Volume Formulas
EXPECTATION	G2.1.1	Know and demonstrate the relationships between the area formula of a triangle, the area formula of a parallelogram, and the area formula of a trapezoid. Area of a Circle from Segments Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons
EXPECTATION	G2.1.2	Know and demonstrate the relationships between the area formulas of various quadrilaterals. Area of a Circle from Segments Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons
STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G2:	Relationships Between Figures: Students use and justify relationships between lines, angles, area and volume formulas, and 2- and 3-dimensional representations. They solve problems and provide proofs about congruence
GRADE LEVEL EXPECTATION	G2.2	Relationships Between Two-dimensional and Three-dimensional Representations
EXPECTATION	G2.2.1	Identify or sketch a possible three-dimensional figure, given two-dimensional views. Create a two-dimensional representation of a three-dimensional figure. 3-D Shape Explorer - Surface Area of Rectangular Prisms Software 3D Shape Builder Software
EXPECTATION	G2.2.2	Identify or sketch cross sections of three-dimensional figures. Identify or sketch solids formed by revolving two- 3-D Shape Explorer - Surface Area of Rectangular Prisms Software Which Model

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G2:	Relationships Between Figures: Students use and justify relationships between lines, angles, area and volume formulas, and 2- and 3-dimensional representations. They solve problems and provide proofs about congruence
GRADE LEVEL EXPECTATION	G2.3	Congruence and Similarity
EXPECTATION	G2.3.1	Prove that triangles are congruent using the SSS, SAS, ASA, and AAS criteria, and that right triangles, are congruent using the hypotenuse-leg criterion. Appling Deductive Reasoning CONGRUENCE Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.2	Use theorems about congruent triangles to prove additional theorems and solve problems, with and without Appling Deductive Reasoning CONGRUENCE Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.3	Prove that triangles are similar by using SSS, SAS, and AA conditions for similarity. Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.4	Use theorems about similar triangles to solve problems with and without use of coordinates. Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.5	Know and apply the theorem stating that the effect of a scale factor of k relating one two-dimensional figure to another or one three-dimensional figure to another, on the length, area, and volume of the figures is to

		AREA AREA Area and Volume of Similar Shapes Worksheet (2). Area and Volume of Similar Shapes Worksheet (1). Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Cube Conundrum Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle Surface Area and Volumes of Spheres Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) What is the Meaning of Multiplication What is the Meaning of Multiplication

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G3:	Transformations of Figures in the Plane: Students will solve problems about distance-preserving transformations and shape-preserving transformations. The transformations will be described synthetically
GRADE LEVEL EXPECTATION	G3.1	Distance-preserving Transformations: Isometries
EXPECTATION	G3.1.1	Define reflection, rotation, translation, and glide reflection and find the image of a figure under a given Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Multiplication

		Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Reflection-Shortest Path Application of Reflection-Shortest Path Application of Translation - Block Design Application of Translation- Block Design Application of Translation- Block Design Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Critical Thinking - Shortest Path- Laser Critical Thinking - Shortest Path- Laser Fishy Transformations - Combined Transformations (GSP) Game of Buried Treasure Game of Buried Treasure Kaleidoscopic Polygons MATRICES Matrix Transformations: "F" Practice Shortest Path - Feed and Water Practice Shortest Path - Feed and Water Proportional Triangle Nesting Reflection in Geometry and Algebra Reflection in Geometry and Algebra Reflections over Intersecting Lines Reflections over Intersecting Lines Reflections over Intersecting Lines Reflections over Two Parallel lines Reflections over Two Parallel lines Reflections over Two Parallel lines Rotation in the Coordinate Plane Rotation in the Coordinate Plane Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations Transformations Transformations Translate to Enlarge - Dilation of 2-D Shapes (GSP) Translation in the Coordinate Plane Translation in the Coordinate Plane Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G3:	Transformations of Figures in the Plane: Students will solve problems about distance-preserving transformations and shape-preserving transformations. The transformations will be described synthetically
GRADE LEVEL EXPECTATION	G3.1	Distance-preserving Transformations: Isometries
EXPECTATION	G3.1.2	Given two figures that are images of each other under an isometry, find the isometry and describe it Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations
EXPECTATION	G3.1.3	Find the image of a figure under the composition of two or more isometries and determine whether the resulting figure is a reflection, rotation, translation, or glide reflection image of the original figure. Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations
STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G3:	Transformations of Figures in the Plane: Students will solve problems about distance-preserving transformations and shape-preserving transformations. The transformations will be described synthetically
GRADE LEVEL EXPECTATION	G3.2	Shape-preserving Transformations: Dilations and Isometries
EXPECTATION	G3.2.1	Know the definition of dilation and find the image of a figure under a given dilation. AREA AREA Application of Matrix Operations Application of Matrix Operations

		Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP) Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects
EXPECTATION	G3.2.2	Given two figures that are images of each other under some dilation, identify the center and magniture of the [illegible] AREA AREA Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom

		Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP) Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects What is the Meaning of Multiplication What is the Meaning of Multiplication
EXPECTATION	G3.2.3	Find the image of a figure under the composition of a dilation and an isometry. (Recommended) Application of Translation - Block Design Application of Translation- Block Design Application of Translation- Block Design Fishy Transformations - Combined Transformations (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and

GRADE LEVEL EXPECTATION	S1.1	Producing and Interpreting Plots
EXPECTATION	S1.1.1	Construct and interpret dot plots, histograms, relative frequency histograms, bar graphs, basic control charts, and box plots with appropriate labels and scales; determine which kinds of plots are appropriate for different types of data; compare data sets and interpret differences based on graphs and summary statistics. Assumptions Box and Whisker HISTOGRAMS How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Relate

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.1	Producing and Interpreting Plots
EXPECTATION	S1.1.2	Given a distribution of a variable in a data set, describe its shape, including symmetry or skewness, and state how the shape is related to measures of center (mean and median) and measures of variation (range and standard deviation) with particular attention to the effects of outliers on these measures. Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION How Do They Compare Normal Distributions

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and

GRADE LEVEL EXPECTATION	S1.2	Measures of Center and Variation
EXPECTATION	S1.2.1	Calculate and interpret measures of center including: mean, median, and mode; explain uses, advantages and disadvantages of each measure given a particular set of data and its context. AVERAGE Assumptions Box and Whisker C-FREQUENCY DEVIATION DEVIATION How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV QUARTILES QUARTILES QUARTILES QUARTILES TABLES D Use Measures of Central Tendency

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.2	Measures of Center and Variation
EXPECTATION	S1.2.3	Compute and interpret measures of variation, including percentiles, quartiles, interquartile range, variance, Box and Whisker C-FREQUENCY DEVIATION DEVIATION Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Normal Distributions QUARTILES QUARTILES QUARTILES

		QUARTILES TABLES D

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.3	The Normal Distribution
EXPECTATION	S1.3.1	Explain the concept of distribution and the relationship between summary statistics for a data set and Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Normal Distributions

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.3	The Normal Distribution
EXPECTATION	S1.3.2	Describe characteristics of the normal distribution, including its shape and the relationships among its mean, How Do They Compare Normal Distributions
EXPECTATION	S1.3.3	Know and use the fact that about 68%, 95%, and 99.7% of the data lie within one, two, and three standard deviations of the mean, respectively in a normal distribution. How Do They Compare Normal Distributions

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.3	The Normal Distribution
EXPECTATION	S1.3.4	Calculate z-scores, use z-scores to recognize outliers, and use z-scores to make informed decisions. Normal Distributions

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S2:	Bivariate Data - Examining Relationships: Students plot and interpret bivariate data by constructing scatterplots, recognizing linear and nonlinear patterns, and interpreting correlation coefficients; they fit and
GRADE LEVEL EXPECTATION	S2.1	Scatterplots and Correlation
EXPECTATION	S2.1.2	Given a scatterplot, identify patterns, clusters, and outliers. Recognize no correlation, weak correlation, and Analyzing Predictions (Easiteach) Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV Predicting with Linear Models Randomness in the Digits of Pi Randomness in the Digits of Square Roots Relate SCATTERGRAMS

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S2:	Bivariate Data - Examining Relationships: Students plot and interpret bivariate data by constructing scatterplots, recognizing linear and nonlinear patterns, and interpreting correlation coefficients; they fit and

GRADE LEVEL EXPECTATION	S2.1	Scatterplots and Correlation
EXPECTATION	S2.1.3	Estimate and interpret Pearson's correlation coefficient for a scatterplot of a bivariate data set. Recognize that correlation measures the strength of linear association. Analyzing Predictions (Easiteach) Predicting with Linear Models Relate SCATTERGRAMS

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S2:	Bivariate Data - Examining Relationships: Students plot and interpret bivariate data by constructing scatterplots, recognizing linear and nonlinear patterns, and interpreting correlation coefficients; they fit and
GRADE LEVEL EXPECTATION	S2.2	Linear Regression
EXPECTATION	S2.2.1	For bivariate data that appear to form a linear pattern, find the least squares regression line by estimating visually and by calculating the equation of the regression line. Interpret the slope of the equation for a Analyzing Predictions (Easiteach) Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3

		Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S2.2.2	Use the equation of the least squares regression line to make appropriate predictions. Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 SCATTERGRAMS The Circumference Function The Circumference Function The Circumference Function

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S3:	Samples, Surveys, and Experiments: Students understand and apply sampling and various sampling methods, examine surveys and experiments, identify bias in methods of conducting surveys, and learn strategies to
GRADE LEVEL EXPECTATION	S3.1	Data Collection and Analysis

EXPECTATION	S3.1.1	Know the meanings of a sample from a population and a census of a population, and distinguish between Comparing Methods of Data Collection (Easiteach) TABLES D
EXPECTATION	S3.1.2	Identify possible sources of bias in data collection and sampling methods and simple experiments; describe how such bias can be reduced and controlled by random sampling; explain the impact of such bias on conclusions made from analysis of the data; and know the effect of replication on the precision of estimates. Comparing Methods of Data Collection (Easiteach) TABLES D
EXPECTATION	S3.1.3	Distinguish between an observational study and an experimental study, and identify, in context, the Determining Line of Fit Determining Line of Fit Determining Line of Fit Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S3.1.4	Design simple experiments or investigations to collect data to answer questions of interest; interpret and Determining Line of Fit Determining Line of Fit Determining Line of Fit Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S3.1.5	Understand methods of sampling, including random sampling, stratified sampling, and convenience samples, and be able to determine, in context, the advantages and disadvantages of each. (Recommended) Comparing Methods of Data Collection (Easiteach) TABLES D

EXPECTATION	S3.1.6	Explain the importance of randomization, double-blind protocols, replication, and the placebo effect in designing experiments and interpreting the results of studies. (Recommended) Comparing Methods of Data Collection (Easiteach) TABLES D
EXPECTATION	S3.1.7.	Explain the basic ideas of statistical process control, including recording data from a process over time. How Do They Compare Relate
EXPECTATION	S3.1.8.	Read and interpret basic control charts; detect patterns and departures from patterns. (Recommended) How Do They Compare Relate
STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting
GRADE LEVEL EXPECTATION	S4.1	Probability
EXPECTATION	S4.1.1	Understand and construct sample spaces in simple situations. Find Probabilities Using Permutations and Combinations Fractions Are Fun Sort It

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting
GRADE LEVEL EXPECTATION	S4.1	Probability
EXPECTATION	S4.1.2	Define mutually exclusive events, independent events, dependent events, compound events, complementary events and conditional probabilities; and use the definitions to compute probabilities. Chance It

		Construct and Interpret Binomial Distribution Counting Principle Permutations Dice Roller & Penny Flipper Find Probabilities and Odds Find Probabilities of Compound Events Finding Probabilities Disjoint and Overlapping Events Finding Probability of Independent and Dependent Events Leads in Coin Tossing PROBABILITY PROBABILITY Sort It The Birthday Problem Two Dice with Histogram What Chance Have I got
EXPECTATION	S4.1.3	Design and carry out an appropriate simulation using random digits to estimate answers to questions about probability; estimate probabilities using results of a simulation; compare results of simulations to theoretical probabilities. (Recommended) Dice Roller & Penny Flipper Experimental and Theoretical Probability Forest Fire Simulation Using a Randomized Hexagonal Automaton Leads in Coin Tossing The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?
STRAND / STANDARD CATEGORY	**MI.S.**	**Statistics and Probability (S)**
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting principles.
GRADE LEVEL EXPECTATION	S4.2	Application and Representation
EXPECTATION	S4.2.1	Compute probabilities of events using tree diagrams, formulas for combinations and permutations, Venn diagrams, or other organizational tools. Adds to One Construct and Interpret Binomial Distribution Dice Roller & Penny Flipper Expectations for Roulette Find Probabilities and Odds Leads in Coin Tossing PROBABILITY PROBABILITY

		The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting
GRADE LEVEL EXPECTATION	S4.2	Application and Representation
EXPECTATION	S4.2.2	Apply probability concepts to practical situations, in such settings as finance, health, ecology, or Assumptions
STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.1	Know and use a definition of a function to decide if a given relation is a function. Defining and Graphing Relations Difference of Squares FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functional Geometry Functional Geometry Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test How do I look Increasing, Decreasing, and Constant Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs

		Introducing Functions as Dynagraphs Inverse Reflection Principle Iterations and functions Iterations and functions Sum of Parts Tilted Squares Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.2	Perform algebraic operations (including compositions) on functions and apply transformations (translations,
		Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Composition of Functions Composition of Functions Composition of Functions Composition of Functions Derivatives Dilation of Functions Dilation of Functions Dilation of Functions Finding the Inverse of a Function and the Inverse Composition Rule Function Transformations Functions and Relations Functions and Relations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Introduction to Translating Functions

		Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.3	Write an expression for the composition of one given function with another and find the domain, range, and graph of the composite function. Recognize components when a function is composed of two or more elementary functions. Composition of Functions Composition of Functions Composition of Functions Composition of Functions Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.4	Determine whether a function (given symbolically or graphically) has an inverse and express the inverse (symbolically, if the function is given symbolically, or graphically, if given graphically) if it exists. Know and interpret the function notation for inverse

		A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations
GRADE LEVEL EXPECTATION	P1.5	Determine whether two given functions are inverses, using composition. A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.6	Identify and describe discontinuities of a function (e.g., greatest integer function, 1/x) and how these relate Cases of Discontiuity Continuity Function Continuity Function Continuity
GRADE LEVEL EXPECTATION	P1.8	Explain how the rates of change of functions in different families (e.g., linear functions, exponential functions, etc.) differ, referring to graphical representations. And So On Comparing Linear, Exponential and Quadratic Models Filling Bottles Graphing Growth and Decay Functions Inverse Proportion Worksheet (3) Modeling Two-Variable Data Part 2 The Laboratory - Relationship Between Two Variables (Software)

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.7	Understand the concept of limit of a function as x approaches a number or infinity. Use the idea of limit to analyze a graph as it approaches an asymptote. Compute limits of simple functions (e.g., find the limit as x An Essential Singularity Continuity Defining the Limit Defining the Limit Exploring Derivatives: Slope of the Secant Line and Average Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change Exploring Derivatives: Slope of the secant line and average rate of change Function Continuity Function Continuity How do we find a Limit? Left hand/Right hand limits How doe we find a Limit? (Left hand/Right hand limits)

		Limits of Infinite Sequences Limits: Finite c, Finite L Limits: Finite c, Infinite L Limits: Infinite c, Finite L Limits: Infinite c, Infinite L Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P2:	Exponential and Logarithmic Functions
GRADE LEVEL EXPECTATION	P2.1	Use the inverse relationship between exponential and logarithmic functions to solve equations and problems. Solving Logarithmic and Exponential Equations
GRADE LEVEL EXPECTATION	P2.2	Graph logarithmic functions. Graph translations and reflections of these functions. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Elementary Transcendental Functions and Their Inverses Exponential Decay Function Explorer 2D Functions Graphing Functions with Four Parameters Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Multiplication by Adding Logs Solving Logarithmic and Exponential Equations

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P2:	Exponential and Logarithmic Functions
GRADE LEVEL EXPECTATION	P2.3	Compare the large-scale behavior of exponential and logarithmic functions with different bases and recognize that different growth rates are visible in the graphs of the functions

		A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
GRADE LEVEL EXPECTATION	P2.4	Solve exponential and logarithmic equations when possible, (e.g. 5^x=3^(x+1)). For those that cannot be solved analytically, use graphical methods to find approximate solutions. Carbon Dating Functions Functions Newton's Law of Cooling Solving Logarithmic and Exponential Equations
GRADE LEVEL EXPECTATION	P2.5	Explain how the parameters of an exponential or logarithmic model relate to the data set or situation being modeled. Find an exponential or logarithmic function to model a given data set or situation. Solve problems Carbon Dating Exploration versus Consumption Exponential Decay Functions Functions involving e GRAPHS A

		Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Representing Inverse Variation Graphically Representing Inverse Variation Graphically Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.P.**	**Precalculus**
STANDARD	**P3:**	Quadratic Functions
GRADE LEVEL EXPECTATION	**P3.1**	Solve quadratic-type equations (e.g. e^(2x) - 4 e^(x+4)=0) by substitution. Algebra Quiz Annotated Quadratic Polynomial Completing the Square Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Methods of Solving Quadratic QUADRATICS QUADRATICS QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Solving Equations Using Graphs Worksheet (1)

		Solving Equations Using Graphs Worksheet (2) Try Try Try Again Using the Quadratic Formula an Interpreting the Discriminant

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P3:	Quadratic Functions
GRADE LEVEL EXPECTATION	P3.2	Apply quadratic functions and their graphs in the context of motion under gravity and simple optimization ' ' Ballistic Trajectories Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form
GRADE LEVEL EXPECTATION	P3.3	Explain how the parameters of an exponential or logarithmic model relate to the data set or situation being modeled. Find a quadratic function to model a given data set or situation. Ballistic Trajectories Comparing Linear, Exponential and Quadratic Models Exponential Decay Functions GRAPHS A Graphing Growth and Decay Functions Lily Pond Newton's Law of Cooling Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P4:	Polynomial Functions

GRADE LEVEL EXPECTATION	P4.2	Solve polynomial equations and inequalities of degree greater than or equal to three. Graph polynomial functions given in factored form using zeros and their multiplicities, testing the sign-on intervals and analyzing the function behavior near the zeros. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Function Transformations Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters How do I look Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P5:	Rational Functions and Difference Quotients
GRADE LEVEL EXPECTATION	P5.1	Solve equations and inequalities involving rational functions. Graph rational functions given in factored form using zeros, identifying asymptotes, analyzing their behavior for large x values, and testing intervals. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P5:	Rational Functions and Difference Quotients
GRADE LEVEL EXPECTATION	P5.3	Know and apply the definition and geometric interpretation of difference quotient. Simplify difference quotients and interpret difference quotients as rates of change and slopes of secant lines. DIFFERENTIATION DIFFERENTIATION Exploring Derivatives: Slope of the Secant Line and Average Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change Exploring Derivatives: Slope of the secant line and average rate of change Rate of Change Rate of Change Secant Approximations Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Tangent to a Curve

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P6:	Trigonometric Functions
GRADE LEVEL EXPECTATION	P6.1	Define (using the unit circle), graph, and use all trigonometric functions of any angle. Convert between radian and degree measure. Calculate arc lengths in given circles. A Tangent Tracer Angles Measured in Degrees and Radians Comparing Sine and Cosine Comparing Sine and Cosine Continued Fraction Approximations of the Tangent Function Doppler Effect Elementary Transcendental Functions and Their Inverses Family of Curves, Tangents, and Intuition Function Explorer 2D

		Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle Inset Plot Magnifier Many Sine Curves Modeling Harmonic Motion Modeling Harmonic Motion Nested Trigonometric Function Plots Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP) Soil Temperature TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 Tetraviews of Elementary Functions The Cosecant Function (GSP) The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated Trigonometric Functions with Four Parameters Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)

GRADE LEVEL EXPECTATION	P6.2	Graph transformations of the sine and cosine functions (involving changes in amplitude, period, midline, and phase) and explain the relationship between constants in the formula and transformed graph. Doppler Effect Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Many Sine Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Sinusoids and Transformations (GSP) Soil Temperature Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 The Cosecant Function (GSP) Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions with Four Parameters Wave Interference

GRADE LEVEL EXPECTATION	P6.3	Know basic properties of the inverse trigonometric functions sin^-1 x, cos^-1 x, tan^-1 x, including their domains and ranges. Recognize their graphs. Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Elementary Transcendental Functions and Their Inverses Evaluate Inverse Trigonometric Functions Function Explorer 2D Functions Illustrating Cosine with the Unit Circle II Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem
GRADE LEVEL EXPECTATION	P6.4	Know the basic trigonometric identities for sine, cosine, and tangent (e.g., the Pythagorean identities, sum and difference formulas, co-functions relationships, double-angle and half-angle formulas). Analytic Trigonometry Analytic Trigonometry Analytic Trigonometry Apply Double-Angle and Half Angle Formulas Apply Sum and Difference Formulas Identities in Calculus Verify Trigonometric Identities
GRADE LEVEL EXPECTATION	P6.5	Solve trigonometric equations using basic identities and inverse trigonometric functions. Composing Trigonometric and Inverse Trigonometric Functions Solve Trigonometric Equations Two Wheel Belt
GRADE LEVEL EXPECTATION	P6.6	Prove trigonometric identities and derive some of the basic ones (e.g., double-angle formula from sum and difference formulas, half-angle formula from double-angle formula, etc.). Analytic Trigonometry Analytic Trigonometry Analytic Trigonometry Apply Double-Angle and Half Angle Formulas Apply Sum and Difference Formulas Identities in Calculus Verify Trigonometric Identities
GRADE LEVEL EXPECTATION	P6.7	Find a sinusoidal function to model a given data set or situation and explain how the parameters of the model A Tangent Tracer

		Comparing Sine and Cosine Comparing Sine and Cosine Doppler Effect Elementary Transcendental Functions and Their Inverses Family of Curves, Tangents, and Intuition Function Explorer 2D Function Transformations Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle Many Sine Curves Modeling Harmonic Motion Modeling Harmonic Motion Nested Trigonometric Function Plots Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP) Soil Temperature Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03

		The Cosecant Function (GSP) Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated Trigonometric Functions with Four Parameters
STRAND / STANDARD CATEGORY	**MI.P.**	**Precalculus**
STANDARD	**P7:**	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	**P7.1**	Perform operations (addition, subtraction, and multiplication by scalars) on vectors in the plane. Solve applied Block on a Frictionless Inclined Plane CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Forces on a Simple Pendulum How to Add and Subtract Vectors How to Add and Subtract Vectors How to Add and Subtract Vectors VECTORS VECTORS Vector Cross Product Vector Cross Product Vector Operations in Three Dimensions
GRADE LEVEL EXPECTATION	**P7.2**	Know and apply the algebraic and geometric definitions of the dot product of vectors. Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Vector Cross Product Vector Cross Product Vector Operations in Three Dimensions

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P7:	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	P7.3	Know the definitions of matrix addition and multiplication. Add, subtract, and multiply matrices. Multiply a Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Basic Matrix Operations MATRICES MATRICES MATRICES MATRICES MATRICES MATRICES MATRICES Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P7:	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	P7.5	Define the inverse of a matrix and compute the inverse of two-by-two and three-by-three matrices when they Using Inverse Matrices to solve Linear Systems
GRADE LEVEL EXPECTATION	P7.6	Explain the role of determinants in solving systems of linear equations using matrices and compute determinants of two-by-two and three-by-three matrices. EQUATIONS EQUATIONS Evaluate the Determinant and Apply Cramer's Rule Fitting Polynomial Functions Fitting Polynomial Functions

		Fitting Polynomial Functions Matrices Multivariate Linear Systems and Row Operations PUZSQC40 Using Inverse Matrices to solve Linear Systems

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P7:	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	P7.7	Write systems of two and three linear equations in matrix form. Solve such systems using Gaussian elimination EQUATIONS EQUATIONS Evaluate the Determinant and Apply Cramer's Rule Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Matrices Multivariate Linear Systems and Row Operations PUZSQC40 Using Inverse Matrices to solve Linear Systems
GRADE LEVEL EXPECTATION	P7.8	Represent and solve systems of inequalities in two variables and apply these methods in linear programming Application of Graphing Inequalities Application of Graphing Inequalities Graph of Inequalities Solving Inequalities Using the Number Line
STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P8:	Sequences, Series, and Mathematical Induction
GRADE LEVEL EXPECTATION	P8.1	Know, explain, and use sigma and factorial notation. COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS

		COMBINATIONS COMBINATIONS Combinations and the Binomial Theorem Counting Principle Permutations DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Define and Use Sequences and Series Factorial Find Probabilities Using Permutations and Combinations Mathematical Induction Series: A Few Examples Series: Steps on a Number Line
GRADE LEVEL EXPECTATION	P8.2	Given an arithmetic, geometric, or recursively defined sequence, write an expression for the nth term when possible. Write a particular term of a sequence when given the nth term. And So On Define and Use Sequences and Series EQUATIONS Gifts Galore & Phoning friends Make a Difference Pyramids SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax
GRADE LEVEL EXPECTATION	P8.3	Understand, explain, and use the formulas for the sums of finite arithmetic and geometric sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil

		Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets
GRADE LEVEL EXPECTATION	P8.4	Compute the sums of infinite geometric series. Understand and apply the convergence criterion for geometric A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets
GRADE LEVEL EXPECTATION	P8.5	Understand and explain the principle of mathematical induction and prove statements using mathematical A Visual Proof of Nicomachus' Theorem Discrete Mathematics Mathematical Induction PROOF RADICALS Sum of Three Triangular Numbers
GRADE LEVEL EXPECTATION	P8.6	Prove the binomial theorem using mathematical induction. Show its relationships to Pascal's triangle and to combinations. Use the binomial theorem to find terms in the expansion of a binomial to a power greater than Binomial Theorem

		Binomial Theorem Christmas Stocking Identity Combinations and the Binomial Theorem Cube Conundrum DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Expansion of a Polynomial Pascal's Triangle
STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P9:	Polar Coordinates, Parameterizations, and Conic Sections
GRADE LEVEL EXPECTATION	P9.1	Convert between polar and rectangular coordinates. Graph functions given in polar coordinates. Introduction to Polar Coordinates Introduction to Polar Coordinates Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Polar Coordinates
GRADE LEVEL EXPECTATION	P9.2	Write complex numbers in polar form. Know and use De Moivre's Theorem. De Moivre's Theorem and nth Roots Introduction to Polar Coordinates Introduction to Polar Coordinates Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Polar Coordinates Proving Identities -Disproving Non - Identities

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P9:	Polar Coordinates, Parameterizations, and Conic Sections
GRADE LEVEL EXPECTATION	P9.3	Evaluate parametric equations for given values of the parameter. Generalized Arrhenius Function Mbius Monorail

		Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.4	Convert between parametric and rectangular forms of equations. Generalized Arrhenius Function Mbius Monorail Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.5	Graph curves described by parametric equations and find parametric equations for a given graph. Generalized Arrhenius Function Mbius Monorail Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.6	Use parametric equations in applied contexts (e.g., orbits and projectiles) to model situations and solve ' ' Generalized Arrhenius Function Mbius Monorail Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations

		Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.7	Know, explain, and apply the locus definitions of parabolas, ellipses, and hyperbolas and recognize these conic Application of Parabolas Application of Parabolas Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Sum 17 Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition

		Using Geometry to Create Parabolas by Definition
GRADE LEVEL EXPECTATION	P9.8	Identify parabolas, ellipses, and hyperbolas from equations, write the equations in standard form, and sketch an appropriate graph of the conic section. Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations Interactive Conics
GRADE LEVEL EXPECTATION	P9.9	Derive the equation for a conic section from given geometric information (e.g., find the equation of an ellipse given its two axes). Identify key characteristics (e.g. foci and asymptotes) of a conic section from its equation or graph. Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations Interactive Conics

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S1:	Exploring Univariate and Bivariate Data
GRADE LEVEL EXPECTATION	S1.2	Compute and interpret the within-group and between-group variation when comparing two or more data sets. How Do They Compare Relate
GRADE LEVEL EXPECTATION	S1.3	Compute residuals and use plots of residuals to assess the adequacy of a simple linear regression model. How Do They Compare Relate

GRADE LEVEL EXPECTATION	S1.4	Identify influential points in a bivariate data set and predict and verify the effect of their removal on the least- Interpret Stem and Leaf, Histograms, and Box and Whisker Plots
GRADE LEVEL EXPECTATION	S1.5	When applicable, use logarithmic and power transformations to achieve linearity and use the transformed data Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs
GRADE LEVEL EXPECTATION	S1.6	Explore categorical data via contingency tables, computing and interpreting marginal, joint, and conditional relative frequencies and examining measures of association. C-FREQUENCY
STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S2:	Sampling and Study Design
GRADE LEVEL EXPECTATION	S2.1	Describe the strengths and weaknesses of sampling methods, including simple random sampling, stratified random sampling, convenience sampling, voluntary response, and cluster sampling. Recognize potential Comparing Methods of Data Collection (Easiteach) TABLES D

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S2:	Sampling and Study Design
GRADE LEVEL EXPECTATION	S2.2	Critically assess the validity of conclusions drawn from surveys such as political polls, recognizing possible biases such as size bias and non-response bias and understanding the role of question formulation. Comparing Methods of Data Collection (Easiteach) How Do They Compare Relate TABLES D

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S2:	Sampling and Study Design
GRADE LEVEL EXPECTATION	S2.3	Know and recognize in context the concepts of treatment group, control group, and experimental unit and demonstrate the importance of double-blind protocol, random assignment, experimental unit, and replication. Comparing Methods of Data Collection (Easiteach) TABLES D
GRADE LEVEL EXPECTATION	S2.4	Understand and describe how to implement completely randomized and randomized block designs (including matched-pair designs), recognizing when and how blocking can lower variability. How Do They Compare Relate

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.1	Know the subjective and relative frequency interpretations of probabilities, including an informal Experimental and Theoretical Probability

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.2	Use basic probability rules such as the addition rule, law of total probability, and complement rule to compute Chance It Counting Principle Permutations Find Probabilities of Compound Events Finding Probabilities Disjoint and Overlapping Events PROBABILITY PROBABILITY Sort It

		Two Dice with Histogram What Chance Have I got
GRADE LEVEL EXPECTATION	S3.3	Use Bayes' Theorem to solve conditional probability problems, with emphasis on the interpretation of results. Sort It

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.5	Compute the expected value and standard deviation of discrete random variables and know the effect of a linear transformation of a random variable on its mean and standard deviation. DEVIATION DEVIATION Expectations for Roulette Normal Distributions

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.6	Apply standard discrete distributions, including the binomial, geometric, and hypergeometric. Christmas Stocking Identity Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Normal Distributions

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.8	Use tables and technology to determine probabilities and percentiles of normal distributions. How Do They Compare Normal Distributions
GRADE LEVEL EXPECTATION	S3.9	Use simulation methods to answer questions about probability models that are too complex for analytical treatment at this level, e.g., interacting particle system models. Dice Roller & Penny Flipper Forest Fire Simulation Using a Randomized Hexagonal Automaton Leads in Coin Tossing The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S4:	Sampling Distributions
GRADE LEVEL EXPECTATION	S4.1	Given the mean and standard deviation of each random variable in a set of random variables, compute the mean of the sum and, assuming independence, compute the variance and standard deviation of the sum. How Do They Compare Relate
GRADE LEVEL EXPECTATION	S4.6	Compute control limits for commonly used control charts and use these to assess whether a process is out of How Do They Compare Relate

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability

STANDARD	S5:	Point and Interval Estimation
GRADE LEVEL EXPECTATION	S5.1	Compute bias, variance, and mean squared error of estimators of the mean and proportion. Comparing Methods of Data Collection (Easiteach) TABLES D

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.1	Know the terminology and logic of significance testing, including null and alternative hypotheses, p-value, How Do They Compare Relate

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Mathematics

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.2	Assuming a normal model and known standard deviation, carry out a significance test for a single mean, with emphasis on understanding the computation and interpretation of the p-value, and compute the power curve How Do They Compare Normal Distributions

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.3	Carry out (large sample) significance tests for one proportion and the difference of two proportions, with emphasis on proper interpretation of results. How Do They Compare Relate

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.6	Assuming a normal model and known standard deviation, compute the sample size necessary to achieve a pre-specified power at a pre-specified value of the population mean. How Do They Compare Normal Distributions

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.7	Demonstrate, in the context of specific studies, the understanding that a result can be statistically significant while of insignificant practical importance and that a failure to reject a null hypothesis may be due to low power and does not necessarily imply the null hypothesis is true. How Do They Compare Relate

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S7:	Inference for Regression
GRADE LEVEL EXPECTATION	S7.1	Know the statistical model for regression, including linearity, normality of errors, and constancy of error variance. Analyzing Predictions (Easiteach) Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points

		Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S7:	Inference for Regression
GRADE LEVEL EXPECTATION	S7.3	Test hypotheses about the slope of a regression line, with emphasis on interpretation of results. Analyzing Predictions (Easiteach) Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression

		Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S8:	Assessing Assumptions of Statistical Models
GRADE LEVEL EXPECTATION	S8.2	In the context of specific studies, recognize aspects of study design that either support or offer evidence Comparing Methods of Data Collection (Easiteach)
GRADE LEVEL EXPECTATION	S8.3	Demonstrate knowledge of the possible effects of incorrect assumptions (i.e., improperly specified models) on inferential procedures and of the robustness of inferential procedures to departures from specified How Do They Compare Relate

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.1.	Know the different properties that hold in different number systems and recognize that the applicable properties change in the transition from the positive integers to all integers, to the rational numbers, and to

		Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Reason Using Properties from Algebra Subtracting Integers Subtracting Integers Subtracting Integers The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication What is the Meaning of Multiplication

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.2.	Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Identity Elements and Inverses

		Identity Elements and Inverses Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.3.	Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations. Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses Into Multiplying Integers Into Multiplying Integers Into Multiplying Integers Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers

		The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication What is the Meaning of Multiplication
EXPECTATION	L1.1.4.	Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number by a number less than 0, a number between 0 and 1, and a number greater than 1. EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS Fractional Parts of Powers of Rationals INVERSES Into Multiplying Integers Into Multiplying Integers Into Multiplying Integers Negative Exponents and Parentheses Worksheet (1) Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (2) Powerful RADICALS Rules with Negative Exponents Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.5.	Justify numerical relationships. Finding the Inverse of a Function and the Inverse Composition Rule

		Functions and Relations Functions and Relations

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.2.	Representations and Relationships
EXPECTATION	L1.2.2.	Interpret representations that reflect absolute value relationships. Inequalities and Absolute Value Solving Absolute Equations and Inequalities Solving Inequalities Using the Number Line
EXPECTATION	L1.2.4.	Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media. AVERAGE Analyzing Predictions (Easiteach) Box and Whisker C-FREQUENCY COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS DEVIATION DEVIATION DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Determining Line of Fit Determining Line of Fit Determining Line of Fit Functional Geometry Functional Geometry

		Functions in A Triangle Functions in A Triangle Games Galore HISTOGRAMS Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MEAN MOVING AV Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Two-Variable Data Part 1 Normal Distributions PROBABILITY PROBABILITY Pick and Mix Family QUARTILES QUARTILES QUARTILES QUARTILES Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS TABLES D TABLES D The Circumference Function The Circumference Function The Circumference Function

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers

EXPECTATION	L2.1.2.	Calculate fluently with numerical expressions involving exponents; use the rules of exponents; evaluate numerical expressions involving rational and negative exponents; transition easily between roots and EXPONENTS EXPONENTS EXPONENTS Evaluate nth Roots Get In Lane Order of Operations Order of Operations Order of Operations Positive Exponents and Parentheses Worksheet (1) Switch - Calculations Software

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.4.	Know that the imaginary number i is one of two solutions to x^2 = -1. Game of Buried Treasure Game of Buried Treasure Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers Proving Identities -Disproving Non - Identities

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities

GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.1.	Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables. Balancing Act Part II Changing Formulas Codebreaker 2 - Simplification Software Constructing Simple Arguments (Easiteach) Escape the Cave - Using Letters to Represent Unknown Numbers Software Expression Machine FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Newton's Law of Cooling Reflecting Function Plots Write and Evaluate Expressions Writing and Solving Ratios and Proportions

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.2.	Know the properties of exponents and roots and apply them in algebraic expressions. EXPONENTS EXPONENTS EXPONENTS INDICES A Introduction to Exponents Introduction to Exponents Negative Exponents and Parentheses Worksheet (1)

		Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (1) Positive Exponents and Parentheses Worksheet (2) Powerful Roughly the Answer Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.3.	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities. Algebra Quiz Difference of Squares EXPRESSIONS FACTORISE Factoring Binomials Factoring Polynomials Completely Factoring Trinomials Factoring Trinomials Using Algebra Tiles Integer Polynomial Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Operations with Polynomials (division) QUADRATICS QUADRATICS QUADRATICS QUADRATICSx

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.1.	Write equations and inequalities with one or two variables to represent mathematical or applied situations, Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models EQUATIONS Find the Number GRAPHS A Graphing Linear Inequalities Inequalities and Absolute Value Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Line Plot QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically Solving Inequalities Using the Number Line Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.3.	Solve linear and quadratic equations and inequalities including systems of up to three linear equations with three unknowns. Justify steps in the solution, and apply the quadratic formula appropriately. Algebra Quiz Algebraic Solutions to Polynomial Equations Annotated Quadratic Polynomial

		Balancing Act Part II
		Completing the Square
		Complex Conjugates
		Evaluate the Determinant and Apply Cramer's Rule
		Find the Number
		Finding Numbers that satisfy two or more equations
		Finding Numbers that satisfy two or more equations
		Finding Solutions by Undoing Steps
		Finding Solutions by Undoing Steps
		Finding Solutions by Undoing Steps
		Functions
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		Graph of Inequalities
		Graphing Linear Inequalities
		Inequalities and Absolute Value
		Intro to Equations
		Intro to Equations
		Intro to Equations
		Introduction to Equations
		Matrices
		Methods of Solving Linear Systems of Equations and Inequalities
		Methods of Solving Quadratic
		Multivariate Linear Systems and Row Operations
		QUADRATICS
		QUADRATICS
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		Quadratic Formula and the Discriminant
		Real Zeros of Polynomial Functions
		Reviewing Quadratic Roots
		Reviewing Quadratic Roots
		SIMULTANEOUS
		SIMULTANEOUS

		SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS Solve It Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Solving Inequalities Using the Number Line Solving Inequalities Worksheet (1) Solving Inequalities Worksheet (2) Solving Inequalities Worksheet (3) Solving Inequalities Worksheet (4) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Try Try Try Again Using Inverse Matrices to solve Linear Systems Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations Using the Quadratic Formula an Interpreting the Discriminant
EXPECTATION	A1.2.4.	Solve absolute value equations and inequalities and justify steps in the solution. Inequalities and Absolute Value Solving Absolute Equations and Inequalities Solving Inequalities Using the Number Line
EXPECTATION	A1.2.6.	Solve power equations and equations including radical expressions; justify steps in the solution, and explain End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Simplifying Radical Expressions and Equations
EXPECTATION	A1.2.8.	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable.

		CO-ORD GEOM CO-ORD GEOM Changing Formulas TRANSPOSITION

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1.	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and
		A Balanced View Composition of Functions Composition of Functions Composition of Functions Defining and Graphing Relations Difference of Squares Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functional Geometry Functional Geometry Functions Functions and Relations Functions and Relations Functions and Relations Functions and Relations Functions in A Triangle Functions in A Triangle Horizontal Line Test, Vertical Line Test How do I look

		Increasing, Decreasing, and Constant Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Inverse Reflection Principle Iterations and functions Iterations and functions Mapping Diagrams Sum of Parts Tilted Squares Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation and evaluate a function at a value in its domain. FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Reflecting Function Plots Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations.

A Perfect Square
Analyze Arithmetic and Geometric Sequence and Series
And So On
Balancing Act Part II
CO-ORD GEOM
CO-ORD GEOM
CO-ORD GEOM
Changing Formulas
Comparing Linear, Exponential and Quadratic Models
Composition of Functions
Composition of Functions
Composition of Functions
Define and Use Sequences and Series
Domain and Range of Dynagraphs & Cartesian Graphs
Domain and Range of Dynagraphs & Cartesian Graphs
Domain and Range of Dynagraphs & Cartesian Graphs
EQUATIONS
Find the Number
Finding Solutions by Undoing Steps
Finding Solutions by Undoing Steps
Finding Solutions by Undoing Steps
GRAPHS A
GRAPHS A
GRAPHS A
GRAPHS A
GRAPHS A
Gifts Galore & Phoning friends
Graphing
Graphing Linear Inequalities
How Slope is Measured
How Slope is Measured
How do I look
Intro to Equations
Intro to Equations
Intro to Equations
Introducing Functions as Dynagraphs
Introducing Functions as Dynagraphs
Introducing Functions as Dynagraphs
Introduction to Equations
Laws
Modeling Num as Segments & Area
Modeling Num as Segments & Area
Modeling Number as Segments and Areas

		Modeling Two-Variable Data Part 1 Multiplication by Adding Logs Multiplying Binomials Pyramids QUADRATICSx Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Scientific Notation Worksheet (1) Scientific Notation Worksheet (2) Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Solve It Solving One-step, Two Step, And Multi Step equations Sum 17 Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations What Expression Write and Solve Equations and Inequalities
EXPECTATION	A2.1.4.	Recognize that functions may be defined by different expressions over different intervals of their domains; Function Transformations Functions

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.5.	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Geometric Series Coil Geometric Series Coil Geometric Square Root Construction IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series Models of Geometric Series Ratio of Similarity Ratio of Similarity Ratio of Similarity The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets Use Recursive Rules with Sequences and Functions

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.6.	Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and

An Essential Singularity
Complex Zeros and the Fundamental Theorem of Algebra
Continuity
Cubic Equation
Defining the Limit
Defining the Limit
End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem
Exploring Derivatives: Slope of the Secant Line and Average Rate of Change
Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change
Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change
Exploring Derivatives: Slope of the secant line and average rate of change
Filling Bottles
Function Continuity
Function Continuity
Functions
Functions
Functions
Functions
GRAPHS A
GRAPHS A
GRAPHS A
GRAPHS A
Graphing Quadratic Equations Using Roots
How do we find a Limit? Left hand/Right hand limits
How doe we find a Limit? (Left hand/Right hand limits)
Increasing, Decreasing, and Constant Functions
Limits of Infinite Sequences
Limits: Finite c, Finite L
Limits: Finite c, Infinite L
Limits: Infinite c, Finite L
Limits: Infinite c, Infinite L
Polynomial Fitter
Polynomial Functions of Higher Degree (degrees greater than 2)
Polynomial Roots
Predicting a Velocity Plot

		Predicting a Velocity Plot QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Rational Functions Real Zeros of Polynomial Functions Reviewing Quadratic Roots Reviewing Quadratic Roots The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.1.7.	Identify and interpret the key features of a function from its graph or its formula(s). Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Filling Bottles Functions Functions Graph Classifier Software Increasing, Decreasing, and Constant Functions Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Predicting a Velocity Plot Predicting a Velocity Plot Rational Functions The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.2.	Apply given transformations to parent functions and represent symbolically. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Derivatives Dilation of Functions Dilation of Functions Dilation of Functions Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game
EXPECTATION	A2.2.3.	Determine whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse . A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule

		Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

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Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.3.	Representations of Functions
EXPECTATION	A2.3.2.	Describe the tabular pattern associated with functions having a constant rate of change (linear); or variable And So On Comparing Linear, Exponential and Quadratic Models Filling Bottles Graphing Growth and Decay Functions Inverse Proportion Worksheet (3) Modeling Two-Variable Data Part 2 The Laboratory - Relationship Between Two Variables (Software)

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.4.	Models of Real-World Situations Using Families of Functions
EXPECTATION	A2.4.1.	Identify the family of function best suited for modeling a given real-world situation.

		Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Modeling Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3
EXPECTATION	A2.4.2.	Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions

		Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.4.3.	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons

		Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
STRAND / STANDARD CATEGORY	**MI.AI.**	**Algebra I**
STANDARD	**A3:**	Families of Functions
GRADE LEVEL EXPECTATION	**A3.1.**	Lines and Linear Functions
EXPECTATION	**A3.1.1.**	Write the symbolic forms of linear functions (standard, point-slope, and slope-intercept) given appropriate CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM

		CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept GRAPHS A Graphing Absolute Value Functions Graphing Absolute Value Functions Graphing Linear Inequalities Iterations and functions Iterations and functions LINES Line Plot Line up Modeling Two-Variable Data Part 1 Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Circumference Function The Circumference Function The Circumference Function The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns
EXPECTATION	A3.1.2.	Graph lines (including those of the form x = h and y = k) given appropriate information. A Balanced View Comparing Linear, Exponential and Quadratic Models Determine Equation Using y = mx + b

		Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Finding the Inverse of a Function and the Inverse Composition Rule Function Transformations Functions and Relations Functions and Relations Functions and Relations GRAPHS A GRAPHS A Graphing Functions with Four Parameters How do I look Interactive Slope Introduction to Slope - A measure of Steepness Introduction to Slope: A measure of steepness Inverse Reflection Principle Iterations and functions Iterations and functions Polynomial Roots Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.1.	Lines and Linear Functions
EXPECTATION	A3.1.3.	Relate the coefficients in a linear function to the slope and x- and y- intercepts of its graph. Determine Equation Using y = mx + b

		Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Interactive Slope Line Plot Polynomial Roots Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)
EXPECTATION	A3.1.4.	Find an equation of the line parallel or perpendicular to given line, through a given point; understand and use the facts that non-vertical parallel lines have equal slopes, and that non-vertical perpendicular lines have slopes that multiply to give -1 CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form LINES Line up Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular

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Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.2.	Exponential and Logarithmic Functions
EXPECTATION	A3.2.1.	Write the symbolic form and sketch the graph of an exponential function given appropriate information. Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.4.	Understand and use the fact that the base of an exponential function determines whether the function increases or decreases and how base affects the rate of growth or decay. Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions involving e Graphing Functions with Four Parameters

		Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.5.	Relate exponential functions to real phenomena, including half-life and doubling time. Carbon Dating Compound Interest Compound Interests Exploration versus Consumption Exponential Decay Functions involving e Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 PERCENT Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Simple vs Compound Interest Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.AI.**	**Algebra I**
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.3.	Quadratic Functions
EXPECTATION	A3.3.1.	Write the symbolic form and sketch the graph of a quadratic function given appropriate information.

Animated Projectile Motion
Annotated Quadratic Polynomial
Ballistic Trajectories
Comparing Linear, Exponential and Quadratic Models
Exploring Parabolas in Vertex Form
Exploring Parabolas in Vertex Form
Exploring Parabolas in Vertex Form
Function Transformations
Functions
Functions
GRAPHS A
GRAPHS A
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GRAPHS A
GRAPHS A
GRAPHS A
GRAPHS A
GRAPHS A
Graph and Solving Quadratic Inequalities
Graphing Functions with Four Parameters
Graphing Quadratic Equations
Graphing Quadratic Equations
Graphing Quadratic Equations Using Roots
How do I look
Methods of Solving Quadratic
Modeling Two-Variable Data Part 2
Parabolas in Factored Form
Parabolas in Factored Form
Parabolas in Factored Form
Parabolas in Standard Form
Parabolas in Standard Form
Parabolas in Standard Form
Polynomial Functions of Higher Degree (degrees greater than 2)
Polynomial Roots
Power Functions and Their Graphs
QUADRATICSx
Quadratic Equation
Quadratic Formula and the Discriminant
Real Zeros of Polynomial Functions
Reflecting Function Plots
Review of Parabolas

		Review of Parabolas Review of Parabolas Reviewing Quadratic Roots Reviewing Quadratic Roots Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Sum 17 Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using the Quadratic Formula an Interpreting the Discriminant

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Mathematics

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.3.	Quadratic Functions
EXPECTATION	A3.3.2.	Identify the elements of a parabola (vertex, axis of symmetry, direction of opening) given its symbolic form or its graph, and relate these elements to the coefficient(s) of the symbolic form of the function. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Annotated Quadratic Polynomial Dilation of Functions Dilation of Functions Dilation of Functions Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A

		GRAPHS A Graph and Solving Quadratic Inequalities Graphing Functions with Four Parameters Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Quadratic Equation Quadratic Practice Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Review of Parabolas Review of Parabolas Review of Parabolas Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.3.	Quadratic Functions
EXPECTATION	A3.3.4.	Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function. GRAPHS A GRAPHS A GRAPHS A GRAPHS A

		Graphing Quadratic Equations Using Roots Polynomial Roots QUADRATICSx QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Reviewing Quadratic Roots Reviewing Quadratic Roots Using the Quadratic Formula an Interpreting the Discriminant

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.4.	Power Functions
EXPECTATION	A3.4.1.	Write the symbolic form and sketch the graph of power functions. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.4.	Power Functions
EXPECTATION	A3.4.2.	Express directly and inversely proportional relationships as functions and recognize their characteristics. Direct Proportion Worksheet (2) Finding out about graphs Functional Geometry

		Functional Geometry Functions in A Triangle Functions in A Triangle How do I look Inverse Proportion Worksheet (3) Inverse Square Laws Rates and Ratios Rates and Ratios Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Sense of Proportion The Circumference Function

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.4.	Power Functions
EXPECTATION	A3.4.3.	Analyze the graphs of power functions, noting reflectional or rotational symmetry. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Functions Functions Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Review of Parabolas Review of Parabolas Review of Parabolas

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.5.	Polynomial Functions
EXPECTATION	A3.5.1.	Write the symbolic form and sketch the graph of simple polynomial functions. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.5.	Polynomial Functions
EXPECTATION	A3.5.2.	Understand the effects of degree, leading coefficient, and number of real zeros on the graphs of polynomial Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions

		Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions
EXPECTATION	A3.5.3.	Determine the maximum possible number of zeroes of a polynomial function and understand the relationship between the x-intercepts of the graph and the factored form of the function. Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions
STRAND / STANDARD CATEGORY	**MI.AI.**	**Algebra I**
STANDARD	S2:	Bivariate Data-Examining Relationships
GRADE LEVEL EXPECTATION	S2.1.	Scatter plots and Correlation
EXPECTATION	S2.1.2.	Given a scatter plot, identify patterns, clusters, and outliers. Recognize no correlation, weak correlation, and Analyzing Predictions (Easiteach) Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV Predicting with Linear Models Randomness in the Digits of Pi Randomness in the Digits of Square Roots

		Relate SCATTERGRAMS

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	S2:	Bivariate Data-Examining Relationships
GRADE LEVEL EXPECTATION	S2.1.	Scatter plots and Correlation
EXPECTATION	S2.1.3.	Estimate and interpret Pearson's correlation coefficient for a scatter plot of a bivariate data set. Recognize that correlation measures the strength of linear association. Analyzing Predictions (Easiteach) Predicting with Linear Models Relate SCATTERGRAMS

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	S2:	Bivariate Data-Examining Relationships
GRADE LEVEL EXPECTATION	S2.2.	Linear Regression
EXPECTATION	S2.2.1.	For bivariate data that appear to form a linear pattern, find the least squares regression line by estimating visually and by calculating the equation of the regression line. Interpret the slope of the equation for a Analyzing Predictions (Easiteach) Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Functional Geometry Functional Geometry

		Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S2.2.2.	Use the equation of the least squares regression line to make appropriate predictions. Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 SCATTERGRAMS The Circumference Function The Circumference Function The Circumference Function

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.2.	Representations and Relationships
EXPECTATION	L1.2.1.	Use mathematical symbols to represent quantitative relationships and situations. A Perfect Square Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Find the Number GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Graphing Linear Inequalities Laws Line Plot Multiplication by Adding Logs Multiplying Binomials QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically Solve It Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.3.	Counting and Probabilistic Reasoning

EXPECTATION	L1.3.1.	Describe, explain, and apply various counting techniques; relate combinations to Pascal's triangle; know when Binomial Theorem COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS Christmas Stocking Identity Combinations and the Binomial Theorem Counting Principle Permutations DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Find Probabilities Using Permutations and Combinations Let's Count On Pascal's Triangle Pick and Mix Family
EXPECTATION	L1.3.2.	Define and interpret commonly used expressions of probability. Experimental and Theoretical Probability

Michigan Curriculum Standards

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.3.	Explain the exponential relationship between a number and its base 10 logarithm, and use it to relate rules of logarithms to those of exponents in expressions involving numbers. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Multiplication by Adding Logs Properties of Logarithms

		Solving Logarithmic and Exponential Equations

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Grade 10

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.5.	Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers. Complex Conjugates Expansion of a Polynomial Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.2.	Sequences and Iteration
EXPECTATION	L2.2.1.	Find the nth term in arithmetic, geometric, or other simple sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series And So On Area Ratios - Squares Define and Use Sequences and Series EQUATIONS Ford Circles Generating Arithmetic and Geometric Sequences Geometric Series Coil Geometric Series Coil

		Gifts Galore & Phoning friends Haunted House - Generating Terms of a Sequence Software Limits of Infinite Sequences Models of Geometric Series Models of Geometric Series Models of Geometric Series Pyramids SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Use Recursive Rules with Sequences and Functions
EXPECTATION	L2.2.2.	Compute sums of finite arithmetic and geometric sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets

Michigan Curriculum Standards

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Grade 10

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation

GRADE LEVEL EXPECTATION	L2.2.	Sequences and Iteration
EXPECTATION	L2.2.3.	Use iterative processes in such examples as computing compound interest or applying approximation A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set Compound Interest Compound Interests Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Functions involving e Geometric Series Coil Geometric Series Coil Geometric Square Root Construction IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series Models of Geometric Series PERCENT Ratio of Similarity Ratio of Similarity Ratio of Similarity Simple vs Compound Interest The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation

GRADE LEVEL EXPECTATION	L2.3.	Measurement Units, Calculations, and Scales
EXPECTATION	L2.3.2.	Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Elementary Transcendental Functions and Their Inverses Exponential Decay Function Explorer 2D Functions Graphing Functions with Four Parameters Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Multiplication by Adding Logs Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.4.	Understanding Error
EXPECTATION	L2.4.1.	Determine what degree of accuracy is reasonable for measurements in a given situation; express accuracy through use of significant digits, error tolerance, or percent of error; describe how errors in measurements are magnified by computation; recognize accumulated error in applied situations. BOUNDS BOUNDS BOUNDS Boundaries EXPONENTS How Far is it PERCENT

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II

STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.1.	Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables. Balancing Act Part II Changing Formulas Codebreaker 2 - Simplification Software Constructing Simple Arguments (Easiteach) Escape the Cave - Using Letters to Represent Unknown Numbers Software Expression Machine FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Newton's Law of Cooling Reflecting Function Plots Write and Evaluate Expressions Writing and Solving Ratios and Proportions

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Grade 10

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.4.	Add, subtract, multiply, and simplify polynomials and rational expressions. A Perfect Square Algebra Quiz Binomial Theorem Cube Conundrum Expansion of a Polynomial FRACTIONS A

		FRACTIONS A FRACTIONS A Intro to Multiplication of Binomials Introduction to Multiplication of Binomials Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Matrices Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Multiplying Binomials Number Pyramids - Algebra Software Operations with Polynomials Operations with Polynomials (addition and subtraction) Operations with Polynomials (division) Operations with Polynomials (multiplication) Polynomial Long Multiplication QUADRATICS Recognizing Quadratics
EXPECTATION	A1.1.6.	Transform exponential and logarithmic expressions into equivalent forms using the properties of exponents and logarithms, including the inverse relationship between exponents and logarithms. Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.5.	Solve polynomial equations and equations involving rational expressions and justify steps in the solution. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra Functions Functions Real Zeros of Polynomial Functions

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.7.	Solve exponential and logarithmic equations and justify steps in the solution. Carbon Dating Functions Functions Newton's Law of Cooling Solving Logarithmic and Exponential Equations
EXPECTATION	A1.2.8.	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable, CO-ORD GEOM CO-ORD GEOM Changing Formulas TRANSPOSITION
EXPECTATION	A1.2.9.	Know common formulas and apply appropriately in contextual situations. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CUBITP22 Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons FORMULAE

		Finding Volume of Cylinder and Sphere Finding out about graphs PERCENT Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise

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Mathematics

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.10.	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Elementary Transcendental Functions and Their Inverses Evaluate Inverse Trigonometric Functions Function Explorer 2D Functions Illustrating Cosine with the Unit Circle II Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1.	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function, and
		A Balanced View
		Composition of Functions
		Composition of Functions
		Composition of Functions
		Defining and Graphing Relations
		Difference of Squares
		Domain and Range of Dynagraphs & Cartesian Graphs
		Domain and Range of Dynagraphs & Cartesian Graphs
		Domain and Range of Dynagraphs & Cartesian Graphs
		FUNCTIONS
		FUNCTIONS
		FUNCTIONS
		FUNCTIONS
		FUNCTIONS
		Finding the Inverse of a Function and the Inverse Composition Rule
		Functional Geometry
		Functional Geometry
		Functions
		Functions and Relations
		Functions and Relations
		Functions and Relations
		Functions and Relations
		Functions in A Triangle
		Functions in A Triangle
		Horizontal Line Test, Vertical Line Test
		How do I look
		Increasing, Decreasing, and Constant Functions
		Introducing Functions as Dynagraphs
		Introducing Functions as Dynagraphs
		Introducing Functions as Dynagraphs
		Inverse Reflection Principle
		Iterations and functions
		Iterations and functions
		Mapping Diagrams

		Sum of Parts Tilted Squares Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation, and evaluate a function at a value in its domain. FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Reflecting Function Plots Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words, and translate among representations. A Perfect Square Analyze Arithmetic and Geometric Sequence and Series And So On Balancing Act Part II CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM

		Changing Formulas
		Comparing Linear, Exponential and Quadratic Models
		Composition of Functions
		Composition of Functions
		Composition of Functions
		Define and Use Sequences and Series
		Domain and Range of Dynagraphs & Cartesian Graphs
		Domain and Range of Dynagraphs & Cartesian Graphs
		Domain and Range of Dynagraphs & Cartesian Graphs
		EQUATIONS
		Find the Number
		Finding Solutions by Undoing Steps
		Finding Solutions by Undoing Steps
		Finding Solutions by Undoing Steps
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		Gifts Galore & Phoning friends
		Graphing
		Graphing Linear Inequalities
		How Slope is Measured
		How Slope is Measured
		How do I look
		Intro to Equations
		Intro to Equations
		Intro to Equations
		Introducing Functions as Dynagraphs
		Introducing Functions as Dynagraphs
		Introducing Functions as Dynagraphs
		Introduction to Equations
		Laws
		Modeling Num as Segments & Area
		Modeling Num as Segments & Area
		Modeling Number as Segments and Areas
		Modeling Two-Variable Data Part 1
		Multiplication by Adding Logs
		Multiplying Binomials
		Pyramids
		QUADRATICSx
		Representing Direct Variation Algebraically and Graphically
		Representing Direct Variation Algebraically and graphically
		Representing Direct Variation Algebraically and graphically

		Representing Inverse Variation Graphically Representing Inverse Variation Graphically SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Scientific Notation Worksheet (1) Scientific Notation Worksheet (2) Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Solve It Solving One-step, Two Step, And Multi Step equations Sum 17 Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations What Expression Write and Solve Equations and Inequalities
EXPECTATION	A2.1.6.	Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and An Essential Singularity Complex Zeros and the Fundamental Theorem of Algebra Continuity Cubic Equation Defining the Limit Defining the Limit End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Exploring Derivatives: Slope of the Secant Line and Average Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change Exploring Derivatives: Slope of the secant line and average rate of change Filling Bottles Function Continuity

		Function Continuity Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Quadratic Equations Using Roots How do we find a Limit? Left hand/Right hand limits How doe we find a Limit? (Left hand/Right hand limits) Increasing, Decreasing, and Constant Functions Limits of Infinite Sequences Limits: Finite c, Finite L Limits: Finite c, Infinite L Limits: Infinite c, Finite L Limits: Infinite c, Infinite L Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Predicting a Velocity Plot Predicting a Velocity Plot QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Rational Functions Real Zeros of Polynomial Functions Reviewing Quadratic Roots Reviewing Quadratic Roots The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.1.7.	Identify and interpret the key features of a function from its graph or its formula(s). Cycle Ride Determine Equation Using y = mx + b Determine Equation Using y=mx +b

		Determine Equation Using y=mx +b End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Filling Bottles Functions Functions Graph Classifier Software Increasing, Decreasing, and Constant Functions Interactive Slope Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Predicting a Velocity Plot Predicting a Velocity Plot Projectile Motion Rational Functions Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Laboratory - Relationship Between Two Variables (Software) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.2.	Apply given transformations to parent functions, and represent symbolically. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Derivatives

		Dilation of Functions Dilation of Functions Dilation of Functions Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game
EXPECTATION	A2.2.3.	Recognize whether a function (given in tabular or graphical form) has an inverse, and recognize simple inverse .
		A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.4.	Models of Real-World Situations Using Families of Functions
EXPECTATION	A2.4.1.	Identify the family of functions best suited for modeling a given real-world situation. Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Modeling Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3
EXPECTATION	A2.4.2.	Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere

		Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.4.3.	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM

		Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	**A3:**	Families of Functions

GRADE LEVEL EXPECTATION	A3.2.	Exponential and Logarithmic Functions
EXPECTATION	A3.2.2.	Interpret the symbolic forms and recognize the graphs of exponential and logarithmic functions. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.3.	Apply properties of exponential and logarithmic functions. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions

		Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.6.	Rational Functions
EXPECTATION	A3.6.1.	Write the symbolic form and sketch the graph of simple rational functions. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically
EXPECTATION	A3.6.2.	Analyze graphs of simple rational functions and understand the relationship between the zeros of the numerator and denominator, and the function's intercepts, asymptotes, and domain. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A

		Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	**A3:**	Families of Functions
GRADE LEVEL EXPECTATION	**A3.7.**	Trigonometric Functions
EXPECTATION	**A3.7.1.**	Use the unit circle to define sine and cosine; approximate values of sine and cosine; use sine and cosine to define the remaining trigonometric functions; explain why the trigonometric functions are periodic. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
EXPECTATION	**A3.7.2.**	Use the relationship between degree and radian measures to solve problems. Angles Measured in Degrees and Radians
EXPECTATION	**A3.7.3.**	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of pi/6 and pi/4. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle

		Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
EXPECTATION	A3.7.4.	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Continued Fraction Approximations of the Tangent Function Doppler Effect Elementary Transcendental Functions and Their Inverses Family of Curves, Tangents, and Intuition Function Explorer 2D Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle

		Inset Plot Magnifier Many Sine Curves Modeling Harmonic Motion Modeling Harmonic Motion Nested Trigonometric Function Plots Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP) Soil Temperature TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 Tetraviews of Elementary Functions The Cosecant Function (GSP) The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated Trigonometric Functions with Four Parameters
EXPECTATION	A3.7.5.	Graph transformations of basic trigonometric functions (involving changes in period, amplitude, phase, and midline) and understand the relationship between constants in the formula and the transformed graph. Doppler Effect Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Many Sine Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves

		Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Sinusoids and Transformations (GSP) Soil Temperature Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 The Cosecant Function (GSP) Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions with Four Parameters Wave Interference

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.7.	Conic Sections and Their Properties
EXPECTATION	G1.7.1.	Find an equation of a circle given its center and radius; given the equation of a circle, find its center and Conic Sections - Writing Equations of Circles Defining and Graphing Relations
EXPECTATION	G1.7.2.	Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones. Application of Parabolas Application of Parabolas

		Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition
EXPECTATION	**G1.7.3** .	Graph ellipses and hyperbolas with axes parallel to the x- and y-axes, given equations. Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.1.	Producing and Interpreting Plots
EXPECTATION	S1.1.1.	Construct and interpret dot plots, histograms, relative frequency histograms, bar graphs, basic control charts, and box plots with appropriate labels and scales; determine which kinds of plots are appropriate for different types of data; compare data sets and interpret differences based on graphs and summary statistics. Assumptions Box and Whisker HISTOGRAMS How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Relate
EXPECTATION	S1.1.2.	Given a distribution of a variable in a data set, describe its shape, including symmetry or skewness, and state how the shape is related to measures of center (mean and median) and measures of variation (range and standard deviation) with particular attention to the effects of outliers on these measures. Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION How Do They Compare Normal Distributions
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.2.	Measures of Center and Variation
EXPECTATION	S1.2.1.	Calculate and interpret measures of center including: mean, median, and mode; explain uses, advantages and disadvantages of each measure given a particular set of data and its context. AVERAGE Assumptions Box and Whisker C-FREQUENCY DEVIATION DEVIATION

		How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV QUARTILES QUARTILES QUARTILES QUARTILES TABLES D Use Measures of Central Tendency

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.2.	Measures of Center and Variation
EXPECTATION	S1.2.3.	Compute and interpret measures of variation, including percentiles, quartiles, interquartile range, variance, Box and Whisker C-FREQUENCY DEVIATION DEVIATION Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Normal Distributions QUARTILES QUARTILES QUARTILES QUARTILES TABLES D

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions

GRADE LEVEL EXPECTATION	S1.3.	The Normal Distribution
EXPECTATION	S1.3.1.	Explain the concept of distribution and the relationship between summary statistics for a data set and Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Normal Distributions

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.3.	The Normal Distribution
EXPECTATION	S1.3.2.	Describe characteristics of the normal distribution, including its shape and the relationships among its mean, How Do They Compare Normal Distributions
EXPECTATION	S1.3.3.	Know and use the fact that about 68%, 95%, and 99.7% of the data lie within one, two, and three standard deviations of the mean, respectively in a normal distribution. How Do They Compare Normal Distributions

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.3.	The Normal Distribution
EXPECTATION	S1.3.4.	Calculate z-scores, use z-scores to recognize outliers, and use z-scores to make informed decisions.

		Normal Distributions
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S3:	Samples, Surveys and Experiments
GRADE LEVEL EXPECTATION	S3.1.	Data Collection and Analysis
EXPECTATION	S3.1.1.	Know the meanings of a sample from a population and a census of a population, and distinguish between Comparing Methods of Data Collection (Easiteach) TABLES D

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S3:	Samples, Surveys and Experiments
GRADE LEVEL EXPECTATION	S3.1.	Data Collection and Analysis
EXPECTATION	S3.1.2.	Identify possible sources of bias in data collection, sampling methods and simple experiments; describe how such bias can be reduced and controlled by random sampling; explain the impact of such bias on conclusions made from analysis of the data; and know the effect of replication on the precision of estimates. Comparing Methods of Data Collection (Easiteach) TABLES D

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S3:	Samples, Surveys and Experiments
GRADE LEVEL EXPECTATION	S3.1.	Data Collection and Analysis
EXPECTATION	S3.1.3.	Distinguish between an observational study and an experimental study, and identify, in context, the Determining Line of Fit Determining Line of Fit

		Determining Line of Fit Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle The Circumference Function The Circumference Function The Circumference Function
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations
GRADE LEVEL EXPECTATION	S4.1.	Probability
EXPECTATION	S4.1.1.	Understand and construct sample spaces in simple situations Find Probabilities Using Permutations and Combinations Fractions Are Fun Sort It

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations
GRADE LEVEL EXPECTATION	S4.1.	Probability
EXPECTATION	S4.1.2.	Define mutually exclusive events, independent events, dependent events, compound events, complementary events, and conditional probabilities; and use the definitions to compute probabilities. Chance It Construct and Interpret Binomial Distribution Counting Principle Permutations Dice Roller & Penny Flipper Find Probabilities and Odds Find Probabilities of Compound Events Finding Probabilities Disjoint and Overlapping Events Finding Probability of Independent and Dependent Events Leads in Coin Tossing PROBABILITY

		PROBABILITY Sort It The Birthday Problem Two Dice with Histogram What Chance Have I got
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations
GRADE LEVEL EXPECTATION	S4.2.	Application and Representation
EXPECTATION	S4.2.1.	Compute probabilities of events using tree diagrams, formulas for combinations and permutations, Venn Adds to One Construct and Interpret Binomial Distribution Dice Roller & Penny Flipper Expectations for Roulette Find Probabilities and Odds Leads in Coin Tossing PROBABILITY PROBABILITY The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations
GRADE LEVEL EXPECTATION	S4.2.	Application and Representation
EXPECTATION	S4.2.2.	Apply probability concepts to practical situations, in such settings as finance, health, ecology, or epidemiology Assumptions

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.6.	Explain the importance of the irrational numbers square root of 2 an square root of 3 in basic right triangle trigonometry, and the importance of pi because of its role in circle relationships. ANGLE04PZDH ANGLE04ZDH Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle The 30-60 Right Triangle The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.2.	Representations and Relationships
EXPECTATION	L1.2.3.	Use vectors to represent quantities that have magnitude and direction, interpret direction and magnitude of a vector numerically, and calculate the sum and difference of two vectors. Block on a Frictionless Inclined Plane CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Forces on a Simple Pendulum How to Add and Subtract Vectors How to Add and Subtract Vectors How to Add and Subtract Vectors Introduction to Vectors Introduction to Vectors Introduction to Vectors VECTORS VECTORS Vector Cross Product Vector Cross Product Vector Operations in Three Dimensions Vector Projections

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L2:	Calculation, Algorithms, and Estimation

GRADE LEVEL EXPECTATION	L2.3.	Measurement Units, Calculations, and Scales
EXPECTATION	L2.3.1.	Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly. Volume of Prisms and Cylinders

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Mathematics

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof
GRADE LEVEL EXPECTATION	L3.1.	Mathematical Reasoning
EXPECTATION	L3.1.1.	Distinguish between inductive and deductive reasoning, identifying and providing examples of each. Appling Deductive Reasoning Boundaries Critical Thinking - Dividing Land Critical Thinking - Dividing Land Cube Conundrum Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Short cut to Finding Areas of dot-paper polygons Short cut to finding areas of dot-paper polygons Tilted Squares Triangle Proofs Using Inductive Reasoning
EXPECTATION	L3.1.2.	Differentiate between statistical arguments (statements verified empirically using examples or data) and logical arguments based on the rules of logic. Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)

EXPECTATION	L3.1.3.	Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics. Identify and give examples of each. An IMO Triangle Problem Analyze Conditional Statements Appling Deductive Reasoning Coordinate Proof Coordinate Proof Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euler Line Game of Buried Treasure Game of Buried Treasure Lines and Angles Parallel and Perpendicular Line Proofs Polygon Proof - Interior Angle Sums of Polygons (GSP) Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Thales' Theorem Triangle Proofs Triangle Review - Interior and Exterior Angles (GSP) Using Postulates and Diagrams

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof
GRADE LEVEL EXPECTATION	L3.2.	Language and Laws of Logic
EXPECTATION	L3.2.1.	Know and use the terms of basic logic. An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs

		Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams
EXPECTATION	L3.2.2.	Use the connectives "not," "and," "or," and "if..., then," in mathematical and everyday settings. Know the truth table of each connective and how to logically negate statements involving these connectives. Analyze Conditional Statements Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs
EXPECTATION	L3.2.3.	Use the quantifiers "there exists" and "all" in mathematical and everyday settings and know how to logically An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams
EXPECTATION	L3.2.4.	Write the converse, inverse, and contrapositive of an "If..., then..." statement. Use the fact, in mathematical and everyday settings, that the contrapositive is logically equivalent to the original while the inverse and Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof

GRADE LEVEL EXPECTATION	L3.3.	Proof
EXPECTATION	L3.3.1.	Know the basic structure for the proof of an "If..., then..." statement (assuming the hypothesis and ending with the conclusion) and that proving the contrapositive is equivalent. Analyze Conditional Statements
EXPECTATION	L3.3.2.	Construct proofs by contradiction. Use counter-examples, when appropriate, to disprove a statement. Tilted Squares
EXPECTATION	L3.3.3.	Explain the difference between a necessary and a sufficient condition within the statement of a theorem. Determine the correct conclusions based on interpreting a theorem in which necessary or sufficient conditions Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.1.	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.1.	Solve multistep problems and construct proofs involving vertical angles, linear pairs of angles, supplementary angles, complementary angles, and right angles. Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet Circle Geometry Worksheet Golden Ratio 1 Line up Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP) Types of Angles
EXPECTATION	G1.1.2.	Solve multistep problems and construct proofs involving corresponding angles, alternate interior angles, alternate exterior angles, and same-side (consecutive) interior angles. Animation of Angle Properties - Angles on a Straight Line and in Triangles Software

		Pantograph Linkage Parallel and Perpendicular Line Proofs Properties of Parallel Lines Properties of Parallel Lines

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.1.	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.3.	Perform and justify constructions, including midpoint of a line segment and bisector of an angle, using A Rectangle with Maximum Area A Rectangle with Maximum Area A Triangle Area Problem A Triangle Area Problem Accurate Constructions - Animations Software Advanced Construction Napolean's Theorem Advanced Construction Napolean's Theorem Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Application of Parabolas Application of Parabolas Compass Animations - Constructions Using Straight Edge and Compasses Software Compass Animations Software Constructing Templates for the Platonic Solids Constructing Templates for the Platonic Solids Constructing Templates for the Platonic Solids Creating Complex Design's Creating Complex Design's Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty

		Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exploring the Euler Segment Exploring the Euler Segment Functions in A Triangle Functions in A Triangle Hyperbola Hyperbola Hyperbola Lines and Angles Morley's Triangle - Application of Angle Trisection Morley's Triangle - Application of Angle Trisection Off at a Tangent - Exploring the Tangent to a Circle (GSP) Parabola Parabola Parabola Parabola Properties of Parallel Lines Properties of Parallel Lines Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Some Ellipse Relationships Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals Trisecting an Angle Trisecting an Angle Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular Using the Equilateral Triangle - Surfer & Spotter Using the Equilateral Triangle - Surfer & Spotter
EXPECTATION	G1.1.4.	Given a line and a point, construct a line through the point that is parallel to the original line using straightedge and compass. Given a line and a point, construct a line through the point that is perpendicular to Accurate Constructions - Animations Software Compass Animations - Constructions Using Straight Edge and Compasses Software Off at a Tangent - Exploring the Tangent to a Circle (GSP) Properties of Parallel Lines Properties of Parallel Lines Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular
EXPECTATION	G1.1.5.	Given a line segment in terms of its endpoints in the coordinate plane, determine its length and midpoint.

		Determining the Origin Determining the Origin AREA AREA AREA CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Cycle Ride Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Determining the Origin Distance between 2 points Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.1.	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.6.	Recognize Euclidean geometry as an axiom system. Know the key axioms and understand the meaning of and distinguish between undefined terms, axioms, definitions, and theorems. Lines and Angles Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Thales' Theorem Using Postulates and Diagrams
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties

EXPECTATION	G1.2.1.	Prove that the angle sum of a triangle is 180 degrees and that an exterior angle of a triangle is the sum of the ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet Calculating Exterior Angles of Triangles Worksheet Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles Polygon Problems - Exterior Angles of Polygons (GSP) Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP)

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties
EXPECTATION	G1.2.2.	Construct and justify arguments and solve multistep problems involving angle measure, side length, perimeter, ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA AREA AREA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software

		CIRCLES CIRCLESX Calculating Angles in Polygons Worksheet Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles PERCENT Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Related Rates: Triangle Angle and Area TRIGONOMETRY Tilted Squares Triangle Area and Perimeters Triangle Area and Perimeters Write and Evaluate Expressions
EXPECTATION	G1.2.3	Know a proof of the Pythagorean Theorem, and use the Pythagorean Theorem and its converse to solve multi-
		Coordinate Proof Coordinate Proof Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Divide and Rule - Dividing Line Segments in a Given Ratio (GSP). Pythagorean Theorem Pythagorean Theorem 3D Pythagorean Triples Round the Bend Sum of Parts TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3)

		The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties
EXPECTATION	G1.2.4.	Prove and use the relationships among the side lengths and the angles of 30 degree - 60 degree - 90 degrees triangles and 45 degree - 45 degree - 90 degree triangles. ANGLE04PZDH ANGLE04ZDH The 30-60 Right Triangle The 30-60 Right Triangle

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties
EXPECTATION	G1.2.5.	Solve multistep problems and construct proofs about the properties of medians, altitudes and perpendicular bisectors to the sides of a triangle, and the angle bisectors of a triangle. Using a straightedge and compass, Advanced Construction Napolean's Theorem Advanced Construction Napolean's Theorem An IMO Triangle Problem Euler Line Exploring the Euler Segment Exploring the Euler Segment

		Investigating the Properties of Excircles of a Triangle Investigating the Properties of Excircles of a Triangle Morley's Triangle - Application of Angle Trisection Morley's Triangle - Application of Angle Trisection Triangle Inequalities Triangle Inequalities Using the Equilateral Triangle - Surfer & Spotter Using the Equilateral Triangle - Surfer & Spotter
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.3.	Triangles and Trigonometry
EXPECTATION	G1.3.1.	Define the sine, cosine, and tangent of acute angles in a right triangle as ratios of sides. Solve problems about angles, side lengths, or areas using trigonometric ratios in right triangles. ANGLE04PZDH ANGLE04ZDH Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle The 30-60 Right Triangle The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4)

		The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.3.	Triangles and Trigonometry
EXPECTATION	G1.3.2.	Know and use the Law of Sines and the Law of Cosines and use them to solve problems. Find the area of a triangle with sides a and b and included angle theta using the formula Area = (1/2) absin theta. ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA CIRCLES CIRCLESX Law of Cosines Law of Sines Related Rates: Triangle Angle and Area TRIGONOMETRY TRIGONOMETRY The Law of Cosines The Law of Cosines The Law of Sines The Law of Sines
EXPECTATION	G1.3.3.	Determine the exact values of sine, cosine, and tangent for 0 degrees, 30 degrees, 45 degrees, 60 degrees, and their integer multiples and apply in various contexts. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine

		Composing Trigonometric and Inverse Trigonometric Functions Continued Fraction Approximations of the Tangent Function How Far Can One See from a Height? Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Trigonometric Ratios Trigonometric Ratios Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)

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Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.4.	Quadrilaterals and Their Properties
EXPECTATION	G1.4.1.	Solve multistep problems and construct proofs involving angle measure, side length, diagonal length, perimeter, and area of squares, rectangles, parallelograms, kites, and trapezoids. A Rectangle with Maximum Area A Rectangle with Maximum Area

		AREA AREA Area Review BOUNDS Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Exterior and Interior Angles of Regular Polygons Worksheet Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Tilted Squares Write and Evaluate Expressions

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.4.	Quadrilaterals and Their Properties
EXPECTATION	G1.4.2.	Solve multistep problems and construct proofs involving quadrilaterals using Euclidean methods or coordinate Coordinate Proof Coordinate Proof
EXPECTATION	G1.4.3.	Describe and justify hierarchical relationships among quadrilaterals. Analyze Conditional Statements Golden Ratio 1 Special Midpoint Quadrilaterals Special Midpoint Quadrilaterals Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals
EXPECTATION	G1.4.4.	Prove theorems about the interior and exterior angle sums of a quadrilateral. ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA Calculating Angles in Polygons Worksheet

		Calculating Exterior Angles of Triangles Worksheet Exterior and Interior Angles of Regular Polygons Worksheet Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Polygon Problems - Exterior Angles of Polygons (GSP) Triangle Review - Interior and Exterior Angles (GSP)
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.5.	Other Polygons and Their Properties
EXPECTATION	G1.5.1.	Know and use subdivision or circumscription methods to find areas of polygons. Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Pick's Theorem

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.5.	Other Polygons and Their Properties
EXPECTATION	G1.5.2.	Know, justify, and use formulas for the perimeter and area of a regular n-gon and formulas to find interior and exterior angles of a regular n-gon and their sums. Calculating Angles in Polygons Worksheet Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Exterior and Interior Angles of Regular Polygons Worksheet Golden Ratio 1 Interior & Exterior Angles Polygon Proof - Interior Angle Sums of Polygons (GSP)

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.6.	Circles and Their Properties
EXPECTATION	G1.6.1.	Solve multistep problems involving circumference and area of circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) Arc Resolution Area of a Circle from Segments CIRCLESX Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Finding Volume of Cylinder and Sphere Introduction to Radians Introduction to Radians Introduction to Radians Keeping on Track Length of a Coiled Rope The Circumference Function The Circumference Function The Circumference Function The Cycloid The Cycloid Two Wheel Belt What's my surface? Write and Evaluate Expressions
EXPECTATION	G1.6.2.	Solve problems and justify arguments about chords and lines tangent to circles. ANGLE ANGLE ANGLE Ford Circles Hyperbola Hyperbola Hyperbola Inscribed Angle Subtended Chord Intersecting Circles Off at a Tangent - Exploring the Tangent to a Circle (GSP) Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP)

		Thales' Theorem The Statue of Regiomontanus Two Wheel Belt
EXPECTATION	G1.6.3.	Solve problems and justify arguments about central angles, inscribed angles, and triangles in circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) ANGLE ANGLE ANGLE ANGLE Circle Geometry Worksheet Inscribed Angle Subtended Chord Properties of Circles Part 2 (GSP) Thales' Theorem
EXPECTATION	G1.6.4.	Know and use properties of arcs and sectors, and find lengths of arcs and areas of sectors. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) Arc Resolution CIRCLES CIRCLESX CIRCLESX Circle Geometry Worksheet Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Thales' Theorem

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.8.	Three-dimensional Figures
EXPECTATION	G1.8.1.	Solve multistep problems involving surface area and volume of pyramids, prisms, cones, cylinders, AREA AREA BOUNDS Cylinder Hemisphere Cone

		FORMULAE Finding Volume of Cylinder and Sphere Missing Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones What's my surface?

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G2:	Relationships Between Figures
GRADE LEVEL EXPECTATION	G2.1.	Relationships Between Area and Volume Formulas
EXPECTATION	G2.1.1.	Know and demonstrate the relationships between the area formula of a triangle, the area formula of a parallelogram, and the area formula of a trapezoid. Area of a Circle from Segments Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons
EXPECTATION	G2.1.2.	Know and demonstrate the relationships between the area formulas of various quadrilaterals. Area of a Circle from Segments Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons
STRAND / STANDARD CATEGORY	MI.G.	Geometry

STANDARD	G2:	Relationships Between Figures
GRADE LEVEL EXPECTATION	G2.2.	Relationships Between Two-dimensional and Three-dimensional Representations
EXPECTATION	G2.2.1.	Identify or sketch a possible three-dimensional figure, given two-dimensional views. Create a two-dimensional representation of a three-dimensional figure. 3-D Shape Explorer - Surface Area of Rectangular Prisms Software 3D Shape Builder Software
EXPECTATION	G2.2.2.	Identify or sketch cross sections of three-dimensional figures. Identify or sketch solids formed by revolving two- 3-D Shape Explorer - Surface Area of Rectangular Prisms Software Which Model
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G2:	Relationships Between Figures
GRADE LEVEL EXPECTATION	G2.3.	Congruence and Similarity
EXPECTATION	G2.3.1.	Prove that triangles are congruent using the SSS, SAS, ASA, and AAS criteria and that right triangles are congruent using the hypotenuse-leg criterion. Appling Deductive Reasoning CONGRUENCE Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.2.	Use theorems about congruent triangles to prove additional theorems and solve problems, with and without Appling Deductive Reasoning CONGRUENCE Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.3.	Prove that triangles are similar by using SSS, SAS, and AA conditions for similarity.

		Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.4.	Use theorems about similar triangles to solve problems with and without use of coordinates. Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.5.	Know and apply the theorem stating that the effect of a scale factor of k relating one two-dimensional figure to another or one three-dimensional figure to another, on the length, area, and volume of the figures, is to multiply each by k, k^2, and k^3, respectively. AREA AREA Area and Volume of Similar Shapes Worksheet (2). Area and Volume of Similar Shapes Worksheet (1). Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Cube Conundrum Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle Surface Area and Volumes of Spheres Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) What is the Meaning of Multiplication What is the Meaning of Multiplication

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G3:	Transformations of Figures in the Plane
GRADE LEVEL EXPECTATION	G3.1.	Distance-preserving Transformations Isometries
EXPECTATION	G3.1.1.	Define reflection, rotation, translation, and glide reflection and find the image of a figure under a given
		Application of Matrix Multiplication
		Application of Matrix Multiplication
		Application of Matrix Multiplication
		Application of Matrix Operations
		Application of Matrix Operations
		Application of Matrix Operations
		Application of Reflection-Shortest Path
		Application of Reflection-Shortest Path
		Application of Translation - Block Design
		Application of Translation- Block Design
		Application of Translation- Block Design
		Crazy Paving 1 - Translate Shapes on a Grid Software
		Crazy Paving 2 - Translate Shapes on a Grid Software
		Critical Thinking - Shortest Path- Laser
		Critical Thinking - Shortest Path- Laser
		Fishy Transformations - Combined Transformations (GSP)
		Game of Buried Treasure
		Game of Buried Treasure
		Kaleidoscopic Polygons
		MATRICES
		Matrix Transformations: "F"
		Practice Shortest Path - Feed and Water
		Practice Shortest Path - Feed and Water
		Proportional Triangle Nesting
		Reflection in Geometry and Algebra
		Reflection in Geometry and Algebra
		Reflections over Intersecting Lines
		Reflections over Intersecting Lines
		Reflections over Intersecting Lines
		Reflections over Two Parallel lines
		Reflections over Two Parallel lines
		Reflections over Two Parallel lines
		Rotation in the Coordinate Plane
		Rotation in the Coordinate Plane

		Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations Transformations Transformations Translate to Enlarge - Dilation of 2-D Shapes (GSP) Translation in the Coordinate Plane Translation in the Coordinate Plane Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects

Michigan Curriculum Standards

Mathematics

Grade 10

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G3:	Transformations of Figures in the Plane
GRADE LEVEL EXPECTATION	G3.1.	Distance-preserving Transformations Isometries
EXPECTATION	G3.1.2.	Given two figures that are images of each other under an isometry, find the isometry and describe it Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations
EXPECTATION	G3.1.3.	Find the image of a figure under the composition of two or more isometries and determine whether the resulting figure is a reflection, rotation, translation, or glide reflection image of the original figure. Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G3:	Transformations of Figures in the Plane
GRADE LEVEL EXPECTATION	G3.2.	Shape-preserving Transformations: Dilations and Isometries
EXPECTATION	G3.2.1.	Know the definition of dilation and find the image of a figure under a given dilation. AREA AREA Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP) Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects
EXPECTATION	G3.2.2.	Given two figures that are images of each other under some dilation, identify the center and magnitude of the

		AREA AREA Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP) Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects What is the Meaning of Multiplication What is the Meaning of Multiplication

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)

STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from
GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.1	Know the different properties that hold in different number systems and recognize that the applicable properties change in the transition from the positive integers to all integers, to the rational numbers, and to Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Reason Using Properties from Algebra Subtracting Integers Subtracting Integers Subtracting Integers The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication What is the Meaning of Multiplication

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from

GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.2	Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Identity Elements and Inverses Identity Elements and Inverses Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from
GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.3	Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations. Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses Into Multiplying Integers Into Multiplying Integers

		Into Multiplying Integers Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication What is the Meaning of Multiplication
EXPECTATION	L1.1.4	Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number by a number less than 0, a number between 0 and 1, and a number greater than 1. EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS Fractional Parts of Powers of Rationals INVERSES Into Multiplying Integers Into Multiplying Integers Into Multiplying Integers Negative Exponents and Parentheses Worksheet (1) Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (2) Powerful RADICALS Rules with Negative Exponents Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from these representations
GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.5	Justify numerical relationships Boundaries EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS FRACTIONS Finding Square Roots Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations INVERSES PERCENT PERCENT PUZSQC40 RADICALS RADICALS RADICALS RADICALS RADICALS SEQPUZ08 SEQPUZ25 SEQUP13 Solving Percent Problems

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)

STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from these representations.
GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.6	Explain the importance of the irrational numbers square root of 2 and square root of 3 in basic right triangle trigonometry, and the importance of pi because of its role in circle relationships. ANGLE04PZDH ANGLE04ZDH Am I Rational or Irrational Arc Resolution Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? Introduction to Radians Introduction to Radians Introduction to Radians Rational Number Explorer SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle The 30-60 Right Triangle The Circumference Function The Circumference Function The Circumference Function The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet

		The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem
STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from these representations
GRADE LEVEL EXPECTATION	L1.2	Representations and Relationships
EXPECTATION	L1.2.1	Use mathematical symbols to represent quantitative relationships and situations. A Perfect Square Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Find the Number GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Graphing Linear Inequalities Laws Line Plot Multiplication by Adding Logs Multiplying Binomials QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically Solve It Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from these representations
GRADE LEVEL EXPECTATION	L1.2	Representations and Relationships
EXPECTATION	L1.2.2	Interpret representations that reflect absolute value relationships in such contexts as error tolerance. BOUNDS BOUNDS BOUNDS Boundaries How Far is it PERCENT
EXPECTATION	L1.2.3	Use vectors to represent quantities that have magnitude and direction, interpret direction and magnitude of a vector numerically, and calculate the sum and difference of two vectors. Block on a Frictionless Inclined Plane CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Forces on a Simple Pendulum How to Add and Subtract Vectors How to Add and Subtract Vectors How to Add and Subtract Vectors Introduction to Vectors Introduction to Vectors Introduction to Vectors VECTORS VECTORS Vector Cross Product Vector Cross Product Vector Operations in Three Dimensions

		Vector Projections

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from these representations
GRADE LEVEL EXPECTATION	L1.2	Representations and Relationships
EXPECTATION	L1.2.4	Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media. AVERAGE Analyzing Predictions (Easiteach) Box and Whisker C-FREQUENCY COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS DEVIATION DEVIATION DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Determining Line of Fit Determining Line of Fit Determining Line of Fit Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Games Galore HISTOGRAMS Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MEAN

		MOVING AV Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Two-Variable Data Part 1 Normal Distributions PROBABILITY PROBABILITY Pick and Mix Family QUARTILES QUARTILES QUARTILES QUARTILES Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS TABLES D TABLES D The Circumference Function The Circumference Function The Circumference Function

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from
GRADE LEVEL EXPECTATION	L1.3	Counting and Probabilistic Reasoning
EXPECTATION	L1.3.1	Describe, explain, and apply various counting techniques; relate combinations to Pascal's triangle; know when Binomial Theorem COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS

		COMBINATIONS COMBINATIONS COMBINATIONS Christmas Stocking Identity Combinations and the Binomial Theorem Counting Principle Permutations DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Find Probabilities Using Permutations and Combinations Let's Count On Pascal's Triangle Pick and Mix Family
EXPECTATION	L1.3.2	Define and interpret commonly used expressions of probability. Experimental and Theoretical Probability

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.1	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.2	Calculate fluently with numerical expressions involving exponents; use the rules of exponents; evaluate numerical expressions involving rational and negative exponents; transition easily between roots and EXPONENTS EXPONENTS EXPONENTS Evaluate nth Roots Get In Lane Order of Operations Order of Operations Order of Operations Positive Exponents and Parentheses Worksheet (1) Switch - Calculations Software

EXPECTATION	L2.1.3	Explain the exponential relationship between a number and its base 10 logarithm and use it to relate rules of logarithms to those of exponents in expressions involving numbers. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Multiplication by Adding Logs Properties of Logarithms Solving Logarithmic and Exponential Equations

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.1	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.4	Know that the complex number i is one of two solutions to x^2 = -1. Game of Buried Treasure Game of Buried Treasure Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers Proving Identities -Disproving Non - Identities
EXPECTATION	L2.1.5	Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers. Complex Conjugates Expansion of a Polynomial Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.2	Sequences and Iteration
EXPECTATION	L2.2.1	Find the nth term in arithmetic, geometric, or other simple sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series And So On Area Ratios - Squares Define and Use Sequences and Series EQUATIONS Ford Circles Generating Arithmetic and Geometric Sequences Geometric Series Coil Geometric Series Coil Gifts Galore & Phoning friends Haunted House - Generating Terms of a Sequence Software Limits of Infinite Sequences Models of Geometric Series Models of Geometric Series Models of Geometric Series Pyramids SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Use Recursive Rules with Sequences and Functions
EXPECTATION	L2.2.2	Compute sums of finite arithmetic and geometric sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series

		Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.2	Sequences and Iteration
EXPECTATION	L2.2.3	Use iterative processes in such examples as computing compound interest or applying approximation A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set Compound Interest Compound Interests Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Functions involving e Geometric Series Coil Geometric Series Coil Geometric Square Root Construction

		IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series Models of Geometric Series PERCENT Ratio of Similarity Ratio of Similarity Ratio of Similarity Simple vs Compound Interest The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.2	Sequences and Iteration
EXPECTATION	L2.2.4	Compute sums of infinite geometric sequences. (Recommended) A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil

		Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.3	Measurement Units, Calculations, and Scales
EXPECTATION	L2.3.1	Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly. Volume of Prisms and Cylinders
EXPECTATION	L2.3.2	Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Elementary Transcendental Functions and Their Inverses Exponential Decay Function Explorer 2D Functions Graphing Functions with Four Parameters Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Multiplication by Adding Logs Solving Logarithmic and Exponential Equations

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.4	Understanding Error
EXPECTATION	L2.4.1	Determine what degree of accuracy is reasonable for measurements in a given situation; express accuracy through use of significant digits, error tolerance, or percent of error; describe how errors in measurements are magnified by computation; recognize accumulated error in applied situations. BOUNDS BOUNDS BOUNDS Boundaries EXPONENTS How Far is it PERCENT
STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false
GRADE LEVEL EXPECTATION	L3.1	Mathematical Reasoning
EXPECTATION	L3.1.1	Distinguish between inductive and deductive reasoning, identifying and providing examples of each. Algebra Wipeout Software Number Pyramids - Algebra Software
EXPECTATION	L3.1.2	Differentiate between statistical arguments (statements verified empirically using examples or data) and logical arguments based on the rules of logic. Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)
EXPECTATION	L3.1.3	Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics. Identify and give examples of each.

		An IMO Triangle Problem Analyze Conditional Statements Appling Deductive Reasoning Coordinate Proof Coordinate Proof Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euler Line Game of Buried Treasure Game of Buried Treasure Lines and Angles Parallel and Perpendicular Line Proofs Polygon Proof - Interior Angle Sums of Polygons (GSP) Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Thales' Theorem Triangle Proofs Triangle Review - Interior and Exterior Angles (GSP) Using Postulates and Diagrams

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false.
GRADE LEVEL EXPECTATION	L3.2	Language and Laws of Logic
EXPECTATION	L3.2.1	Know and use the terms of basic logic. An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs

		Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams
EXPECTATION	L3.2.2	Use the connectives "not," "and," "or," and "if..., then," in mathematical and everyday settings. Know the truth table of each connective and how to logically negate statements involving these connectives. Analyze Conditional Statements Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs
EXPECTATION	L3.2.3	Use the quantifiers "there exists" and "all" in mathematical and everyday settings and know how to logically An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false
GRADE LEVEL EXPECTATION	L3.2	Language and Laws of Logic
EXPECTATION	L3.2.4	Write the converse, inverse, and contrapositive of an "if..., then..." statement. Use the fact, in mathematical and everyday settings, that the contrapositive is logically equivalent to the original, while the inverse and

		Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs
STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false.
GRADE LEVEL EXPECTATION	L3.3	Proof
EXPECTATION	L3.3.1	Know the basic structure for the proof of an "if..., then..." statement (assuming the hypothesis and ending with the conclusion) and that proving the contrapositive is equivalent. Analyze Conditional Statements
EXPECTATION	L3.3.2	Construct proofs by contradiction. Use counterexamples, when appropriate, to disprove a statement. Tilted Squares
EXPECTATION	L3.3.3	Explain the difference between a necessary and a sufficient condition within the statement of a theorem. Determine the correct conclusions based on interpreting a theorem in which necessary or sufficient conditions in the theorem or hypothesis are satisfied. Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas.
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions

EXPECTATION	A1.1.1	Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables. Balancing Act Part II Changing Formulas Codebreaker 2 - Simplification Software Constructing Simple Arguments (Easiteach) Escape the Cave - Using Letters to Represent Unknown Numbers Software Expression Machine FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Newton's Law of Cooling Reflecting Function Plots Write and Evaluate Expressions Writing and Solving Ratios and Proportions

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.2	Know the definitions and properties of exponents and roots transition fluently between them, and apply them EXPONENTS EXPONENTS EXPONENTS INDICES A Introduction to Exponents Introduction to Exponents Negative Exponents and Parentheses Worksheet (1)

		Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (1) Positive Exponents and Parentheses Worksheet (2) Powerful Roughly the Answer Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.3	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities Algebra Quiz Difference of Squares EXPRESSIONS FACTORISE Factoring Binomials Factoring Polynomials Completely Factoring Trinomials Factoring Trinomials Using Algebra Tiles Integer Polynomial Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Operations with Polynomials (division) QUADRATICS QUADRATICS QUADRATICS QUADRATICSx

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Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas.
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.4	Add, subtract, multiply, and simplify polynomials and rational expressions. A Perfect Square Algebra Quiz Binomial Theorem Cube Conundrum Expansion of a Polynomial FRACTIONS A FRACTIONS A FRACTIONS A Intro to Multiplication of Binomials Introduction to Multiplication of Binomials Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Matrices Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Multiplying Binomials Number Pyramids - Algebra Software Operations with Polynomials Operations with Polynomials (addition and subtraction) Operations with Polynomials (division) Operations with Polynomials (multiplication) Polynomial Long Multiplication

		QUADRATICS Recognizing Quadratics
EXPECTATION	A1.1.6	Transform exponential and logarithmic expressions into equivalent forms using the properties of exponents and logarithms, including the inverse relationship between exponents and logarithms. Solving Logarithmic and Exponential Equations
EXPECTATION	A1.1.7	Transform trigonometric expressions into equivalent forms using basic identities such as sin^2 theta + cos^2 theta = 1 and tan^2 theta + 1 = sec^2 theta (Recommended) Analytic Trigonometry Analytic Trigonometry Analytic Trigonometry Apply Double-Angle and Half Angle Formulas Apply Sum and Difference Formulas Identities in Calculus Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Verify Trigonometric Identities

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.1	Write equations and inequalities with one or two variables to represent mathematical or applied situations, Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models EQUATIONS Find the Number GRAPHS A Graphing Linear Inequalities Inequalities and Absolute Value

		Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Line Plot QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically Solving Inequalities Using the Number Line Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.3	Solve linear and quadratic equations and inequalities including systems of up to three linear equations with three unknowns. Justify steps in the solution, and apply the quadratic formula appropriately. Algebra Quiz Algebraic Solutions to Polynomial Equations Annotated Quadratic Polynomial Balancing Act Part II Completing the Square Complex Conjugates Evaluate the Determinant and Apply Cramer's Rule Find the Number Finding Numbers that satisfy two or more equations Finding Numbers that satisfy two or more equations Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps Functions GRAPHS A GRAPHS A GRAPHS A

GRAPHS A
GRAPHS A
Graph of Inequalities
Graphing Linear Inequalities
Inequalities and Absolute Value
Intro to Equations
Intro to Equations
Intro to Equations
Introduction to Equations
Matrices
Methods of Solving Linear Systems of Equations and Inequalities
Methods of Solving Quadratic
Multivariate Linear Systems and Row Operations
QUADRATICS
QUADRATICS
QUADRATICSx
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QUADRATICSx
QUADRATICSx
QUADRATICSx
Quadratic Formula and the Discriminant
Real Zeros of Polynomial Functions
Reviewing Quadratic Roots
Reviewing Quadratic Roots
SIMULTANEOUS
SIMULTANEOUS
SIMULTANEOUS
SIMULTANEOUS
SIMULTANEOUS
SIMULTANEOUS
Solve It
Solving Equations Using Graphs Worksheet (1)
Solving Equations Using Graphs Worksheet (2)
Solving Inequalities Using the Number Line
Solving Inequalities Worksheet (1)
Solving Inequalities Worksheet (2)
Solving Inequalities Worksheet (3)
Solving Inequalities Worksheet (4)
Systems of Equations Worksheet (10)

		Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Try Try Try Again Using Inverse Matrices to solve Linear Systems Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations Using the Quadratic Formula an Interpreting the Discriminant
EXPECTATION	A1.2.4	Solve absolute value equations and inequalities, and justify steps in the solution. Inequalities and Absolute Value Solving Absolute Equations and Inequalities Solving Inequalities Using the Number Line

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.5	Solve polynomial equations and equations involving rational expressions, and justify steps in the solution. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra Functions Functions Real Zeros of Polynomial Functions

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)

STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.6	Solve power equations and equations including radical expressions, justify steps in the solution, and explain End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Simplifying Radical Expressions and Equations
EXPECTATION	A1.2.7	Solve exponential and logarithmic equations, and justify steps in the solution. Carbon Dating Functions Functions Newton's Law of Cooling Solving Logarithmic and Exponential Equations
EXPECTATION	A1.2.8	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. CO-ORD GEOM CO-ORD GEOM Changing Formulas TRANSPOSITION
EXPECTATION	A1.2.9	Know common formulas and apply appropriately in contextual situations. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS

		BOUNDS CIRCLESX CUBITP22 Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs PERCENT Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities

EXPECTATION	A1.2.10	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific intervals. Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Elementary Transcendental Functions and Their Inverses Evaluate Inverse Trigonometric Functions Function Explorer 2D Functions Illustrating Cosine with the Unit Circle II Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem
STRAND / STANDARD CATEGORY	**MI.A.**	**Algebra and Functions (A)**
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range. A Balanced View Composition of Functions Composition of Functions Composition of Functions Defining and Graphing Relations Difference of Squares Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functional Geometry Functional Geometry Functions Functions and Relations Functions and Relations Functions and Relations

		Functions and Relations Functions in A Triangle Functions in A Triangle Horizontal Line Test, Vertical Line Test How do I look Increasing, Decreasing, and Constant Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Inverse Reflection Principle Iterations and functions Iterations and functions Mapping Diagrams Sum of Parts Tilted Squares Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

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Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.2	Read, interpret, and use function notation and evaluate a function at a value in its domain. FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Reflecting Function Plots

		Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs
EXPECTATION	A2.1.3	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations. A Balanced View A Perfect Square Analyze Arithmetic and Geometric Sequence and Series And So On Balancing Act Part II CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Changing Formulas Comparing Linear, Exponential and Quadratic Models Complex Zeros and the Fundamental Theorem of Algebra Composition of Functions Composition of Functions Composition of Functions Define and Use Sequences and Series Defining and Graphing Relations Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs EQUATIONS Exlploring odd and even functions Exlploring odd and even functions Exlploring odd and even functions Expression Machine Find the Number Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Gifts Galore & Phoning friends

Graphing
Graphing Growth and Decay Functions
Graphing Linear Inequalities
Graphing Square Root Functions
How Slope is Measured
How Slope is Measured
How do I look
Intro to Equations
Intro to Equations
Intro to Equations
Introducing Functions as Dynagraphs
Introducing Functions as Dynagraphs
Introducing Functions as Dynagraphs
Introduction to Equations
Laws
Mapping Diagrams
Modeling Num as Segments & Area
Modeling Num as Segments & Area
Modeling Number as Segments and Areas
Modeling Two-Variable Data Part 1
Modeling Two-Variable Data Part 2
Modeling Two-Variable Data Part 3
Multiplication by Adding Logs
Multiplying Binomials
Power Functions and Their Graphs
Pyramids
QUADRATICSx
Representing Direct Variation Algebraically and Graphically
Representing Direct Variation Algebraically and graphically
Representing Direct Variation Algebraically and graphically
Representing Inverse Variation Graphically
Representing Inverse Variation Graphically
SEQPUZ08
SEQPUZ25
SEQUENCES A
SEQUENCES A
SEQUENCES A
SEQUENCES Ax
Scientific Notation Worksheet (1)
Scientific Notation Worksheet (2)
Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R))
Solve It
Solving One-step, Two Step, And Multi Step equations
Sum 17

		Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations What Expression Write and Solve Equations and Inequalities
EXPECTATION	A2.1.4	Recognize that functions may be defined by different expressions over different intervals of their domains; Function Transformations Functions

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.5	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set

		Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Geometric Series Coil Geometric Series Coil Geometric Square Root Construction IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series Models of Geometric Series Ratio of Similarity Ratio of Similarity Ratio of Similarity The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets Use Recursive Rules with Sequences and Functions

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.6	Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and graphical representations An Essential Singularity Complex Zeros and the Fundamental Theorem of Algebra

		Continuity
		Cubic Equation
		Defining the Limit
		Defining the Limit
		End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem
		Exploring Derivatives: Slope of the Secant Line and Average Rate of Change
		Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change
		Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change
		Exploring Derivatives: Slope of the secant line and average rate of change
		Filling Bottles
		Function Continuity
		Function Continuity
		Functions
		Functions
		Functions
		Functions
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		Graphing Quadratic Equations Using Roots
		How do we find a Limit? Left hand/Right hand limits
		How doe we find a Limit? (Left hand/Right hand limits)
		Increasing, Decreasing, and Constant Functions
		Limits of Infinite Sequences
		Limits: Finite c, Finite L
		Limits: Finite c, Infinite L
		Limits: Infinite c, Finite L
		Limits: Infinite c, Infinite L
		Polynomial Fitter
		Polynomial Functions of Higher Degree (degrees greater than 2)
		Polynomial Roots
		Predicting a Velocity Plot
		Predicting a Velocity Plot
		QUADRATICSx
		Quadratic Equation
		Quadratic Formula and the Discriminant
		Rational Functions
		Real Zeros of Polynomial Functions
		Reviewing Quadratic Roots
		Reviewing Quadratic Roots
		The Laboratory - Relationship Between Two Variables (Software)
		Using a Graph to Describe your travels for the day
		Using a Graph to Describe your travels for the day

		Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e). Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Filling Bottles Functions Functions Graph Classifier Software Increasing, Decreasing, and Constant Functions Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Predicting a Velocity Plot Predicting a Velocity Plot Rational Functions The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.2	Operations and Transformations

EXPECTATION	A2.2.2	Apply given transformations to basic functions and represent symbolically. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Derivatives Dilation of Functions Dilation of Functions Dilation of Functions Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game
EXPECTATION	A2.2.3	Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse . A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions

		Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations
EXPECTATION	A2.2.4	If a function has an inverse, find the expression(s) for the inverse. (Recommended) A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

Michigan Curriculum Standards

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Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
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GRADE LEVEL EXPECTATION	A2.2	Operations and Transformations
EXPECTATION	A2.2.5	Write an expression for the composition of one function with another; recognize component functions when a function is a composition of other functions. (Recommended) Composition of Functions Composition of Functions Composition of Functions

		Composition of Functions Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.2	Operations and Transformations
EXPECTATION	A2.2.6	Know and interpret the function notation for inverses and verify that two functions are inverses using [illegible] A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.3	Representations of Functions
EXPECTATION	A2.3.2	Describe the tabular pattern associated with functions having constant rate of change (linear); or variable rate of change And So On Comparing Linear, Exponential and Quadratic Models Filling Bottles Graphing Growth and Decay Functions Inverse Proportion Worksheet (3) Modeling Two-Variable Data Part 2 The Laboratory - Relationship Between Two Variables (Software)

Michigan Curriculum Standards

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.4	Models of Real-world Situations Using Families of Functions
EXPECTATION	A2.4.1	Identify the family of function best suited for modeling a given real-world situation. Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Modeling Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3

EXPECTATION	A2.4.2	Adapt the general symbolic form of a function to one that fits the specification of a given situation by using the information to replace arbitrary constants with numbers. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters

		Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.4.3	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx

		Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.4	Models of Real-world Situations Using Families of Functions
EXPECTATION	A2.4.4	Use methods of linear programming to represent and solve simple real-life problems. (Recommended) Application of Graphing Inequalities Application of Graphing Inequalities

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Mathematics

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.1	Lines and Linear Functions
EXPECTATION	A3.1.1	Write the symbolic forms of linear functions (standard, point-slope, and slope-intercept) given appropriate
		CO-ORD GEOM
		CO-ORD GEOM
		CO-ORD GEOM
		CO-ORD GEOM
		CO-ORD GEOM
		CO-ORD GEOM
		CO-ORD GEOM
		Determine Equation Using y = mx + b
		Determine Equation Using y=mx +b
		Determine Equation Using y=mx +b
		Determining Equation of a Line Using Point Slope Form
		Determining Equation of a Line Using Point Slope Form
		Determining Equation of a Line Using Point Slope Form
		Determining Equation of a Line Using the Slope Intercept
		Determining Equation of a Line Using the Slope Intercept
		Determining Equation of a Line Using the Slope Intercept
		GRAPHS A
		Graphing Absolute Value Functions
		Graphing Absolute Value Functions
		Graphing Linear Inequalities
		Iterations and functions
		Iterations and functions
		LINES
		Line Plot
		Line up
		Modeling Two-Variable Data Part 1
		Reflecting Without the Reflect Command: The Algebra of Reflection
		Reflecting Without the Reflect Command: The Algebra of Reflection
		Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R))
		Systems of Equations Worksheet (10)
		Systems of Equations Worksheet (7)
		Systems of Equations Worksheet (8)
		Systems of Equations Worksheet (9)
		The Circumference Function
		The Circumference Function

		The Circumference Function The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns
EXPECTATION	A3.1.2	Graph lines (including those of the form x = h and y = k) given appropriate information. A Balanced View Comparing Linear, Exponential and Quadratic Models Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Finding the Inverse of a Function and the Inverse Composition Rule Function Transformations Functions and Relations Functions and Relations Functions and Relations GRAPHS A GRAPHS A Graphing Functions with Four Parameters How do I look Interactive Slope Introduction to Slope - A measure of Steepness Introduction to Slope: A measure of steepness Inverse Reflection Principle Iterations and functions Iterations and functions Polynomial Roots Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.1	Lines and Linear Functions
EXPECTATION	A3.1.3	Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph. Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Interactive Slope Line Plot Polynomial Roots Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)
EXPECTATION	A3.1.4	Find an equation of the line parallel or perpendicular to given line, through a given point; understand and use the facts that non-vertical parallel lines have equal slopes, and that non-vertical perpendicular lines have CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM

		CO-ORD GEOM Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form LINES Line up Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular

Michigan Curriculum Standards

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.2	Exponential and Logarithmic Functions
EXPECTATION	A3.2.1	Write the symbolic form and sketch the graph of an exponential function given appropriate information. Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations

EXPECTATION	A3.2.2	Interpret the symbolic forms and recognize the graphs of exponential and logarithmic functions; recognize the logarithmic function as the inverse of the exponential function. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.3	Apply properties of exponential and logarithmic functions. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions

		Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.4	Understand and use the fact that the base of an exponential function determines whether the function increases or decreases and understand how the base affects the rate of growth or decay. Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions involving e Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A.3.2.5	Relate exponential and logarithmic functions to real phenomena, including half-life and doubling time. Carbon Dating Compound Interest Compound Interests

		Exploration versus Consumption Exponential Decay Functions involving e Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 PERCENT Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Simple vs Compound Interest Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.A.**	**Algebra and Functions (A)**
STANDARD	**A3:**	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	**A3.3**	Quadratic Functions
EXPECTATION	**A3.3.1**	Write the symbolic form and sketch the graph of a quadratic function given appropriate information. Animated Projectile Motion Annotated Quadratic Polynomial Ballistic Trajectories Comparing Linear, Exponential and Quadratic Models Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A

		GRAPHS A Graph and Solving Quadratic Inequalities Graphing Functions with Four Parameters Graphing Quadratic Equations Graphing Quadratic Equations Graphing Quadratic Equations Using Roots How do I look Methods of Solving Quadratic Modeling Two-Variable Data Part 2 Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Reflecting Function Plots Review of Parabolas Review of Parabolas Review of Parabolas Reviewing Quadratic Roots Reviewing Quadratic Roots Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Sum 17 Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using the Quadratic Formula an Interpreting the Discriminant

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-

GRADE LEVEL EXPECTATION	A3.3	Quadratic Functions
EXPECTATION	A3.3.2	Identify the elements of a parabola (vertex, axis of symmetry, direction of opening) given its symbolic form or its graph, and relate these elements to the coefficient(s) of the symbolic form of the function. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Annotated Quadratic Polynomial Dilation of Functions Dilation of Functions Dilation of Functions Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graph and Solving Quadratic Inequalities Graphing Functions with Four Parameters Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Quadratic Equation Quadratic Practice Reflecting Function Plots Reflection of Functions Reflection of Functions

		Reflection of Functions Review of Parabolas Review of Parabolas Review of Parabolas Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.3	Quadratic Functions
EXPECTATION	A3.3.4	Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function. GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Quadratic Equations Using Roots Polynomial Roots QUADRATICSx QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Reviewing Quadratic Roots Reviewing Quadratic Roots Using the Quadratic Formula an Interpreting the Discriminant

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-

GRADE LEVEL EXPECTATION	A3.4	Power Functions
EXPECTATION	A3.4.1	Write the symbolic form and sketch the graph of power functions. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.4	Power Functions
EXPECTATION	A3.4.2	Express direct and inverse relationships as functions and recognize their characteristics. Direct Proportion Worksheet (2) Finding out about graphs Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle How do I look Inverse Proportion Worksheet (3) Inverse Square Laws Rates and Ratios Rates and Ratios Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Sense of Proportion The Circumference Function

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.4	Power Functions
EXPECTATION	A3.4.3	Analyze the graphs of power functions, noting reflectional or rotational symmetry. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Functions Functions Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Review of Parabolas Review of Parabolas Review of Parabolas
STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.5	Polynomial Functions
EXPECTATION	A3.5.1	Write the symbolic form and sketch the graph of simple polynomial functions. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions

		Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.5	Polynomial Functions
EXPECTATION	A3.5.2	Understand the effects of degree, leading coefficient, and number of real zeros on the graphs of polynomial Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions
EXPECTATION	A3.5.3	Determine the maximum possible number of zeros of a polynomial function, and understand the relationship between the x-intercepts of the graph and the factored form of the function. Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation

		End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions

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Grade 11

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.6	Rational Functions
EXPECTATION	A3.6.1	Write the symbolic form and sketch the graph of simple rational functions. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically
EXPECTATION	A3.6.2	Analyze graphs of simple rational functions and understand the relationship between the zeros of the numerator and denominator and the function's intercepts, asymptotes, and domain. Functions Functions GRAPHS A GRAPHS A

		GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically
STRAND / STANDARD CATEGORY	**MI.A.**	**Algebra and Functions (A)**
STANDARD	**A3:**	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	**A3.7**	Trigonometric Functions
EXPECTATION	**A3.7.1**	Use the unit circle to define sine and cosine; approximate values of sine and cosine; use sine and cosine to define the remaining trigonometric functions; explain why the trigonometric functions are periodic. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
EXPECTATION	**A3.7.2**	Use the relationship between degree and radian measures to solve problems. Angles Measured in Degrees and Radians
EXPECTATION	**A3.7.3**	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of pi/6 and pi/4. A Tangent Tracer Comparing Sine and Cosine

		Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
EXPECTATION	A3.7.4	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Continued Fraction Approximations of the Tangent Function Doppler Effect Elementary Transcendental Functions and Their Inverses Family of Curves, Tangents, and Intuition Function Explorer 2D Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle

		Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle Inset Plot Magnifier Many Sine Curves Modeling Harmonic Motion Modeling Harmonic Motion Nested Trigonometric Function Plots Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP) Soil Temperature TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 Tetraviews of Elementary Functions The Cosecant Function (GSP) The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated Trigonometric Functions with Four Parameters
EXPECTATION	A3.7.5	Graph transformations of basic trigonometric functions (involving changes in period, amplitude, and midline) and understand the relationship between constants in the formula and the transformed graph. Doppler Effect Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Many Sine Curves

		Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Sinusoids and Transformations (GSP) Soil Temperature Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 The Cosecant Function (GSP) Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions with Four Parameters Wave Interference
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry and Trigonometry (G)**
STANDARD	**G1:**	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	**G1.1**	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	**G1.1.1**	Solve multistep problems and construct proofs involving vertical angles, linear pairs of angles supplementary angles, complementary angles, and right angles. Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet Circle Geometry Worksheet Golden Ratio 1 Line up

		Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP) Types of Angles
EXPECTATION	G1.1.2	Solve multistep problems and construct proofs involving corresponding angles, alternate interior angles, alternate exterior angles, and same-side (consecutive) interior angles. Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Pantograph Linkage Parallel and Perpendicular Line Proofs Properties of Parallel Lines Properties of Parallel Lines

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.3	Perform and justify constructions, including midpoint of a line segment and bisector of an angle, using A Rectangle with Maximum Area A Rectangle with Maximum Area A Triangle Area Problem A Triangle Area Problem Accurate Constructions - Animations Software Advanced Construction Napolean's Theorem Advanced Construction Napolean's Theorem Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Application of Parabolas Application of Parabolas Compass Animations - Constructions Using Straight Edge and Compasses Software Compass Animations Software Constructing Templates for the Platonic Solids Constructing Templates for the Platonic Solids Constructing Templates for the Platonic Solids Creating Complex Design's

		Creating Complex Design's Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exploring the Euler Segment Exploring the Euler Segment Functions in A Triangle Functions in A Triangle Hyperbola Hyperbola Hyperbola Lines and Angles Morley's Triangle - Application of Angle Trisection Morley's Triangle - Application of Angle Trisection Off at a Tangent - Exploring the Tangent to a Circle (GSP) Parabola Parabola Parabola Parabola Properties of Parallel Lines Properties of Parallel Lines Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Some Ellipse Relationships Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals Trisecting an Angle Trisecting an Angle Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular Using the Equilateral Triangle - Surfer & Spotter Using the Equilateral Triangle - Surfer & Spotter

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Grade 11

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.4	Given a line and a point, construct a line through the point that is parallel to the original line using straightedge and compass. Given a line and a point, construct a line through the point that is perpendicular to the original line and justify the steps of the construction Accurate Constructions - Animations Software Compass Animations - Constructions Using Straight Edge and Compasses Software Off at a Tangent - Exploring the Tangent to a Circle (GSP) Properties of Parallel Lines Properties of Parallel Lines Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.5	Given a line segment in terms of its endpoints in the coordinate plane, determine its length and midpoint. Determining the Origin Determining the Origin AREA AREA AREA CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Cycle Ride

		Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Determining the Origin Distance between 2 points Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.6	Recognize Euclidean geometry as an axiom system. Know the key axioms and understand the meaning of and distinguish between undefined terms, axioms, definitions, and theorems. Lines and Angles Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Thales' Theorem Using Postulates and Diagrams
STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.2	Triangles and Their Properties
EXPECTATION	G1.2.1	Prove that the angle sum of a triangle is 180 degrees and that an exterior angle of a triangle is the sum of the ANGLE04XAA ANGLE04XAH

		ANGLE04XAHB ANGLE04ZDA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet Calculating Exterior Angles of Triangles Worksheet Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles Polygon Problems - Exterior Angles of Polygons (GSP) Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP)

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.2	Triangles and Their Properties
EXPECTATION	G1.2.2	Construct and justify arguments and solve multistep problems involving angle measure, side length, perimeter, ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA AREA AREA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software CIRCLES CIRCLESX

		Calculating Angles in Polygons Worksheet Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles PERCENT Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Related Rates: Triangle Angle and Area TRIGONOMETRY Tilted Squares Triangle Area and Perimeters Triangle Area and Perimeters Write and Evaluate Expressions
EXPECTATION	G1.2.3	Know a proof of the Pythagorean Theorem, and use the Pythagorean Theorem and its converse to solve Coordinate Proof Coordinate Proof Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Divide and Rule - Dividing Line Segments in a Given Ratio (GSP). Pythagorean Theorem Pythagorean Theorem 3D Pythagorean Triples Round the Bend Sum of Parts TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2)

		The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.2	Triangles and Their Properties
EXPECTATION	G1.2.4	Prove and use the relationships among the side lengths and the angles of 30 degrees - 60 degrees - 90 degrees triangles and 45 degrees - 45 degrees - 90 degrees triangles. ANGLE04PZDH ANGLE04ZDH The 30-60 Right Triangle The 30-60 Right Triangle

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.2	Triangles and Their Properties
EXPECTATION	G1.2.5	Solve multistep problems and construct proofs about the properties of medians, altitudes, perpendicular bisectors to the sides of a triangle, and the angle bisectors of a triangle. Using a straightedge and compass, construct these lines An IMO Triangle Problem Euler Line Investigating the Properties of Excircles of a Triangle

		Investigating the Properties of Excircles of a Triangle Morley's Triangle - Application of Angle Trisection Morley's Triangle - Application of Angle Trisection Triangle Inequalities Triangle Inequalities Using the Equilateral Triangle - Surfer & Spotter Using the Equilateral Triangle - Surfer & Spotter
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry and Trigonometry (G)**
STANDARD	**G1:**	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	**G1.3**	Triangles and Trigonometry
EXPECTATION	**G1.3.1**	Define the sine, cosine, and tangent of acute angles in a right triangle as ratios of sides. Solve problems about angles, side lengths, or areas using trigonometric ratios in right triangles. ANGLE04PZDH ANGLE04ZDH Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle The 30-60 Right Triangle The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2)

		The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem

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Grade 11

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.3	Triangles and Trigonometry
EXPECTATION	G1.3.2	Know and use the Law of Sines and the Law of Cosines and use them to solve problems. Find the area of a triangle with sides a and b and included angle theta using the formula Area = (1/2) absin theta. ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA CIRCLES CIRCLESX Law of Cosines Law of Sines Related Rates: Triangle Angle and Area TRIGONOMETRY TRIGONOMETRY The Law of Cosines The Law of Cosines The Law of Sines The Law of Sines

EXPECTATION	G1.3.3	Determine the exact values of sine, cosine, and tangent for 0 degrees, 30 degrees, 45 degrees, 60 degrees, and their integer multiples and apply in various contexts. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Composing Trigonometric and Inverse Trigonometric Functions Continued Fraction Approximations of the Tangent Function How Far Can One See from a Height? Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Trigonometric Ratios Trigonometric Ratios Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures.

GRADE LEVEL EXPECTATION	G1.4	Quadrilaterals and Their Properties
EXPECTATION	G1.4.1	Solve multistep problems and construct proofs involving angle measure, side length, diagonal length, perimeter, and area of squares, rectangles, parallelograms, kites, and trapezoids. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA Area Review BOUNDS Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Exterior and Interior Angles of Regular Polygons Worksheet Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Tilted Squares Write and Evaluate Expressions

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.4	Quadrilaterals and Their Properties
EXPECTATION	G1.4.2	Solve multistep problems and construct proofs involving quadrilaterals using Euclidean methods or coordinate Coordinate Proof Coordinate Proof
EXPECTATION	G1.4.3	Describe and justify hierarchical relationships among quadrilaterals. Analyze Conditional Statements Golden Ratio 1 Special Midpoint Quadrilaterals Special Midpoint Quadrilaterals

		Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals
EXPECTATION	G1.4.4	Prove theorems about the interior and exterior angle sums of a quadrilateral. ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA Calculating Angles in Polygons Worksheet Calculating Exterior Angles of Triangles Worksheet Exterior and Interior Angles of Regular Polygons Worksheet Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Polygon Problems - Exterior Angles of Polygons (GSP) Triangle Review - Interior and Exterior Angles (GSP)
EXPECTATION	G1.4.5	Understand the definition of a cyclic quadrilateral and know and use the basic properties of cyclic Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)
STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.5	Other Polygons and Their Properties
EXPECTATION	G1.5.1	Know and use subdivision or circumscription methods to find areas of polygons. Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Pick's Theorem

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.5	Other Polygons and Their Properties
EXPECTATION	G1.5.2	Know, justify, and use formulas for the perimeter and area of a regular n-gon and formulas to find interior and exterior angles of a regular n-gon and their sums. Calculating Angles in Polygons Worksheet Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Exterior and Interior Angles of Regular Polygons Worksheet Golden Ratio 1 Interior & Exterior Angles Polygon Proof - Interior Angle Sums of Polygons (GSP)

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.6	Circles and Their Properties
EXPECTATION	G1.6.1	Solve multistep problems involving circumference and area of circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) Arc Resolution Area of a Circle from Segments CIRCLESX Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Finding Volume of Cylinder and Sphere Introduction to Radians Introduction to Radians Introduction to Radians

		Keeping on Track Length of a Coiled Rope The Circumference Function The Circumference Function The Circumference Function The Cycloid The Cycloid Two Wheel Belt What's my surface? Write and Evaluate Expressions
EXPECTATION	G1.6.2	Solve problems and justify arguments about chords and lines tangent to circles. ANGLE ANGLE ANGLE Ford Circles Hyperbola Hyperbola Hyperbola Inscribed Angle Subtended Chord Intersecting Circles Off at a Tangent - Exploring the Tangent to a Circle (GSP) Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Thales' Theorem The Statue of Regiomontanus Two Wheel Belt
EXPECTATION	G1.6.3	Solve problems and justify arguments about central angles, inscribed angles, and triangles in circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) ANGLE ANGLE ANGLE ANGLE Circle Geometry Worksheet Inscribed Angle Subtended Chord Properties of Circles Part 2 (GSP) Thales' Theorem
EXPECTATION	G1.6.4	Know and use properties of arcs and sectors and find lengths of arcs and areas of sectors. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP)

		Arc Resolution CIRCLES CIRCLESX CIRCLESX Circle Geometry Worksheet Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Thales' Theorem

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.7	Conic Sections and Their Properties
EXPECTATION	G.1.7.1	Find an equation of a circle given its center and radius; given the equation of a circle, find its center and Conic Sections - Writing Equations of Circles Defining and Graphing Relations
EXPECTATION	G1.7.2	Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones. Application of Parabolas Application of Parabolas Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse Ellipse Projects Ellipse Projects

		Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition
EXPECTATION	G1.7.3	Graph ellipses and hyperbolas with axes parallel to the x- and y-axes, given equations. Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations
EXPECTATION	G1.7.4	Know and use the relationship between the vertices and foci in and ellipse, the vertices and foci in a hyperbola, and the directrix and focus in a parabola, interpret these relationships in applied contexts. Application of Parabolas Application of Parabolas Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone

		Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Sum 17 Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry and Trigonometry (G)**
STANDARD	**G1:**	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	**G1.8**	Three- Dimensional Figures
EXPECTATION	**G1.8.1**	Solve multistep problems involving surface area and volume of pyramids, prisms, cones, cylinders, 3-D Shape Explorer - Surface Area of Rectangular Prisms Software 3D Shape Builder Software AREA AREA BOUNDS Cylinder Hemisphere Cone

		FORMULAE Finding Volume of Cylinder and Sphere Missing Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Unfolding Prism Nets Animation (Curved Shape) Unfolding Prism Nets Animation (L Shape) Unfolding Prism Nets Animation (T Shape) Unfolding a Cylinder (Animation) Unfolding a Rectangular Prism - W Shape (Animation) Unfolding a Rectangular Prism - T Shape (Animation) Unfolding a Square-based Pyramid (Animation) VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones What's my surface?

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G2:	Relationships Between Figures: Students use and justify relationships between lines, angles, area and volume formulas, and 2- and 3-dimensional representations. They solve problems and provide proofs about congruence
GRADE LEVEL EXPECTATION	G2.1	Relationships Between Area and Volume Formulas
EXPECTATION	G2.1.1	Know and demonstrate the relationships between the area formula of a triangle, the area formula of a parallelogram, and the area formula of a trapezoid. Area of a Circle from Segments Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons
EXPECTATION	G2.1.2	Know and demonstrate the relationships between the area formulas of various quadrilaterals. Area of a Circle from Segments Critical Thinking - Application of Area Formulas

		Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons
STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G2:	Relationships Between Figures: Students use and justify relationships between lines, angles, area and volume formulas, and 2- and 3-dimensional representations. They solve problems and provide proofs about congruence
GRADE LEVEL EXPECTATION	G2.2	Relationships Between Two-dimensional and Three-dimensional Representations
EXPECTATION	G2.2.1	Identify or sketch a possible three-dimensional figure, given two-dimensional views. Create a two-dimensional representation of a three-dimensional figure. 3-D Shape Explorer - Surface Area of Rectangular Prisms Software 3D Shape Builder Software
EXPECTATION	G2.2.2	Identify or sketch cross sections of three-dimensional figures. Identify or sketch solids formed by revolving two- 3-D Shape Explorer - Surface Area of Rectangular Prisms Software Which Model
STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G2:	Relationships Between Figures: Students use and justify relationships between lines, angles, area and volume formulas, and 2- and 3-dimensional representations. They solve problems and provide proofs about congruence
GRADE LEVEL EXPECTATION	G2.3	Congruence and Similarity
EXPECTATION	G2.3.1	Prove that triangles are congruent using the SSS, SAS, ASA, and AAS criteria, and that right triangles, are congruent using the hypotenuse-leg criterion. Appling Deductive Reasoning CONGRUENCE Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.2	Use theorems about congruent triangles to prove additional theorems and solve problems, with and without Appling Deductive Reasoning CONGRUENCE

		Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.3	Prove that triangles are similar by using SSS, SAS, and AA conditions for similarity. Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.4	Use theorems about similar triangles to solve problems with and without use of coordinates. Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.5	Know and apply the theorem stating that the effect of a scale factor of k relating one two-dimensional figure to another or one three-dimensional figure to another, on the length, area, and volume of the figures is to AREA AREA Area and Volume of Similar Shapes Worksheet (2). Area and Volume of Similar Shapes Worksheet (1). Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Cube Conundrum Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle

		Surface Area and Volumes of Spheres Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) What is the Meaning of Multiplication What is the Meaning of Multiplication

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G3:	Transformations of Figures in the Plane: Students will solve problems about distance-preserving transformations and shape-preserving transformations. The transformations will be described synthetically
GRADE LEVEL EXPECTATION	G3.1	Distance-preserving Transformations: Isometries
EXPECTATION	G3.1.1	Define reflection, rotation, translation, and glide reflection and find the image of a figure under a given Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Reflection-Shortest Path Application of Reflection-Shortest Path Application of Translation - Block Design Application of Translation- Block Design Application of Translation- Block Design Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Critical Thinking - Shortest Path- Laser Critical Thinking - Shortest Path- Laser Fishy Transformations - Combined Transformations (GSP) Game of Buried Treasure Game of Buried Treasure Kaleidoscopic Polygons MATRICES Matrix Transformations: "F" Practice Shortest Path - Feed and Water Practice Shortest Path - Feed and Water Proportional Triangle Nesting Reflection in Geometry and Algebra

		Reflection in Geometry and Algebra Reflections over Intersecting Lines Reflections over Intersecting Lines Reflections over Intersecting Lines Reflections over Two Parallel lines Reflections over Two Parallel lines Reflections over Two Parallel lines Rotation in the Coordinate Plane Rotation in the Coordinate Plane Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations Transformations Transformations Translate to Enlarge - Dilation of 2-D Shapes (GSP) Translation in the Coordinate Plane Translation in the Coordinate Plane Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G3:	Transformations of Figures in the Plane: Students will solve problems about distance-preserving transformations and shape-preserving transformations. The transformations will be described synthetically
GRADE LEVEL EXPECTATION	G3.1	Distance-preserving Transformations: Isometries
EXPECTATION	G3.1.2	Given two figures that are images of each other under an isometry, find the isometry and describe it Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations
EXPECTATION	G3.1.3	Find the image of a figure under the composition of two or more isometries and determine whether the resulting figure is a reflection, rotation, translation, or glide reflection image of the original figure.

		Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry and Trigonometry (G)**
STANDARD	**G3:**	Transformations of Figures in the Plane: Students will solve problems about distance-preserving transformations and shape-preserving transformations. The transformations will be described synthetically
GRADE LEVEL EXPECTATION	**G3.2**	Shape-preserving Transformations: Dilations and Isometries
EXPECTATION	**G3.2.1**	Know the definition of dilation and find the image of a figure under a given dilation. AREA AREA Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP)

		Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects
EXPECTATION	G3.2.2	Given two figures that are images of each other under some dilation, identify the center and magnitude of the [illegible] AREA AREA Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP) Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects What is the Meaning of Multiplication

		What is the Meaning of Multiplication
EXPECTATION	G3.2.3	Find the image of a figure under the composition of a dilation and an isometry. (Recommended) Application of Translation - Block Design Application of Translation- Block Design Application of Translation- Block Design Fishy Transformations - Combined Transformations (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.1	Producing and Interpreting Plots
EXPECTATION	S1.1.1	Construct and interpret dot plots, histograms, relative frequency histograms, bar graphs, basic control charts, and box plots with appropriate labels and scales; determine which kinds of plots are appropriate for different types of data; compare data sets and interpret differences based on graphs and summary statistics. Assumptions Box and Whisker HISTOGRAMS How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Relate

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.1	Producing and Interpreting Plots

EXPECTATION	S1.1.2	Given a distribution of a variable in a data set, describe its shape, including symmetry or skewness, and state how the shape is related to measures of center (mean and median) and measures of variation (range and standard deviation) with particular attention to the effects of outliers on these measures. Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION How Do They Compare Normal Distributions

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.2	Measures of Center and Variation
EXPECTATION	S1.2.1	Calculate and interpret measures of center including: mean, median, and mode; explain uses, advantages and disadvantages of each measure given a particular set of data and its context. AVERAGE Assumptions Box and Whisker C-FREQUENCY DEVIATION DEVIATION How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV QUARTILES QUARTILES QUARTILES QUARTILES TABLES D Use Measures of Central Tendency

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.2	Measures of Center and Variation
EXPECTATION	S1.2.3	Compute and interpret measures of variation, including percentiles, quartiles, interquartile range, variance, Box and Whisker C-FREQUENCY DEVIATION DEVIATION Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Normal Distributions QUARTILES QUARTILES QUARTILES QUARTILES TABLES D

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.3	The Normal Distribution
EXPECTATION	S1.3.1	Explain the concept of distribution and the relationship between summary statistics for a data set and Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Normal Distributions

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.3	The Normal Distribution
EXPECTATION	S1.3.2	Describe characteristics of the normal distribution, including its shape and the relationships among its mean, How Do They Compare Normal Distributions
EXPECTATION	S1.3.3	Know and use the fact that about 68%, 95%, and 99.7% of the data lie within one, two, and three standard deviations of the mean, respectively in a normal distribution. How Do They Compare Normal Distributions

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.3	The Normal Distribution
EXPECTATION	S1.3.4	Calculate z-scores, use z-scores to recognize outliers, and use z-scores to make informed decisions. Normal Distributions

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S2:	Bivariate Data - Examining Relationships: Students plot and interpret bivariate data by constructing scatterplots, recognizing linear and nonlinear patterns, and interpreting correlation coefficients; they fit and
GRADE LEVEL EXPECTATION	S2.1	Scatterplots and Correlation

EXPECTATION	S2.1.2	Given a scatterplot, identify patterns, clusters, and outliers. Recognize no correlation, weak correlation, and Analyzing Predictions (Easiteach) Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV Predicting with Linear Models Randomness in the Digits of Pi Randomness in the Digits of Square Roots Relate SCATTERGRAMS

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S2:	Bivariate Data - Examining Relationships: Students plot and interpret bivariate data by constructing scatterplots, recognizing linear and nonlinear patterns, and interpreting correlation coefficients; they fit and
GRADE LEVEL EXPECTATION	S2.1	Scatterplots and Correlation
EXPECTATION	S2.1.3	Estimate and interpret Pearson's correlation coefficient for a scatterplot of a bivariate data set. Recognize that correlation measures the strength of linear association. Analyzing Predictions (Easiteach) Predicting with Linear Models Relate SCATTERGRAMS

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S2:	Bivariate Data - Examining Relationships: Students plot and interpret bivariate data by constructing scatterplots, recognizing linear and nonlinear patterns, and interpreting correlation coefficients; they fit and
GRADE LEVEL EXPECTATION	S2.2	Linear Regression
EXPECTATION	S2.2.1	For bivariate data that appear to form a linear pattern, find the least squares regression line by estimating visually and by calculating the equation of the regression line. Interpret the slope of the equation for a Analyzing Predictions (Easiteach)

		Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S2.2.2	Use the equation of the least squares regression line to make appropriate predictions. Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling

		Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 SCATTERGRAMS The Circumference Function The Circumference Function The Circumference Function

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S3:	Samples, Surveys, and Experiments: Students understand and apply sampling and various sampling methods, examine surveys and experiments, identify bias in methods of conducting surveys, and learn strategies to
GRADE LEVEL EXPECTATION	S3.1	Data Collection and Analysis
EXPECTATION	S3.1.1	Know the meanings of a sample from a population and a census of a population, and distinguish between Comparing Methods of Data Collection (Easiteach) TABLES D
EXPECTATION	S3.1.2	Identify possible sources of bias in data collection and sampling methods and simple experiments; describe how such bias can be reduced and controlled by random sampling; explain the impact of such bias on conclusions made from analysis of the data; and know the effect of replication on the precision of estimates. Comparing Methods of Data Collection (Easiteach) TABLES D
EXPECTATION	S3.1.3	Distinguish between an observational study and an experimental study, and identify, in context, the Determining Line of Fit Determining Line of Fit Determining Line of Fit Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S3.1.4	Design simple experiments or investigations to collect data to answer questions of interest; interpret and

		Determining Line of Fit Determining Line of Fit Determining Line of Fit Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S3.1.5	Understand methods of sampling, including random sampling, stratified sampling, and convenience samples, and be able to determine, in context, the advantages and disadvantages of each. (Recommended) Comparing Methods of Data Collection (Easiteach) TABLES D
EXPECTATION	S3.1.6	Explain the importance of randomization, double-blind protocols, replication, and the placebo effect in designing experiments and interpreting the results of studies. (Recommended) Comparing Methods of Data Collection (Easiteach) TABLES D
EXPECTATION	S3.1.7.	Explain the basic ideas of statistical process control, including recording data from a process over time. How Do They Compare Relate
EXPECTATION	S3.1.8.	Read and interpret basic control charts; detect patterns and departures from patterns. (Recommended) How Do They Compare Relate
STRAND / STANDARD CATEGORY	**MI.S.**	**Statistics and Probability (S)**
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting
GRADE LEVEL EXPECTATION	S4.1	Probability
EXPECTATION	S4.1.1	Understand and construct sample spaces in simple situations. Find Probabilities Using Permutations and Combinations

		Fractions Are Fun Sort It

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting
GRADE LEVEL EXPECTATION	S4.1	Probability
EXPECTATION	S4.1.2	Define mutually exclusive events, independent events, dependent events, compound events, complementary events and conditional probabilities; and use the definitions to compute probabilities. Chance It Construct and Interpret Binomial Distribution Counting Principle Permutations Dice Roller & Penny Flipper Find Probabilities and Odds Find Probabilities of Compound Events Finding Probabilities Disjoint and Overlapping Events Finding Probability of Independent and Dependent Events Leads in Coin Tossing PROBABILITY PROBABILITY Sort It The Birthday Problem Two Dice with Histogram What Chance Have I got
EXPECTATION	S4.1.3	Design and carry out an appropriate simulation using random digits to estimate answers to questions about probability; estimate probabilities using results of a simulation; compare results of simulations to theoretical Dice Roller & Penny Flipper Experimental and Theoretical Probability Forest Fire Simulation Using a Randomized Hexagonal Automaton Leads in Coin Tossing The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting
GRADE LEVEL EXPECTATION	S4.2	Application and Representation
EXPECTATION	S4.2.1	Compute probabilities of events using tree diagrams, formulas for combinations and permutations, Venn Adds to One Construct and Interpret Binomial Distribution Dice Roller & Penny Flipper Expectations for Roulette Find Probabilities and Odds Leads in Coin Tossing PROBABILITY PROBABILITY The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting
GRADE LEVEL EXPECTATION	S4.2	Application and Representation
EXPECTATION	S4.2.2	Apply probability concepts to practical situations, in such settings as finance, health, ecology, or Assumptions
STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.1	Know and use a definition of a function to decide if a given relation is a function. Defining and Graphing Relations

		Difference of Squares FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functional Geometry Functional Geometry Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test How do I look Increasing, Decreasing, and Constant Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Inverse Reflection Principle Iterations and functions Iterations and functions Sum of Parts Tilted Squares Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.2	Perform algebraic operations (including compositions) on functions and apply transformations (translations, Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Composition of Functions

		Composition of Functions Composition of Functions Composition of Functions Derivatives Dilation of Functions Dilation of Functions Dilation of Functions Finding the Inverse of a Function and the Inverse Composition Rule Function Transformations Functions and Relations Functions and Relations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.3	Write an expression for the composition of one given function with another and find the domain, range, and graph of the composite function. Recognize components when a function is composed of two or more elementary functions Composition of Functions Composition of Functions

		Composition of Functions Composition of Functions Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.4	Determine whether a function (given symbolically or graphically) has an inverse and express the inverse (symbolically, if the function is given symbolically, or graphically, if given graphically) if it exists. Know and A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations
GRADE LEVEL EXPECTATION	P1.5	Determine whether two given functions are inverses, using composition. A Balanced View Composition of Functions Composition of Functions Composition of Functions

		FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.6	Identify and describe discontinuities of a function (e.g., greatest integer function, 1/x) and how these relate Cases of Discontiuity Continuity Function Continuity Function Continuity
GRADE LEVEL EXPECTATION	P1.8	Explain how the rates of change of functions in different families (e.g., linear functions, exponential functions, etc.) differ, referring to graphical representations. And So On Comparing Linear, Exponential and Quadratic Models Filling Bottles Graphing Growth and Decay Functions Inverse Proportion Worksheet (3) Modeling Two-Variable Data Part 2 The Laboratory - Relationship Between Two Variables (Software)

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.7	Understand the concept of limit of a function as x approaches a number or infinity. Use the idea of limit to analyze a graph as it approaches an asymptote. Compute limits of simple functions (e.g., find the limit as x approaches 0 of f(x) = 1/x) informally. An Essential Singularity Continuity Defining the Limit Defining the Limit Exploring Derivatives: Slope of the Secant Line and Average Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change Exploring Derivatives: Slope of the secant line and average rate of change Function Continuity Function Continuity How do we find a Limit? Left hand/Right hand limits How doe we find a Limit? (Left hand/Right hand limits) Limits of Infinite Sequences Limits: Finite c, Finite L Limits: Finite c, Infinite L Limits: Infinite c, Finite L Limits: Infinite c, Infinite L Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P2:	Exponential and Logarithmic Functions
GRADE LEVEL EXPECTATION	P2.1	Use the inverse relationship between exponential and logarithmic functions to solve equations and problems. Solving Logarithmic and Exponential Equations
GRADE LEVEL EXPECTATION	P2.2	Graph logarithmic functions. Graph translations and reflections of these functions. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Elementary Transcendental Functions and Their Inverses

		Exponential Decay Function Explorer 2D Functions Graphing Functions with Four Parameters Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Multiplication by Adding Logs Solving Logarithmic and Exponential Equations

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P2:	Exponential and Logarithmic Functions
GRADE LEVEL EXPECTATION	P2.3	Compare the large-scale behavior of exponential and logarithmic functions with different bases and recognize that different growth rates are visible in the graphs of the functions A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations

GRADE LEVEL EXPECTATION	P2.4	Solve exponential and logarithmic equations when possible, (e.g. 5^x=3^(x+1)). For those that cannot be solved analytically, use graphical methods to find approximate solutions. Carbon Dating Functions Functions Newton's Law of Cooling Solving Logarithmic and Exponential Equations
GRADE LEVEL EXPECTATION	P2.5	Explain how the parameters of an exponential or logarithmic model relate to the data set or situation being modeled. Find an exponential or logarithmic function to model a given data set or situation. Solve problems Carbon Dating Exploration versus Consumption Exponential Decay Functions Functions involving e GRAPHS A Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Representing Inverse Variation Graphically Representing Inverse Variation Graphically Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.P.**	**Precalculus**
STANDARD	P3:	Quadratic Functions
GRADE LEVEL EXPECTATION	P3.1	Solve quadratic-type equations (e.g. e^(2x) - 4 e^(x+4)=0) by substitution. Algebra Quiz Annotated Quadratic Polynomial Completing the Square Functions GRAPHS A GRAPHS A

		GRAPHS A GRAPHS A GRAPHS A Methods of Solving Quadratic QUADRATICS QUADRATICS QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Try Try Try Again Using the Quadratic Formula an Interpreting the Discriminant

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P3:	Quadratic Functions
GRADE LEVEL EXPECTATION	P3.2	Apply quadratic functions and their graphs in the context of motion under gravity and simple optimization ' ' Ballistic Trajectories Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form
GRADE LEVEL EXPECTATION	P3.3	Explain how the parameters of an exponential or logarithmic model relate to the data set or situation being modeled. Find a quadratic function to model a given data set or situation. Ballistic Trajectories Comparing Linear, Exponential and Quadratic Models Exponential Decay Functions GRAPHS A

		Graphing Growth and Decay Functions Lily Pond Newton's Law of Cooling Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P4:	Polynomial Functions
GRADE LEVEL EXPECTATION	P4.2	Solve polynomial equations and inequalities of degree greater than or equal to three. Graph polynomial functions given in factored form using zeros and their multiplicities, testing the sign-on intervals and analyzing the functions' large scale behavior. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Function Transformations Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters How do I look Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions

Michigan Curriculum Standards

Mathematics

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P5:	Rational Functions and Difference Quotients
GRADE LEVEL EXPECTATION	P5.1	Solve equations and inequalities involving rational functions. Graph rational functions given in factored form using zeros, identifying asymptotes, analyzing their behavior for large x values, and testing intervals. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P5:	Rational Functions and Difference Quotients
GRADE LEVEL EXPECTATION	P5.3	Know and apply the definition and geometric interpretation of difference quotient. Simplify difference quotients and interpret difference quotients as rates of change and slopes of secant lines. DIFFERENTIATION DIFFERENTIATION Exploring Derivatives: Slope of the Secant Line and Average Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change Exploring Derivatives: Slope of the secant line and average rate of change Rate of Change Rate of Change Secant Approximations Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Tangent to a Curve

Michigan Curriculum Standards

Mathematics

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P6:	Trigonometric Functions
GRADE LEVEL EXPECTATION	P6.1	Define (using the unit circle), graph, and use all trigonometric functions of any angle. Convert between radian and degree measure. Calculate arc lengths in given circles. A Tangent Tracer Angles Measured in Degrees and Radians Comparing Sine and Cosine Comparing Sine and Cosine Continued Fraction Approximations of the Tangent Function Doppler Effect Elementary Transcendental Functions and Their Inverses Family of Curves, Tangents, and Intuition Function Explorer 2D Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle Inset Plot Magnifier Many Sine Curves Modeling Harmonic Motion Modeling Harmonic Motion Nested Trigonometric Function Plots Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP)

		Soil Temperature TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 Tetraviews of Elementary Functions The Cosecant Function (GSP) The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated Trigonometric Functions with Four Parameters Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
GRADE LEVEL EXPECTATION	P6.2	Graph transformations of the sine and cosine functions (involving changes in amplitude, period, midline, and phase) and explain the relationship between constants in the formula and transformed graph. Doppler Effect Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Many Sine Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Sinusoids and Transformations (GSP) Soil Temperature

		Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 The Cosecant Function (GSP) Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions with Four Parameters Wave Interference
GRADE LEVEL EXPECTATION	P6.3	Know basic properties of the inverse trigonometric functions sin^-1 x, cos^-1 x, tan^-1 x, including their domains and ranges. Recognize their graphs. Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Elementary Transcendental Functions and Their Inverses Evaluate Inverse Trigonometric Functions Function Explorer 2D Functions Illustrating Cosine with the Unit Circle II Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem
GRADE LEVEL EXPECTATION	P6.4	Know the basic trigonometric identities for sine, cosine, and tangent (e.g., the Pythagorean identities, sum and difference formulas, co-functions relationships, double-angle and half-angle formulas). Analytic Trigonometry Analytic Trigonometry Analytic Trigonometry Apply Double-Angle and Half Angle Formulas Apply Sum and Difference Formulas Identities in Calculus Verify Trigonometric Identities
GRADE LEVEL EXPECTATION	P6.5	Solve trigonometric equations using basic identities and inverse trigonometric functions. Composing Trigonometric and Inverse Trigonometric Functions

		Solve Trigonometric Equations Two Wheel Belt
GRADE LEVEL EXPECTATION	P6.6	Prove trigonometric identities and derive some of the basic ones (e.g., double-angle formula from sum and difference formulas, half-angle formula from double-angle formula, etc.). Analytic Trigonometry Analytic Trigonometry Analytic Trigonometry Apply Double-Angle and Half Angle Formulas Apply Sum and Difference Formulas Identities in Calculus Verify Trigonometric Identities
GRADE LEVEL EXPECTATION	P6.7	Find a sinusoidal function to model a given data set or situation and explain how the parameters of the model A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Doppler Effect Elementary Transcendental Functions and Their Inverses Family of Curves, Tangents, and Intuition Function Explorer 2D Function Transformations Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle Many Sine Curves Modeling Harmonic Motion Modeling Harmonic Motion

		Nested Trigonometric Function Plots Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP) Soil Temperature Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 The Cosecant Function (GSP) Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated Trigonometric Functions with Four Parameters
STRAND / STANDARD CATEGORY	**MI.P.**	**Precalculus**
STANDARD	**P7:**	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	**P7.1**	Perform operations (addition, subtraction, and multiplication by scalars) on vectors in the plane. Solve applied Block on a Frictionless Inclined Plane CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Forces on a Simple Pendulum How to Add and Subtract Vectors How to Add and Subtract Vectors How to Add and Subtract Vectors VECTORS VECTORS Vector Cross Product

		Vector Cross Product Vector Operations in Three Dimensions
GRADE LEVEL EXPECTATION	P7.2	Know and apply the algebraic and geometric definitions of the dot product of vectors. Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Vector Cross Product Vector Cross Product Vector Operations in Three Dimensions

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P7:	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	P7.3	Know the definitions of matrix addition and multiplication. Add, subtract, and multiply matrices. Multiply a Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Basic Matrix Operations MATRICES MATRICES MATRICES MATRICES MATRICES MATRICES MATRICES Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P7:	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	P7.5	Define the inverse of a matrix and compute the inverse of two-by-two and three-by-three matrices when they Using Inverse Matrices to solve Linear Systems
GRADE LEVEL EXPECTATION	P7.6	Explain the role of determinants in solving systems of linear equations using matrices and compute determinants of two-by-two and three-by-three matrices. EQUATIONS EQUATIONS Evaluate the Determinant and Apply Cramer's Rule Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Matrices Multivariate Linear Systems and Row Operations PUZSQC40 Using Inverse Matrices to solve Linear Systems

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P7:	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	P7.7	Write systems of two and three linear equations in matrix form. Solve such systems using Gaussian elimination EQUATIONS EQUATIONS Evaluate the Determinant and Apply Cramer's Rule Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Matrices Multivariate Linear Systems and Row Operations PUZSQC40 Using Inverse Matrices to solve Linear Systems
GRADE LEVEL EXPECTATION	P7.8	Represent and solve systems of inequalities in two variables and apply these methods in linear programming

		Application of Graphing Inequalities Application of Graphing Inequalities Graph of Inequalities Solving Inequalities Using the Number Line
STRAND / STANDARD CATEGORY	**MI.P.**	**Precalculus**
STANDARD	**P8:**	Sequences, Series, and Mathematical Induction
GRADE LEVEL EXPECTATION	**P8.1**	Know, explain, and use sigma and factorial notation. COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS Combinations and the Binomial Theorem Counting Principle Permutations DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Define and Use Sequences and Series Factorial Find Probabilities Using Permutations and Combinations Mathematical Induction Series: A Few Examples Series: Steps on a Number Line
GRADE LEVEL EXPECTATION	**P8.2**	Given an arithmetic, geometric, or recursively defined sequence, write an expression for the nth term when possible. Write a particular term of a sequence when given the nth term. And So On Define and Use Sequences and Series EQUATIONS Gifts Galore & Phoning friends Make a Difference Pyramids SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A

		SEQUENCES A SEQUENCES Ax
GRADE LEVEL EXPECTATION	P8.3	Understand, explain, and use the formulas for the sums of finite arithmetic and geometric sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets
GRADE LEVEL EXPECTATION	P8.4	Compute the sums of infinite geometric series. Understand and apply the convergence criterion for geometric A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples

		The Cantor Sequence with Bits The Sum of Two Cantor Sets
GRADE LEVEL EXPECTATION	P8.5	Understand and explain the principle of mathematical induction and prove statements using mathematical induction. A Visual Proof of Nicomachus' Theorem Discrete Mathematics Mathematical Induction PROOF RADICALS Sum of Three Triangular Numbers
GRADE LEVEL EXPECTATION	P8.6	Prove the binomial theorem using mathematical induction. Show its relationships to Pascal's triangle and to combinations. Use the binomial theorem to find terms in the expansion of a binomial to a power greater than 2. Binomial Theorem Binomial Theorem Christmas Stocking Identity Combinations and the Binomial Theorem Cube Conundrum DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Expansion of a Polynomial Pascal's Triangle
STRAND / STANDARD CATEGORY	**MI.P.**	**Precalculus**
STANDARD	P9:	Polar Coordinates, Parameterizations, and Conic Sections
GRADE LEVEL EXPECTATION	P9.1	Convert between polar and rectangular coordinates. Graph functions given in polar coordinates. Introduction to Polar Coordinates Introduction to Polar Coordinates Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Polar Coordinates
GRADE LEVEL EXPECTATION	P9.2	Write complex numbers in polar form. Know and use De Moivre's Theorem. De Moivre's Theorem and nth Roots Introduction to Polar Coordinates Introduction to Polar Coordinates

		Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Polar Coordinates Proving Identities -Disproving Non - Identities

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P9:	Polar Coordinates, Parameterizations, and Conic Sections
GRADE LEVEL EXPECTATION	P9.3	Evaluate parametric equations for given values of the parameter. Generalized Arrhenius Function Mbius Monorail Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.4	Convert between parametric and rectangular forms of equations. Generalized Arrhenius Function Mbius Monorail Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.5	Graph curves described by parametric equations and find parametric equations for a given graph. Generalized Arrhenius Function Mbius Monorail

		Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.6	Use parametric equations in applied contexts (e.g., orbits and projectiles) to model situations and solve Generalized Arrhenius Function Mbius Monorail Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.7	Know, explain, and apply the locus definitions of parabolas, ellipses, and hyperbolas and recognize these conic Application of Parabolas Application of Parabolas Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition

		Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Sum 17 Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition
GRADE LEVEL EXPECTATION	P9.8	Identify parabolas, ellipses, and hyperbolas from equations, write the equations in standard form, and sketch an appropriate graph of the conic section. Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations Interactive Conics
GRADE LEVEL EXPECTATION	P9.9	Derive the equation for a conic section from given geometric information (e.g., find the equation of an ellipse given its two axes). Identify key characteristics (e.g. foci and asymptotes) of a conic section from its equation Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations Interactive Conics

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S1:	Exploring Univariate and Bivariate Data
GRADE LEVEL EXPECTATION	S1.2	Compute and interpret the within-group and between-group variation when comparing two or more data sets. How Do They Compare Relate
GRADE LEVEL EXPECTATION	S1.3	Compute residuals and use plots of residuals to assess the adequacy of a simple linear regression model. How Do They Compare Relate
GRADE LEVEL EXPECTATION	S1.4	Identify influential points in a bivariate data set and predict and verify the effect of their removal on the least- Interpret Stem and Leaf, Histograms, and Box and Whisker Plots
GRADE LEVEL EXPECTATION	S1.5	When applicable, use logarithmic and power transformations to achieve linearity and use the transformed data Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs
GRADE LEVEL EXPECTATION	S1.6	Explore categorical data via contingency tables, computing and interpreting marginal, joint, and conditional relative frequencies and examining measures of association. C-FREQUENCY
STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S2:	Sampling and Study Design
GRADE LEVEL EXPECTATION	S2.1	Describe the strengths and weaknesses of sampling methods, including simple random sampling, stratified random sampling, convenience sampling, voluntary response, and cluster sampling. Recognize potential Comparing Methods of Data Collection (Easiteach) TABLES D

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S2:	Sampling and Study Design
GRADE LEVEL EXPECTATION	S2.2	Critically assess the validity of conclusions drawn from surveys such as political polls, recognizing possible biases such as size bias and non-response bias and understanding the role of question formulation. Comparing Methods of Data Collection (Easiteach) How Do They Compare Relate TABLES D

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S2:	Sampling and Study Design
GRADE LEVEL EXPECTATION	S2.3	Know and recognize in context the concepts of treatment group, control group, and experimental unit and demonstrate the importance of double-blind protocol, random assignment, experimental unit, and replication. Comparing Methods of Data Collection (Easiteach) TABLES D
GRADE LEVEL EXPECTATION	S2.4	Understand and describe how to implement completely randomized and randomized block designs (including matched-pair designs), recognizing when and how blocking can lower variability. How Do They Compare Relate

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.1	Know the subjective and relative frequency interpretations of probabilities, including an informal Experimental and Theoretical Probability

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.2	Use basic probability rules such as the addition rule, law of total probability, and complement rule to compute Chance It Counting Principle Permutations Find Probabilities of Compound Events Finding Probabilities Disjoint and Overlapping Events PROBABILITY PROBABILITY Sort It Two Dice with Histogram What Chance Have I got
GRADE LEVEL EXPECTATION	S3.3	Use Bayes' Theorem to solve conditional probability problems, with emphasis on the interpretation of results. Sort It

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.5	Compute the expected value and standard deviation of discrete random variables and know the effect of a linear transformation of a random variable on its mean and standard deviation. DEVIATION DEVIATION Expectations for Roulette Normal Distributions

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability

STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.6	Apply standard discrete distributions, including the binomial, geometric, and hypergeometric. Christmas Stocking Identity Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Normal Distributions

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.8	Use tables and technology to determine probabilities and percentiles of normal distributions. How Do They Compare Normal Distributions
GRADE LEVEL EXPECTATION	S3.9	Use simulation methods to answer questions about probability models that are too complex for analytical treatment at this level, e.g., interacting particle system models. Dice Roller & Penny Flipper Forest Fire Simulation Using a Randomized Hexagonal Automaton Leads in Coin Tossing The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S4:	Sampling Distributions
GRADE LEVEL EXPECTATION	S4.1	Given the mean and standard deviation of each random variable in a set of random variables, compute the mean of the sum and, assuming independence, compute the variance and standard deviation of the sum.

		How Do They Compare Relate
GRADE LEVEL EXPECTATION	S4.6	Compute control limits for commonly used control charts and use these to assess whether a process is out of [illegible] How Do They Compare Relate

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S5:	Point and Interval Estimation
GRADE LEVEL EXPECTATION	S5.1	Compute bias, variance, and mean squared error of estimators of the mean and proportion. Comparing Methods of Data Collection (Easiteach) TABLES D

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.1	Know the terminology and logic of significance testing, including null and alternative hypotheses, p-value, [illegible] How Do They Compare Relate

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.2	Assuming a normal model and known standard deviation, carry out a significance test for a single mean, with emphasis on understanding the computation and interpretation of the p-value, and compute the power curve [illegible] How Do They Compare Normal Distributions

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.3	Carry out (large sample) significance tests for one proportion and the difference of two proportions, with emphasis on proper interpretation of results. How Do They Compare Relate

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.6	Assuming a normal model and known standard deviation, compute the sample size necessary to achieve a pre-specified power at a pre-specified value of the population mean. How Do They Compare Normal Distributions

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.7	Demonstrate, in the context of specific studies, the understanding that a result can be statistically significant while of insignificant practical importance and that a failure to reject a null hypothesis may be due to low power and does not necessarily imply the null hypothesis is true. How Do They Compare Relate

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S7:	Inference for Regression
GRADE LEVEL EXPECTATION	S7.1	Know the statistical model for regression, including linearity, normality of errors, and constancy of error . Analyzing Predictions (Easiteach) Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S7:	Inference for Regression
GRADE LEVEL EXPECTATION	S7.3	Test hypotheses about the slope of a regression line, with emphasis on interpretation of results.

EXPECTATION		Analyzing Predictions (Easiteach) Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S8:	Assessing Assumptions of Statistical Models
GRADE LEVEL EXPECTATION	S8.2	In the context of specific studies, recognize aspects of study design that either support or offer evidence Comparing Methods of Data Collection (Easiteach)
GRADE LEVEL EXPECTATION	S8.3	Demonstrate knowledge of the possible effects of incorrect assumptions (i.e., improperly specified models) on inferential procedures and of the robustness of inferential procedures to departures from specified

		How Do They Compare Relate

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.1.	Know the different properties that hold in different number systems and recognize that the applicable properties change in the transition from the positive integers to all integers, to the rational numbers, and to the real numbers. Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Reason Using Properties from Algebra Subtracting Integers Subtracting Integers Subtracting Integers The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication What is the Meaning of Multiplication

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.2.	Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Identity Elements and Inverses Identity Elements and Inverses Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers

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Grade 11

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.3.	Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations. Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses

		Into Multiplying Integers Into Multiplying Integers Into Multiplying Integers Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication What is the Meaning of Multiplication
EXPECTATION	L1.1.4.	Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number by a number less than 0, a number between 0 and 1, and a number greater than 1. EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS Fractional Parts of Powers of Rationals INVERSES Into Multiplying Integers Into Multiplying Integers Into Multiplying Integers Negative Exponents and Parentheses Worksheet (1) Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (2) Powerful RADICALS Rules with Negative Exponents Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents

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Grade 11

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.5.	Justify numerical relationships. Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.2.	Representations and Relationships
EXPECTATION	L1.2.2.	Interpret representations that reflect absolute value relationships. Inequalities and Absolute Value Solving Absolute Equations and Inequalities Solving Inequalities Using the Number Line
EXPECTATION	L1.2.4.	Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media. AVERAGE Analyzing Predictions (Easiteach) Box and Whisker C-FREQUENCY COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS

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		COMBINATIONS
		COMBINATIONS
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		DISTRIBUTION
		DISTRIBUTION
		DISTRIBUTION
		DISTRIBUTION
		Determining Line of Fit
		Determining Line of Fit
		Determining Line of Fit
		Functional Geometry
		Functional Geometry
		Functions in A Triangle
		Functions in A Triangle
		Games Galore
		HISTOGRAMS
		Interpret Stem and Leaf, Histograms, and Box and Whisker Plots
		MEAN
		MOVING AV
		Modeling Linear Motion Using Parametric Equations
		Modeling Linear Motion Using Parametric Equations
		Modeling Linear Motion Using Parametric Equations
		Modeling Two-Variable Data Part 1
		Normal Distributions
		PROBABILITY
		PROBABILITY
		Pick and Mix Family
		QUARTILES
		QUARTILES
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		QUARTILES
		Representing Direct Variation Algebraically and Graphically
		Representing Direct Variation Algebraically and graphically
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		The Circumference Function

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Mathematics

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.2.	Calculate fluently with numerical expressions involving exponents; use the rules of exponents; evaluate numerical expressions involving rational and negative exponents; transition easily between roots and exponents. EXPONENTS EXPONENTS EXPONENTS Evaluate nth Roots Get In Lane Order of Operations Order of Operations Order of Operations Positive Exponents and Parentheses Worksheet (1) Switch - Calculations Software

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.4.	Know that the imaginary number i is one of two solutions to x^2 = -1. Game of Buried Treasure Game of Buried Treasure Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers

		Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers Proving Identities -Disproving Non - Identities

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.1.	Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables. Balancing Act Part II Changing Formulas Codebreaker 2 - Simplification Software Constructing Simple Arguments (Easiteach) Escape the Cave - Using Letters to Represent Unknown Numbers Software Expression Machine FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Newton's Law of Cooling Reflecting Function Plots Write and Evaluate Expressions Writing and Solving Ratios and Proportions

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Mathematics

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I

STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.2.	Know the properties of exponents and roots and apply them in algebraic expressions. EXPONENTS EXPONENTS EXPONENTS INDICES A Introduction to Exponents Introduction to Exponents Negative Exponents and Parentheses Worksheet (1) Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (1) Positive Exponents and Parentheses Worksheet (2) Powerful Roughly the Answer Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.3.	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product [illegible] Algebra Quiz Difference of Squares EXPRESSIONS FACTORISE Factoring Binomials Factoring Polynomials Completely Factoring Trinomials Factoring Trinomials Using Algebra Tiles Integer Polynomial

		Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Operations with Polynomials (division) QUADRATICS QUADRATICS QUADRATICS QUADRATICSx
STRAND / STANDARD CATEGORY	**MI.AI.**	**Algebra I**
STANDARD	**A1:**	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	**A1.2.**	Solutions of Equations and Inequalities
EXPECTATION	**A1.2.1.**	Write equations and inequalities with one or two variables to represent mathematical or applied situations, Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models EQUATIONS Find the Number GRAPHS A Graphing Linear Inequalities Inequalities and Absolute Value Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Line Plot QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically Solving Inequalities Using the Number Line Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.3.	Solve linear and quadratic equations and inequalities including systems of up to three linear equations with three unknowns. Justify steps in the solution, and apply the quadratic formula appropriately. Algebra Quiz Algebraic Solutions to Polynomial Equations Annotated Quadratic Polynomial Balancing Act Part II Completing the Square Complex Conjugates Evaluate the Determinant and Apply Cramer's Rule Find the Number Finding Numbers that satisfy two or more equations Finding Numbers that satisfy two or more equations Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graph of Inequalities Graphing Linear Inequalities Inequalities and Absolute Value Intro to Equations Intro to Equations Intro to Equations Introduction to Equations Matrices Methods of Solving Linear Systems of Equations and Inequalities Methods of Solving Quadratic Multivariate Linear Systems and Row Operations QUADRATICS QUADRATICS QUADRATICSx QUADRATICSx QUADRATICSx

		QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Reviewing Quadratic Roots Reviewing Quadratic Roots SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS Solve It Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Solving Inequalities Using the Number Line Solving Inequalities Worksheet (1) Solving Inequalities Worksheet (2) Solving Inequalities Worksheet (3) Solving Inequalities Worksheet (4) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Try Try Try Again Using Inverse Matrices to solve Linear Systems Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations Using the Quadratic Formula an Interpreting the Discriminant
EXPECTATION	A1.2.4.	Solve absolute value equations and inequalities and justify steps in the solution. Inequalities and Absolute Value Solving Absolute Equations and Inequalities Solving Inequalities Using the Number Line
EXPECTATION	A1.2.6.	Solve power equations and equations including radical expressions; justify steps in the solution, and explain

		End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Simplifying Radical Expressions and Equations
EXPECTATION	A1.2.8.	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. CO-ORD GEOM CO-ORD GEOM Changing Formulas TRANSPOSITION

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1.	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and A Balanced View Composition of Functions Composition of Functions Composition of Functions Defining and Graphing Relations Difference of Squares Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS

		Finding the Inverse of a Function and the Inverse Composition Rule Functional Geometry Functional Geometry Functions Functions and Relations Functions and Relations Functions and Relations Functions and Relations Functions in A Triangle Functions in A Triangle Horizontal Line Test, Vertical Line Test How do I look Increasing, Decreasing, and Constant Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Inverse Reflection Principle Iterations and functions Iterations and functions Mapping Diagrams Sum of Parts Tilted Squares Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation and evaluate a function at a value in its domain. FUNCTIONS FUNCTIONS FUNCTIONS

		FUNCTIONS Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Reflecting Function Plots Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations. A Perfect Square Analyze Arithmetic and Geometric Sequence and Series And So On Balancing Act Part II CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Changing Formulas Comparing Linear, Exponential and Quadratic Models Composition of Functions Composition of Functions Composition of Functions Define and Use Sequences and Series Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs EQUATIONS Find the Number Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Gifts Galore & Phoning friends Graphing Graphing Linear Inequalities How Slope is Measured How Slope is Measured

How do I look
Intro to Equations
Intro to Equations
Intro to Equations
Introducing Functions as Dynagraphs
Introducing Functions as Dynagraphs
Introducing Functions as Dynagraphs
Introduction to Equations
Laws
Modeling Num as Segments & Area
Modeling Num as Segments & Area
Modeling Number as Segments and Areas
Modeling Two-Variable Data Part 1
Multiplication by Adding Logs
Multiplying Binomials
Pyramids
QUADRATICSx
Representing Direct Variation Algebraically and Graphically
Representing Direct Variation Algebraically and graphically
Representing Direct Variation Algebraically and graphically
Representing Inverse Variation Graphically
Representing Inverse Variation Graphically
SEQPUZ08
SEQPUZ25
SEQUENCES A
SEQUENCES A
SEQUENCES A
SEQUENCES Ax
Scientific Notation Worksheet (1)
Scientific Notation Worksheet (2)
Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R))
Solve It
Solving One-step, Two Step, And Multi Step equations
Sum 17
Transition Between Dynagaphs to Cartesian Graphs
Transition Between Dynagaphs to Cartesian Graphs
Transition Between Dynagaphs to Cartesian Graphs
Using Dynagaphs to Explore Function Composition
Using Dynagaphs to Explore Function Composition
Using Dynagaphs to Explore Function Composition
Using Points on the Coordinate Plane to Create Patterns
Using Points on the Coordinate Plane to Create Patterns
Using Points on the Coordinate Plane to Create Patterns
Using Rabbit Races to Solve Equations

		Using Rabbit Races to Solve Equations What Expression Write and Solve Equations and Inequalities
EXPECTATION	A2.1.4.	Recognize that functions may be defined by different expressions over different intervals of their domains; Function Transformations Functions

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.5.	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Geometric Series Coil Geometric Series Coil Geometric Square Root Construction IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series Models of Geometric Series Ratio of Similarity Ratio of Similarity

		Ratio of Similarity The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets Use Recursive Rules with Sequences and Functions

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.6.	Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and graphical representations An Essential Singularity Complex Zeros and the Fundamental Theorem of Algebra Continuity Cubic Equation Defining the Limit Defining the Limit End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Exploring Derivatives: Slope of the Secant Line and Average Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change Exploring Derivatives: Slope of the secant line and average rate of change Filling Bottles Function Continuity Function Continuity Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Quadratic Equations Using Roots

		How do we find a Limit? Left hand/Right hand limits How doe we find a Limit? (Left hand/Right hand limits) Increasing, Decreasing, and Constant Functions Limits of Infinite Sequences Limits: Finite c, Finite L Limits: Finite c, Infinite L Limits: Infinite c, Finite L Limits: Infinite c, Infinite L Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Predicting a Velocity Plot Predicting a Velocity Plot QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Rational Functions Real Zeros of Polynomial Functions Reviewing Quadratic Roots Reviewing Quadratic Roots The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.1.7.	Identify and interpret the key features of a function from its graph or its formula(s). Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Filling Bottles Functions Functions Graph Classifier Software Increasing, Decreasing, and Constant Functions Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Predicting a Velocity Plot Predicting a Velocity Plot

		Rational Functions The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.2.	Apply given transformations to parent functions and represent symbolically. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Derivatives Dilation of Functions Dilation of Functions Dilation of Functions Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game

		Transformation Challenge - Group Game Transformation Challenge - Group Game
EXPECTATION	A2.2.3.	Determine whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.3.	Representations of Functions
EXPECTATION	A2.3.2.	Describe the tabular pattern associated with functions having a constant rate of change (linear); or variable And So On Comparing Linear, Exponential and Quadratic Models Filling Bottles Graphing Growth and Decay Functions Inverse Proportion Worksheet (3) Modeling Two-Variable Data Part 2 The Laboratory - Relationship Between Two Variables (Software)

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.4.	Models of Real-World Situations Using Families of Functions
EXPECTATION	A2.4.1.	Identify the family of function best suited for modeling a given real-world situation. Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Modeling Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3
EXPECTATION	A2.4.2.	Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons

		Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.4.3.	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS

		CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.1.	Lines and Linear Functions
EXPECTATION	A3.1.1.	Write the symbolic forms of linear functions (standard, point-slope, and slope-intercept) given appropriate
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		CO-ORD GEOM
		CO-ORD GEOM
		CO-ORD GEOM
		CO-ORD GEOM
		CO-ORD GEOM
		Determine Equation Using y = mx + b
		Determine Equation Using y=mx +b
		Determine Equation Using y=mx +b
		Determining Equation of a Line Using Point Slope Form
		Determining Equation of a Line Using Point Slope Form
		Determining Equation of a Line Using Point Slope Form
		Determining Equation of a Line Using the Slope Intercept
		Determining Equation of a Line Using the Slope Intercept
		Determining Equation of a Line Using the Slope Intercept
		GRAPHS A
		Graphing Absolute Value Functions
		Graphing Absolute Value Functions
		Graphing Linear Inequalities
		Iterations and functions
		Iterations and functions
		LINES
		Line Plot
		Line up
		Modeling Two-Variable Data Part 1
		Reflecting Without the Reflect Command: The Algebra of Reflection
		Reflecting Without the Reflect Command: The Algebra of Reflection
		Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R))
		Systems of Equations Worksheet (10)
		Systems of Equations Worksheet (7)
		Systems of Equations Worksheet (8)
		Systems of Equations Worksheet (9)
		The Circumference Function
		The Circumference Function
		The Circumference Function

		The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns
EXPECTATION	A3.1.2.	Graph lines (including those of the form x = h and y = k) given appropriate information. A Balanced View Comparing Linear, Exponential and Quadratic Models Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Finding the Inverse of a Function and the Inverse Composition Rule Function Transformations Functions and Relations Functions and Relations Functions and Relations GRAPHS A GRAPHS A Graphing Functions with Four Parameters How do I look Interactive Slope Introduction to Slope - A measure of Steepness Introduction to Slope: A measure of steepness Inverse Reflection Principle Iterations and functions Iterations and functions Polynomial Roots Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)

Grade 11

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.1.	Lines and Linear Functions
EXPECTATION	A3.1.3.	Relate the coefficients in a linear function to the slope and x- and y- intercepts of its graph. Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Interactive Slope Line Plot Polynomial Roots Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)
EXPECTATION	A3.1.4.	Find an equation of the line parallel or perpendicular to given line, through a given point; understand and use the facts that non-vertical parallel lines have equal slopes, and that non-vertical perpendicular lines have CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Determining Equation of a Line Using Point Slope Form

		Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form LINES Line up Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.2.	Exponential and Logarithmic Functions
EXPECTATION	A3.2.1.	Write the symbolic form and sketch the graph of an exponential function given appropriate information. Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.4.	Understand and use the fact that the base of an exponential function determines whether the function increases or decreases and how base affects the rate of growth or decay.

		Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions involving e Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.5.	Relate exponential functions to real phenomena, including half-life and doubling time. Carbon Dating Compound Interest Compound Interests Exploration versus Consumption Exponential Decay Functions involving e Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 PERCENT Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Simple vs Compound Interest

		Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.AI.**	**Algebra I**
STANDARD	**A3:**	Families of Functions
GRADE LEVEL EXPECTATION	**A3.3.**	Quadratic Functions
EXPECTATION	**A3.3.1.**	Write the symbolic form and sketch the graph of a quadratic function given appropriate information. Animated Projectile Motion Annotated Quadratic Polynomial Ballistic Trajectories Comparing Linear, Exponential and Quadratic Models Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graph and Solving Quadratic Inequalities Graphing Functions with Four Parameters Graphing Quadratic Equations Graphing Quadratic Equations Graphing Quadratic Equations Using Roots How do I look Methods of Solving Quadratic Modeling Two-Variable Data Part 2 Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form Parabolas in Standard Form Parabolas in Standard Form

		Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Reflecting Function Plots Review of Parabolas Review of Parabolas Review of Parabolas Reviewing Quadratic Roots Reviewing Quadratic Roots Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Sum 17 Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using the Quadratic Formula an Interpreting the Discriminant

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Mathematics

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.3.	Quadratic Functions
EXPECTATION	A3.3.2.	Identify the elements of a parabola (vertex, axis of symmetry, direction of opening) given its symbolic form or its graph, and relate these elements to the coefficient(s) of the symbolic form of the function. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Annotated Quadratic Polynomial Dilation of Functions Dilation of Functions Dilation of Functions Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form

		Exploring Parabolas in Vertex Form Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graph and Solving Quadratic Inequalities Graphing Functions with Four Parameters Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Quadratic Equation Quadratic Practice Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Review of Parabolas Review of Parabolas Review of Parabolas Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I

STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.3.	Quadratic Functions
EXPECTATION	A3.3.4.	Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function. GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Quadratic Equations Using Roots Polynomial Roots QUADRATICSx QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Reviewing Quadratic Roots Reviewing Quadratic Roots Using the Quadratic Formula an Interpreting the Discriminant

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.4.	Power Functions
EXPECTATION	A3.4.1.	Write the symbolic form and sketch the graph of power functions. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.4.	Power Functions
EXPECTATION	A3.4.2.	Express directly and inversely proportional relationships as functions and recognize their characteristics. Direct Proportion Worksheet (2) Finding out about graphs Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle How do I look Inverse Proportion Worksheet (3) Inverse Square Laws Rates and Ratios Rates and Ratios Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Sense of Proportion The Circumference Function

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.4.	Power Functions
EXPECTATION	A3.4.3.	Analyze the graphs of power functions, noting reflectional or rotational symmetry. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Functions

		Functions Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Review of Parabolas Review of Parabolas Review of Parabolas
STRAND / STANDARD CATEGORY	**MI.AI.**	**Algebra I**
STANDARD	**A3:**	Families of Functions
GRADE LEVEL EXPECTATION	**A3.5.**	Polynomial Functions
EXPECTATION	**A3.5.1.**	Write the symbolic form and sketch the graph of simple polynomial functions. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions

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STRAND / STANDARD CATEGORY	**MI.AI.**	**Algebra I**
STANDARD	**A3:**	Families of Functions

GRADE LEVEL EXPECTATION	A3.5.	Polynomial Functions
EXPECTATION	A3.5.2.	Understand the effects of degree, leading coefficient, and number of real zeros on the graphs of polynomial functions of degree greater than 2. Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions
EXPECTATION	A3.5.3.	Determine the maximum possible number of zeroes of a polynomial function and understand the relationship between the x-intercepts of the graph and the factored form of the function. Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions
STRAND / STANDARD CATEGORY	MI.AI.	Algebra I

STANDARD	S2:	Bivariate Data-Examining Relationships
GRADE LEVEL EXPECTATION	S2.1.	Scatter plots and Correlation
EXPECTATION	S2.1.2.	Given a scatter plot, identify patterns, clusters, and outliers. Recognize no correlation, weak correlation, and Analyzing Predictions (Easiteach) Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV Predicting with Linear Models Randomness in the Digits of Pi Randomness in the Digits of Square Roots Relate SCATTERGRAMS

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	S2:	Bivariate Data-Examining Relationships
GRADE LEVEL EXPECTATION	S2.1.	Scatter plots and Correlation
EXPECTATION	S2.1.3.	Estimate and interpret Pearson's correlation coefficient for a scatter plot of a bivariate data set. Recognize that correlation measures the strength of linear association. Analyzing Predictions (Easiteach) Predicting with Linear Models Relate SCATTERGRAMS

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	S2:	Bivariate Data-Examining Relationships
GRADE LEVEL EXPECTATION	S2.2.	Linear Regression
EXPECTATION	S2.2.1.	For bivariate data that appear to form a linear pattern, find the least squares regression line by estimating visually and by calculating the equation of the regression line. Interpret the slope of the equation for a

		Analyzing Predictions (Easiteach) Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S2.2.2.	Use the equation of the least squares regression line to make appropriate predictions. Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression

		Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 SCATTERGRAMS The Circumference Function The Circumference Function The Circumference Function
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	**L1:**	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	**L1.2.**	Representations and Relationships
EXPECTATION	**L1.2.1.**	Use mathematical symbols to represent quantitative relationships and situations. A Perfect Square Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Find the Number GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Graphing Linear Inequalities Laws Line Plot Multiplication by Adding Logs Multiplying Binomials QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically Solve It Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.3.	Counting and Probabilistic Reasoning
EXPECTATION	L1.3.1.	Describe, explain, and apply various counting techniques; relate combinations to Pascal's triangle; know when Binomial Theorem COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS Christmas Stocking Identity Combinations and the Binomial Theorem Counting Principle Permutations DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Find Probabilities Using Permutations and Combinations Let's Count On Pascal's Triangle Pick and Mix Family
EXPECTATION	L1.3.2.	Define and interpret commonly used expressions of probability. Experimental and Theoretical Probability

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation

GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.3.	Explain the exponential relationship between a number and its base 10 logarithm, and use it to relate rules of logarithms to those of exponents in expressions involving numbers. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Multiplication by Adding Logs Properties of Logarithms Solving Logarithmic and Exponential Equations

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Grade 11

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.5.	Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers. Complex Conjugates Expansion of a Polynomial Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.2.	Sequences and Iteration
EXPECTATION	L2.2.1.	Find the nth term in arithmetic, geometric, or other simple sequences. A Geometric Series Coil A Geometric Series Staircase

		A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series And So On Area Ratios - Squares Define and Use Sequences and Series EQUATIONS Ford Circles Generating Arithmetic and Geometric Sequences Geometric Series Coil Geometric Series Coil Gifts Galore & Phoning friends Haunted House - Generating Terms of a Sequence Software Limits of Infinite Sequences Models of Geometric Series Models of Geometric Series Models of Geometric Series Pyramids SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Use Recursive Rules with Sequences and Functions
EXPECTATION	L2.2.2.	Compute sums of finite arithmetic and geometric sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS

		Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.2.	Sequences and Iteration
EXPECTATION	L2.2.3.	Use iterative processes in such examples as computing compound interest or applying approximation . A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set Compound Interest Compound Interests Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Functions involving e Geometric Series Coil Geometric Series Coil Geometric Square Root Construction IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series Models of Geometric Series PERCENT Ratio of Similarity Ratio of Similarity Ratio of Similarity

		Simple vs Compound Interest The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	**L2:**	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	**L2.3.**	Measurement Units, Calculations, and Scales
EXPECTATION	**L2.3.2.**	Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Elementary Transcendental Functions and Their Inverses Exponential Decay Function Explorer 2D Functions Graphing Functions with Four Parameters Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Multiplication by Adding Logs Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	**L2:**	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	**L2.4.**	Understanding Error
EXPECTATION	**L2.4.1.**	Determine what degree of accuracy is reasonable for measurements in a given situation; express accuracy through use of significant digits, error tolerance, or percent of error; describe how errors in measurements are magnified by computation; recognize accumulated error in applied situations. BOUNDS BOUNDS BOUNDS Boundaries

		EXPONENTS How Far is it PERCENT

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.1.	Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables. Balancing Act Part II Changing Formulas Codebreaker 2 - Simplification Software Constructing Simple Arguments (Easiteach) Escape the Cave - Using Letters to Represent Unknown Numbers Software Expression Machine FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Newton's Law of Cooling Reflecting Function Plots Write and Evaluate Expressions Writing and Solving Ratios and Proportions

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II

STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.4.	Add, subtract, multiply, and simplify polynomials and rational expressions. A Perfect Square Algebra Quiz Binomial Theorem Cube Conundrum Expansion of a Polynomial FRACTIONS A FRACTIONS A FRACTIONS A Intro to Multiplication of Binomials Introduction to Multiplication of Binomials Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Matrices Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Multiplying Binomials Number Pyramids - Algebra Software Operations with Polynomials Operations with Polynomials (addition and subtraction) Operations with Polynomials (division) Operations with Polynomials (multiplication) Polynomial Long Multiplication QUADRATICS Recognizing Quadratics
EXPECTATION	A1.1.6.	Transform exponential and logarithmic expressions into equivalent forms using the properties of exponents and logarithms, including the inverse relationship between exponents and logarithms. Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II

STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.5.	Solve polynomial equations and equations involving rational expressions and justify steps in the solution. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra Functions Functions Real Zeros of Polynomial Functions

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.7.	Solve exponential and logarithmic equations and justify steps in the solution. Carbon Dating Functions Functions Newton's Law of Cooling Solving Logarithmic and Exponential Equations
EXPECTATION	A1.2.8.	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable, CO-ORD GEOM CO-ORD GEOM Changing Formulas TRANSPOSITION
EXPECTATION	A1.2.9.	Know common formulas and apply appropriately in contextual situations. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA

		AREA AREA BOUNDS BOUNDS CIRCLESX CUBITP22 Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs PERCENT Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A1:	Expressions, Equations and Inequalities

GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.10.	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Elementary Transcendental Functions and Their Inverses Evaluate Inverse Trigonometric Functions Function Explorer 2D Functions Illustrating Cosine with the Unit Circle II Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1.	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function, and A Balanced View Composition of Functions Composition of Functions Composition of Functions Defining and Graphing Relations Difference of Squares Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functional Geometry Functional Geometry Functions Functions and Relations Functions and Relations Functions and Relations

		Functions and Relations Functions in A Triangle Functions in A Triangle Horizontal Line Test, Vertical Line Test How do I look Increasing, Decreasing, and Constant Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Inverse Reflection Principle Iterations and functions Iterations and functions Mapping Diagrams Sum of Parts Tilted Squares Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation, and evaluate a function at a value in its domain. FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Reflecting Function Plots Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection

		Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words, and translate among representations. A Perfect Square Analyze Arithmetic and Geometric Sequence and Series And So On Balancing Act Part II CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Changing Formulas Comparing Linear, Exponential and Quadratic Models Composition of Functions Composition of Functions Composition of Functions Define and Use Sequences and Series Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs EQUATIONS Find the Number Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps Finding Solutions by Undoing Steps GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Gifts Galore & Phoning friends Graphing Graphing Linear Inequalities How Slope is Measured How Slope is Measured How do I look Intro to Equations Intro to Equations Intro to Equations Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs

		Introduction to Equations Laws Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Modeling Two-Variable Data Part 1 Multiplication by Adding Logs Multiplying Binomials Pyramids QUADRATICSx Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Scientific Notation Worksheet (1) Scientific Notation Worksheet (2) Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Solve It Solving One-step, Two Step, And Multi Step equations Sum 17 Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations What Expression Write and Solve Equations and Inequalities
EXPECTATION	A2.1.6.	Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and graphical representations.

		An Essential Singularity
		Complex Zeros and the Fundamental Theorem of Algebra
		Continuity
		Cubic Equation
		Defining the Limit
		Defining the Limit
		End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem
		Exploring Derivatives: Slope of the Secant Line and Average Rate of Change
		Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change
		Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change
		Exploring Derivatives: Slope of the secant line and average rate of change
		Filling Bottles
		Function Continuity
		Function Continuity
		Functions
		Functions
		Functions
		Functions
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		Graphing Quadratic Equations Using Roots
		How do we find a Limit? Left hand/Right hand limits
		How doe we find a Limit? (Left hand/Right hand limits)
		Increasing, Decreasing, and Constant Functions
		Limits of Infinite Sequences
		Limits: Finite c, Finite L
		Limits: Finite c, Infinite L
		Limits: Infinite c, Finite L
		Limits: Infinite c, Infinite L
		Polynomial Fitter
		Polynomial Functions of Higher Degree (degrees greater than 2)
		Polynomial Roots
		Predicting a Velocity Plot
		Predicting a Velocity Plot
		QUADRATICSx
		Quadratic Equation
		Quadratic Formula and the Discriminant
		Rational Functions
		Real Zeros of Polynomial Functions
		Reviewing Quadratic Roots
		Reviewing Quadratic Roots
		The Laboratory - Relationship Between Two Variables (Software)

		Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.1.7.	Identify and interpret the key features of a function from its graph or its formula(s). Cycle Ride Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Filling Bottles Functions Functions Graph Classifier Software Increasing, Decreasing, and Constant Functions Interactive Slope Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Predicting a Velocity Plot Predicting a Velocity Plot Projectile Motion Rational Functions Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Laboratory - Relationship Between Two Variables (Software) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.2.	Apply given transformations to parent functions, and represent symbolically. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Derivatives Dilation of Functions Dilation of Functions Dilation of Functions Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game
EXPECTATION	A2.2.3.	Recognize whether a function (given in tabular or graphical form) has an inverse, and recognize simple inverse . A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule

		Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.4.	Models of Real-World Situations Using Families of Functions
EXPECTATION	A2.4.1.	Identify the family of functions best suited for modeling a given real-world situation. Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Modeling Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3
EXPECTATION	A2.4.2.	Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM

		CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.4.3.	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. A Rectangle with Maximum Area

A Rectangle with Maximum Area
AREA
AREA
AREA
AREA
AREA
BOUNDS
BOUNDS
CIRCLESX
CO-ORD GEOM
CO-ORD GEOM
CO-ORD GEOM
Critical Thinking - Application of Area Formulas
Critical Thinking - Application of Area Formulas
Cylinder Hemisphere Cone
Demonstrating and Use of the Pythagorean Theorem
Demonstrating and Use of the Pythagorean Theorem
Demonstrating and Use of the Pythagorean Theorem
Derivation of Area of Circle Using Polygons
Derivation of Area of Circle using Polygons
Distance between 2 points
FORMULAE
Finding Volume of Cylinder and Sphere
Finding out about graphs
Functions
Methods of Solving Quadratic
PERCENT
QUADRATICSx
QUADRATICSx
Quadratic Formula and the Discriminant
Real Zeros of Polynomial Functions
Representing Direct Variation Algebraically and Graphically
Representing Direct Variation Algebraically and graphically
Representing Direct Variation Algebraically and graphically
Representing Inverse Variation Graphically
Representing Inverse Variation Graphically
Surface Area and Volumes of Spheres
Surface Area of Prisms and Cylinders
Surface Area of Pyramids and Cones
Triangle Area and Perimeters
Triangle Area and Perimeters
Using the Quadratic Formula an Interpreting the Discriminant
VOLUME 3D
VOLUME 3D

		VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.2.	Exponential and Logarithmic Functions
EXPECTATION	A3.2.2.	Interpret the symbolic forms and recognize the graphs of exponential and logarithmic functions. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.3.	Apply properties of exponential and logarithmic functions.

		A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.6.	Rational Functions
EXPECTATION	A3.6.1.	Write the symbolic form and sketch the graph of simple rational functions. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions

		Representing Inverse Variation Graphically Representing Inverse Variation Graphically
EXPECTATION	A3.6.2.	Analyze graphs of simple rational functions and understand the relationship between the zeros of the numerator and denominator, and the function's intercepts, asymptotes, and domain. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.7.	Trigonometric Functions
EXPECTATION	A3.7.1.	Use the unit circle to define sine and cosine; approximate values of sine and cosine; use sine and cosine to define the remaining trigonometric functions; explain why the trigonometric functions are periodic. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)

EXPECTATION	A3.7.2.	Use the relationship between degree and radian measures to solve problems. Angles Measured in Degrees and Radians
EXPECTATION	A3.7.3.	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of pi/6 and pi/4. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
EXPECTATION	A3.7.4.	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Continued Fraction Approximations of the Tangent Function Doppler Effect Elementary Transcendental Functions and Their Inverses Family of Curves, Tangents, and Intuition Function Explorer 2D Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A

		GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle Inset Plot Magnifier Many Sine Curves Modeling Harmonic Motion Modeling Harmonic Motion Nested Trigonometric Function Plots Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP) Soil Temperature TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 Tetraviews of Elementary Functions The Cosecant Function (GSP) The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated Trigonometric Functions with Four Parameters
EXPECTATION	A3.7.5.	Graph transformations of basic trigonometric functions (involving changes in period, amplitude, phase, and midline) and understand the relationship between constants in the formula and the transformed graph. Doppler Effect Function Transformations Functions Functions

		GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Many Sine Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Sinusoids and Transformations (GSP) Soil Temperature Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 The Cosecant Function (GSP) Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions with Four Parameters Wave Interference

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	G1:	Figures and Their Properties

GRADE LEVEL EXPECTATION	G1.7.	Conic Sections and Their Properties
EXPECTATION	G1.7.1.	Find an equation of a circle given its center and radius; given the equation of a circle, find its center and Conic Sections - Writing Equations of Circles Defining and Graphing Relations
EXPECTATION	G1.7.2.	Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones. Application of Parabolas Application of Parabolas Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Using Geometry to Create Parabolas by Definition

		Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition
EXPECTATION	G1.7.3.	Graph ellipses and hyperbolas with axes parallel to the x- and y-axes, given equations. Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.1.	Producing and Interpreting Plots
EXPECTATION	S1.1.1.	Construct and interpret dot plots, histograms, relative frequency histograms, bar graphs, basic control charts, and box plots with appropriate labels and scales; determine which kinds of plots are appropriate for different types of data; compare data sets and interpret differences based on graphs and summary statistics. Assumptions Box and Whisker HISTOGRAMS How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Relate
EXPECTATION	S1.1.2.	Given a distribution of a variable in a data set, describe its shape, including symmetry or skewness, and state how the shape is related to measures of center (mean and median) and measures of variation (range and standard deviation) with particular attention to the effects of outliers on these measures. Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION How Do They Compare Normal Distributions

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.2.	Measures of Center and Variation
EXPECTATION	S1.2.1.	Calculate and interpret measures of center including: mean, median, and mode; explain uses, advantages and disadvantages of each measure given a particular set of data and its context. AVERAGE Assumptions Box and Whisker C-FREQUENCY DEVIATION DEVIATION How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV QUARTILES QUARTILES QUARTILES QUARTILES TABLES D Use Measures of Central Tendency

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Mathematics

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.2.	Measures of Center and Variation
EXPECTATION	S1.2.3.	Compute and interpret measures of variation, including percentiles, quartiles, interquartile range, variance, Box and Whisker C-FREQUENCY DEVIATION DEVIATION Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Normal Distributions

		QUARTILES QUARTILES QUARTILES QUARTILES TABLES D

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.3.	The Normal Distribution
EXPECTATION	S1.3.1.	Explain the concept of distribution and the relationship between summary statistics for a data set and Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Normal Distributions

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.3.	The Normal Distribution
EXPECTATION	S1.3.2.	Describe characteristics of the normal distribution, including its shape and the relationships among its mean, How Do They Compare Normal Distributions
EXPECTATION	S1.3.3.	Know and use the fact that about 68%, 95%, and 99.7% of the data lie within one, two, and three standard deviations of the mean, respectively in a normal distribution. How Do They Compare

		Normal Distributions

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.3.	The Normal Distribution
EXPECTATION	S1.3.4.	Calculate z-scores, use z-scores to recognize outliers, and use z-scores to make informed decisions. Normal Distributions
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S3:	Samples, Surveys and Experiments
GRADE LEVEL EXPECTATION	S3.1.	Data Collection and Analysis
EXPECTATION	S3.1.1.	Know the meanings of a sample from a population and a census of a population, and distinguish between Comparing Methods of Data Collection (Easiteach) TABLES D

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S3:	Samples, Surveys and Experiments
GRADE LEVEL EXPECTATION	S3.1.	Data Collection and Analysis
EXPECTATION	S3.1.2.	Identify possible sources of bias in data collection, sampling methods and simple experiments; describe how such bias can be reduced and controlled by random sampling; explain the impact of such bias on conclusions made from analysis of the data; and know the effect of replication on the precision of estimates. Comparing Methods of Data Collection (Easiteach) TABLES D

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S3:	Samples, Surveys and Experiments
GRADE LEVEL EXPECTATION	S3.1.	Data Collection and Analysis
EXPECTATION	S3.1.3.	Distinguish between an observational study and an experimental study, and identify, in context, the Determining Line of Fit Determining Line of Fit Determining Line of Fit Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle The Circumference Function The Circumference Function The Circumference Function
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations
GRADE LEVEL EXPECTATION	S4.1.	Probability
EXPECTATION	S4.1.1.	Understand and construct sample spaces in simple situations Find Probabilities Using Permutations and Combinations Fractions Are Fun Sort It

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations

GRADE LEVEL EXPECTATION	S4.1.	Probability
EXPECTATION	S4.1.2.	Define mutually exclusive events, independent events, dependent events, compound events, complementary events, and conditional probabilities; and use the definitions to compute probabilities. Chance It Construct and Interpret Binomial Distribution Counting Principle Permutations Dice Roller & Penny Flipper Find Probabilities and Odds Find Probabilities of Compound Events Finding Probabilities Disjoint and Overlapping Events Finding Probability of Independent and Dependent Events Leads in Coin Tossing PROBABILITY PROBABILITY Sort It The Birthday Problem Two Dice with Histogram What Chance Have I got
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations
GRADE LEVEL EXPECTATION	S4.2.	Application and Representation
EXPECTATION	S4.2.1.	Compute probabilities of events using tree diagrams, formulas for combinations and permutations, Venn Adds to One Construct and Interpret Binomial Distribution Dice Roller & Penny Flipper Expectations for Roulette Find Probabilities and Odds Leads in Coin Tossing PROBABILITY PROBABILITY The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations
GRADE LEVEL EXPECTATION	S4.2.	Application and Representation
EXPECTATION	S4.2.2.	Apply probability concepts to practical situations, in such settings as finance, health, ecology, or epidemiology Assumptions

Michigan Curriculum Standards

Mathematics

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.6.	Explain the importance of the irrational numbers square root of 2 an square root of 3 in basic right triangle trigonometry, and the importance of pi because of its role in circle relationships. ANGLE04PZDH ANGLE04ZDH Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle

		The 30-60 Right Triangle The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.2.	Representations and Relationships
EXPECTATION	L1.2.3.	Use vectors to represent quantities that have magnitude and direction, interpret direction and magnitude of a vector numerically, and calculate the sum and difference of two vectors. Block on a Frictionless Inclined Plane CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Forces on a Simple Pendulum How to Add and Subtract Vectors How to Add and Subtract Vectors How to Add and Subtract Vectors Introduction to Vectors Introduction to Vectors

		Introduction to Vectors VECTORS VECTORS Vector Cross Product Vector Cross Product Vector Operations in Three Dimensions Vector Projections

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.3.	Measurement Units, Calculations, and Scales
EXPECTATION	L2.3.1.	Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly. Volume of Prisms and Cylinders

Michigan Curriculum Standards

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof
GRADE LEVEL EXPECTATION	L3.1.	Mathematical Reasoning
EXPECTATION	L3.1.1.	Distinguish between inductive and deductive reasoning, identifying and providing examples of each. Appling Deductive Reasoning Boundaries Critical Thinking - Dividing Land Critical Thinking - Dividing Land Cube Conundrum Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason

		Short cut to Finding Areas of dot-paper polygons Short cut to finding areas of dot-paper polygons Tilted Squares Triangle Proofs Using Inductive Reasoning
EXPECTATION	L3.1.2.	Differentiate between statistical arguments (statements verified empirically using examples or data) and logical arguments based on the rules of logic. Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)
EXPECTATION	L3.1.3.	Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics. Identify and give examples of each. An IMO Triangle Problem Analyze Conditional Statements Appling Deductive Reasoning Coordinate Proof Coordinate Proof Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euler Line Game of Buried Treasure Game of Buried Treasure Lines and Angles Parallel and Perpendicular Line Proofs Polygon Proof - Interior Angle Sums of Polygons (GSP) Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Thales' Theorem Triangle Proofs Triangle Review - Interior and Exterior Angles (GSP) Using Postulates and Diagrams

Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof
GRADE LEVEL EXPECTATION	L3.2.	Language and Laws of Logic
EXPECTATION	L3.2.1.	Know and use the terms of basic logic. An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams
EXPECTATION	L3.2.2.	Use the connectives "not," "and," "or," and "if..., then," in mathematical and everyday settings. Know the truth table of each connective and how to logically negate statements involving these connectives. Analyze Conditional Statements Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs
EXPECTATION	L3.2.3.	Use the quantifiers "there exists" and "all" in mathematical and everyday settings and know how to logically An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams

EXPECTATION	L3.2.4.	Write the converse, inverse, and contrapositive of an "If..., then..." statement. Use the fact, in mathematical and everyday settings, that the contrapositive is logically equivalent to the original while the inverse and converse are not. Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof
GRADE LEVEL EXPECTATION	L3.3.	Proof
EXPECTATION	L3.3.1.	Know the basic structure for the proof of an "If..., then..." statement (assuming the hypothesis and ending with the conclusion) and that proving the contrapositive is equivalent. Analyze Conditional Statements
EXPECTATION	L3.3.2.	Construct proofs by contradiction. Use counter-examples, when appropriate, to disprove a statement. Tilted Squares
EXPECTATION	L3.3.3.	Explain the difference between a necessary and a sufficient condition within the statement of a theorem. Determine the correct conclusions based on interpreting a theorem in which necessary or sufficient conditions in the theorem or hypothesis are satisfied. Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.1.	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.1.	Solve multistep problems and construct proofs involving vertical angles, linear pairs of angles, supplementary angles, complementary angles, and right angles.

		Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet Circle Geometry Worksheet Golden Ratio 1 Line up Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP) Types of Angles
EXPECTATION	G1.1.2.	Solve multistep problems and construct proofs involving corresponding angles, alternate interior angles, alternate exterior angles, and same-side (consecutive) interior angles. Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Pantograph Linkage Parallel and Perpendicular Line Proofs Properties of Parallel Lines Properties of Parallel Lines

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Mathematics

Grade 11

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.1.	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.3.	Perform and justify constructions, including midpoint of a line segment and bisector of an angle, using A Rectangle with Maximum Area A Rectangle with Maximum Area A Triangle Area Problem A Triangle Area Problem Accurate Constructions - Animations Software Advanced Construction Napolean's Theorem Advanced Construction Napolean's Theorem Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Application of Parabolas Application of Parabolas Compass Animations - Constructions Using Straight Edge and Compasses Software Compass Animations Software

Constructing Templates for the Platonic Solids
Constructing Templates for the Platonic Solids
Constructing Templates for the Platonic Solids
Creating Complex Design's
Creating Complex Design's
Ellipse
Ellipse Projects
Ellipse Projects
Ellipse Projects
Ellipse Projects
Ellipse- Check for understanging the definition
Ellipse- Check for understanging the definition
Ellipse- Check for understanging the definition
Ellipse- Check for understanging the definition
Ellispse -Eccentricty
Euclid's Proposition 1 - Equilateral Triangles
Euclid's Proposition 1 - Equilateral Triangles
Exploring the Euler Segment
Exploring the Euler Segment
Functions in A Triangle
Functions in A Triangle
Hyperbola
Hyperbola
Hyperbola
Lines and Angles
Morley's Triangle - Application of Angle Trisection
Morley's Triangle - Application of Angle Trisection
Off at a Tangent - Exploring the Tangent to a Circle (GSP)
Parabola
Parabola
Parabola
Parabola
Properties of Parallel Lines
Properties of Parallel Lines
Reflecting Without the Reflect Command: The Algebra of Reflection
Reflecting Without the Reflect Command: The Algebra of Reflection
Some Ellipse Relationships
Summarizing Properties of Quadrilaterals
Summarizing Properties of Quadrilaterals
Trisecting an Angle
Trisecting an Angle
Using Slope to Determine if Lines are Parallel or Perpendicular
Using Slope to Determine if lines are Parallel or Perpendicular
Using the Equilateral Triangle - Surfer & Spotter

		Using the Equilateral Triangle - Surfer & Spotter
EXPECTATION	G1.1.4.	Given a line and a point, construct a line through the point that is parallel to the original line using straightedge and compass. Given a line and a point, construct a line through the point that is perpendicular to the original line. Justify the steps of the constructions. Accurate Constructions - Animations Software Compass Animations - Constructions Using Straight Edge and Compasses Software Off at a Tangent - Exploring the Tangent to a Circle (GSP) Properties of Parallel Lines Properties of Parallel Lines Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular
EXPECTATION	G1.1.5.	Given a line segment in terms of its endpoints in the coordinate plane, determine its length and midpoint. Determining the Origin Determining the Origin AREA AREA AREA CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Cycle Ride Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Determining the Origin Distance between 2 points Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals

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Mathematics

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.1.	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.6.	Recognize Euclidean geometry as an axiom system. Know the key axioms and understand the meaning of and distinguish between undefined terms, axioms, definitions, and theorems.

		Lines and Angles Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Thales' Theorem Using Postulates and Diagrams
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties
EXPECTATION	G1.2.1.	Prove that the angle sum of a triangle is 180 degrees and that an exterior angle of a triangle is the sum of the ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet Calculating Exterior Angles of Triangles Worksheet Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles Polygon Problems - Exterior Angles of Polygons (GSP) Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP)

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties
EXPECTATION	G1.2.2.	Construct and justify arguments and solve multistep problems involving angle measure, side length, perimeter, ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA AREA AREA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software CIRCLES CIRCLESX Calculating Angles in Polygons Worksheet Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles PERCENT Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Related Rates: Triangle Angle and Area TRIGONOMETRY Tilted Squares Triangle Area and Perimeters Triangle Area and Perimeters Write and Evaluate Expressions
EXPECTATION	G1.2.3.	Know a proof of the Pythagorean Theorem, and use the Pythagorean Theorem and its converse to solve multi-

		Coordinate Proof Coordinate Proof Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Divide and Rule - Dividing Line Segments in a Given Ratio (GSP). Pythagorean Theorem Pythagorean Theorem 3D Pythagorean Triples Round the Bend Sum of Parts TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties
EXPECTATION	G1.2.4.	Prove and use the relationships among the side lengths and the angles of 30 degree - 60 degree - 90 degrees triangles and 45 degree - 45 degree - 90 degree triangles. ANGLE04PZDH ANGLE04ZDH The 30-60 Right Triangle The 30-60 Right Triangle

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties
EXPECTATION	G1.2.5.	Solve multistep problems and construct proofs about the properties of medians, altitudes and perpendicular bisectors to the sides of a triangle, and the angle bisectors of a triangle. Using a straightedge and compass, construct these lines. Advanced Construction Napolean's Theorem Advanced Construction Napolean's Theorem An IMO Triangle Problem Euler Line Exploring the Euler Segment Exploring the Euler Segment Investigating the Properties of Excircles of a Triangle Investigating the Properties of Excircles of a Triangle Morley's Triangle - Application of Angle Trisection Morley's Triangle - Application of Angle Trisection Triangle Inequalities Triangle Inequalities Using the Equilateral Triangle - Surfer & Spotter Using the Equilateral Triangle - Surfer & Spotter

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.3.	Triangles and Trigonometry
EXPECTATION	G1.3.1.	Define the sine, cosine, and tangent of acute angles in a right triangle as ratios of sides. Solve problems about angles, side lengths, or areas using trigonometric ratios in right triangles. ANGLE04PZDH ANGLE04ZDH Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem

		Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle The 30-60 Right Triangle The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.3.	Triangles and Trigonometry
EXPECTATION	G1.3.2.	Know and use the Law of Sines and the Law of Cosines and use them to solve problems. Find the area of a triangle with sides a and b and included angle theta using the formula Area = (1/2) absin theta. ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH

		ANGLE04XAHB ANGLE04ZDA CIRCLES CIRCLESX Law of Cosines Law of Sines Related Rates: Triangle Angle and Area TRIGONOMETRY TRIGONOMETRY The Law of Cosines The Law of Cosines The Law of Sines The Law of Sines
EXPECTATION	G1.3.3.	Determine the exact values of sine, cosine, and tangent for 0 degrees, 30 degrees, 45 degrees, 60 degrees, and their integer multiples and apply in various contexts. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Composing Trigonometric and Inverse Trigonometric Functions Continued Fraction Approximations of the Tangent Function How Far Can One See from a Height? Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions

		Trigonometric Functions Illustrated Trigonometric Ratios Trigonometric Ratios Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.4.	Quadrilaterals and Their Properties
EXPECTATION	G1.4.1.	Solve multistep problems and construct proofs involving angle measure, side length, diagonal length, perimeter, and area of squares, rectangles, parallelograms, kites, and trapezoids. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA Area Review BOUNDS Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Exterior and Interior Angles of Regular Polygons Worksheet Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Tilted Squares Write and Evaluate Expressions

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.4.	Quadrilaterals and Their Properties
EXPECTATION	G1.4.2.	Solve multistep problems and construct proofs involving quadrilaterals using Euclidean methods or coordinate

		Coordinate Proof Coordinate Proof
EXPECTATION	G1.4.3.	Describe and justify hierarchical relationships among quadrilaterals. Analyze Conditional Statements Golden Ratio 1 Special Midpoint Quadrilaterals Special Midpoint Quadrilaterals Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals
EXPECTATION	G1.4.4.	Prove theorems about the interior and exterior angle sums of a quadrilateral. ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA Calculating Angles in Polygons Worksheet Calculating Exterior Angles of Triangles Worksheet Exterior and Interior Angles of Regular Polygons Worksheet Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Polygon Problems - Exterior Angles of Polygons (GSP) Triangle Review - Interior and Exterior Angles (GSP)
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.5.	Other Polygons and Their Properties
EXPECTATION	G1.5.1.	Know and use subdivision or circumscription methods to find areas of polygons. Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Pick's Theorem

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.5.	Other Polygons and Their Properties
EXPECTATION	G1.5.2.	Know, justify, and use formulas for the perimeter and area of a regular n-gon and formulas to find interior and exterior angles of a regular n-gon and their sums. Calculating Angles in Polygons Worksheet Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Exterior and Interior Angles of Regular Polygons Worksheet Golden Ratio 1 Interior & Exterior Angles Polygon Proof - Interior Angle Sums of Polygons (GSP)

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.6.	Circles and Their Properties
EXPECTATION	G1.6.1.	Solve multistep problems involving circumference and area of circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) Arc Resolution Area of a Circle from Segments CIRCLESX Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Finding Volume of Cylinder and Sphere Introduction to Radians Introduction to Radians Introduction to Radians Keeping on Track Length of a Coiled Rope The Circumference Function The Circumference Function The Circumference Function

		The Cycloid The Cycloid Two Wheel Belt What's my surface? Write and Evaluate Expressions
EXPECTATION	G1.6.2.	Solve problems and justify arguments about chords and lines tangent to circles. ANGLE ANGLE ANGLE Ford Circles Hyperbola Hyperbola Hyperbola Inscribed Angle Subtended Chord Intersecting Circles Off at a Tangent - Exploring the Tangent to a Circle (GSP) Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Thales' Theorem The Statue of Regiomontanus Two Wheel Belt
EXPECTATION	G1.6.3.	Solve problems and justify arguments about central angles, inscribed angles, and triangles in circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) ANGLE ANGLE ANGLE ANGLE Circle Geometry Worksheet Inscribed Angle Subtended Chord Properties of Circles Part 2 (GSP) Thales' Theorem
EXPECTATION	G1.6.4.	Know and use properties of arcs and sectors, and find lengths of arcs and areas of sectors. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) Arc Resolution CIRCLES CIRCLESX CIRCLESX Circle Geometry Worksheet

		Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Thales' Theorem

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.8.	Three-dimensional Figures
EXPECTATION	G1.8.1.	Solve multistep problems involving surface area and volume of pyramids, prisms, cones, cylinders, AREA AREA BOUNDS Cylinder Hemisphere Cone FORMULAE Finding Volume of Cylinder and Sphere Missing Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones What's my surface?

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G2:	Relationships Between Figures
GRADE LEVEL EXPECTATION	G2.1.	Relationships Between Area and Volume Formulas

EXPECTATION	G2.1.1.	Know and demonstrate the relationships between the area formula of a triangle, the area formula of a parallelogram, and the area formula of a trapezoid. Area of a Circle from Segments Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons
EXPECTATION	G2.1.2.	Know and demonstrate the relationships between the area formulas of various quadrilaterals. Area of a Circle from Segments Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry**
STANDARD	G2:	Relationships Between Figures
GRADE LEVEL EXPECTATION	G2.2.	Relationships Between Two-dimensional and Three-dimensional Representations
EXPECTATION	G2.2.1.	Identify or sketch a possible three-dimensional figure, given two-dimensional views. Create a two-dimensional representation of a three-dimensional figure. 3-D Shape Explorer - Surface Area of Rectangular Prisms Software 3D Shape Builder Software
EXPECTATION	G2.2.2.	Identify or sketch cross sections of three-dimensional figures. Identify or sketch solids formed by revolving two- 3-D Shape Explorer - Surface Area of Rectangular Prisms Software Which Model
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry**
STANDARD	G2:	Relationships Between Figures
GRADE LEVEL EXPECTATION	G2.3.	Congruence and Similarity
EXPECTATION	G2.3.1.	Prove that triangles are congruent using the SSS, SAS, ASA, and AAS criteria and that right triangles are congruent using the hypotenuse-leg criterion.

		Appling Deductive Reasoning CONGRUENCE Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.2.	Use theorems about congruent triangles to prove additional theorems and solve problems, with and without use of coordinates. Appling Deductive Reasoning CONGRUENCE Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.3.	Prove that triangles are similar by using SSS, SAS, and AA conditions for similarity. Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.4.	Use theorems about similar triangles to solve problems with and without use of coordinates. Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.5.	Know and apply the theorem stating that the effect of a scale factor of k relating one two-dimensional figure to another or one three-dimensional figure to another, on the length, area, and volume of the figures, is to multiply each by k, k^2, and k^3, respectively. AREA AREA Area and Volume of Similar Shapes Worksheet (2). Area and Volume of Similar Shapes Worksheet (1). Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Cube Conundrum Global Warming Zoom

		Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle Surface Area and Volumes of Spheres Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) What is the Meaning of Multiplication What is the Meaning of Multiplication

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G3:	Transformations of Figures in the Plane
GRADE LEVEL EXPECTATION	G3.1.	Distance-preserving Transformations Isometries
EXPECTATION	G3.1.1.	Define reflection, rotation, translation, and glide reflection and find the image of a figure under a given Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Reflection-Shortest Path Application of Reflection-Shortest Path Application of Translation - Block Design Application of Translation- Block Design Application of Translation- Block Design Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Critical Thinking - Shortest Path- Laser

		Critical Thinking - Shortest Path- Laser Fishy Transformations - Combined Transformations (GSP) Game of Buried Treasure Game of Buried Treasure Kaleidoscopic Polygons MATRICES Matrix Transformations: "F" Practice Shortest Path - Feed and Water Practice Shortest Path - Feed and Water Proportional Triangle Nesting Reflection in Geometry and Algebra Reflection in Geometry and Algebra Reflections over Intersecting Lines Reflections over Intersecting Lines Reflections over Intersecting Lines Reflections over Two Parallel lines Reflections over Two Parallel lines Reflections over Two Parallel lines Rotation in the Coordinate Plane Rotation in the Coordinate Plane Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations Transformations Transformations Translate to Enlarge - Dilation of 2-D Shapes (GSP) Translation in the Coordinate Plane Translation in the Coordinate Plane Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects

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Grade 11

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G3:	Transformations of Figures in the Plane
GRADE LEVEL EXPECTATION	G3.1.	Distance-preserving Transformations Isometries
EXPECTATION	G3.1.2.	Given two figures that are images of each other under an isometry, find the isometry and describe it

		Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations
EXPECTATION	G3.1.3.	Find the image of a figure under the composition of two or more isometries and determine whether the resulting figure is a reflection, rotation, translation, or glide reflection image of the original figure. Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G3:	Transformations of Figures in the Plane
GRADE LEVEL EXPECTATION	G3.2.	Shape-preserving Transformations: Dilations and Isometries
EXPECTATION	G3.2.1.	Know the definition of dilation and find the image of a figure under a given dilation. AREA AREA Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Introducing Proportion Introducing Proportion

		Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP) Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects
EXPECTATION	G3.2.2 .	Given two figures that are images of each other under some dilation, identify the center and magnitude of the [illegible] AREA AREA Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle

		Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP) Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects What is the Meaning of Multiplication What is the Meaning of Multiplication

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from
GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.1	Know the different properties that hold in different number systems and recognize that the applicable properties change in the transition from the positive integers to all integers, to the rational numbers, and to Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Reason Using Properties from Algebra Subtracting Integers Subtracting Integers Subtracting Integers

		The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication What is the Meaning of Multiplication

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STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from
GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.2	Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Identity Elements and Inverses Identity Elements and Inverses Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers

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STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from

GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.3	Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations. Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses Into Multiplying Integers Into Multiplying Integers Into Multiplying Integers Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication What is the Meaning of Multiplication
EXPECTATION	L1.1.4	Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number by a number less than 0, a number between 0 and 1, and a number greater than 1. EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS Fractional Parts of Powers of Rationals

		INVERSES Into Multiplying Integers Into Multiplying Integers Into Multiplying Integers Negative Exponents and Parentheses Worksheet (1) Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (2) Powerful RADICALS Rules with Negative Exponents Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents

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STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from these representations
GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.5	Justify numerical relationships Boundaries EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS FRACTIONS Finding Square Roots Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations INVERSES PERCENT PERCENT PUZSQC40

		RADICALS RADICALS RADICALS RADICALS RADICALS SEQPUZ08 SEQPUZ25 SEQUP13 Solving Percent Problems

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STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from these representations
GRADE LEVEL EXPECTATION	L1.1	Number Systems and Number Sense
EXPECTATION	L1.1.6	Explain the importance of the irrational numbers square root of 2 and square root of 3 in basic right triangle trigonometry, and the importance of pi because of its role in circle relationships. ANGLE04PZDH ANGLE04ZDH Am I Rational or Irrational Arc Resolution Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? Introduction to Radians Introduction to Radians Introduction to Radians Rational Number Explorer SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY

		TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle The 30-60 Right Triangle The Circumference Function The Circumference Function The Circumference Function The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem
STRAND / STANDARD CATEGORY	**MI.L.**	**Quantitative Literacy and Logic (L)**
STANDARD	**L1:**	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from these representations
GRADE LEVEL EXPECTATION	**L1.2**	Representations and Relationships
EXPECTATION	**L1.2.1**	Use mathematical symbols to represent quantitative relationships and situations. A Perfect Square Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Find the Number GRAPHS A GRAPHS A GRAPHS A

		GRAPHS A GRAPHS A Graphing Graphing Linear Inequalities Laws Line Plot Multiplication by Adding Logs Multiplying Binomials QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically Solve It Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities

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STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from these representations
GRADE LEVEL EXPECTATION	L1.2	Representations and Relationships
EXPECTATION	L1.2.2	Interpret representations that reflect absolute value relationships in such contexts as error tolerance. BOUNDS BOUNDS BOUNDS Boundaries How Far is it PERCENT
EXPECTATION	L1.2.3	Use vectors to represent quantities that have magnitude and direction, interpret direction and magnitude of a vector numerically, and calculate the sum and difference of two vectors. Block on a Frictionless Inclined Plane CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM

		CO-ORD GEOM Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Forces on a Simple Pendulum How to Add and Subtract Vectors How to Add and Subtract Vectors How to Add and Subtract Vectors Introduction to Vectors Introduction to Vectors Introduction to Vectors VECTORS VECTORS Vector Cross Product Vector Cross Product Vector Operations in Three Dimensions Vector Projections

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STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from these representations
GRADE LEVEL EXPECTATION	L1.2	Representations and Relationships
EXPECTATION	L1.2.4	Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media. AVERAGE Analyzing Predictions (Easiteach) Box and Whisker C-FREQUENCY COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS DEVIATION

		DEVIATION DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Determining Line of Fit Determining Line of Fit Determining Line of Fit Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Games Galore HISTOGRAMS Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MEAN MOVING AV Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Two-Variable Data Part 1 Normal Distributions PROBABILITY PROBABILITY Pick and Mix Family QUARTILES QUARTILES QUARTILES QUARTILES Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS TABLES D TABLES D The Circumference Function The Circumference Function The Circumference Function

Grade 12

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations: Based on their knowledge of the properties of arithmetic, students understand and reason about numbers, number systems, and the relationships between them. They represent quantitative relationships using mathematical symbols, and interpret relationships from
GRADE LEVEL EXPECTATION	L1.3	Counting and Probabilistic Reasoning
EXPECTATION	L1.3.1	Describe, explain, and apply various counting techniques; relate combinations to Pascal's triangle; know when Binomial Theorem COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS Christmas Stocking Identity Combinations and the Binomial Theorem Counting Principle Permutations DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Find Probabilities Using Permutations and Combinations Let's Count On Pascal's Triangle Pick and Mix Family
EXPECTATION	L1.3.2	Define and interpret commonly used expressions of probability. Experimental and Theoretical Probability

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the

GRADE LEVEL EXPECTATION	L2.1	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.2	Calculate fluently with numerical expressions involving exponents; use the rules of exponents; evaluate numerical expressions involving rational and negative exponents; transition easily between roots and EXPONENTS EXPONENTS EXPONENTS Evaluate nth Roots Get In Lane Order of Operations Order of Operations Order of Operations Positive Exponents and Parentheses Worksheet (1) Switch - Calculations Software
EXPECTATION	L2.1.3	Explain the exponential relationship between a number and its base 10 logarithm and use it to relate rules of logarithms to those of exponents in expressions involving numbers. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Multiplication by Adding Logs Properties of Logarithms Solving Logarithmic and Exponential Equations

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.1	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.4	Know that the complex number i is one of two solutions to x^2 = -1. Game of Buried Treasure Game of Buried Treasure Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers

		Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers Proving Identities -Disproving Non - Identities
EXPECTATION	L2.1.5	Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers. Complex Conjugates Expansion of a Polynomial Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers
STRAND / STANDARD CATEGORY	**MI.L.**	**Quantitative Literacy and Logic (L)**
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.2	Sequences and Iteration
EXPECTATION	L2.2.1	Find the nth term in arithmetic, geometric, or other simple sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series And So On Area Ratios - Squares Define and Use Sequences and Series EQUATIONS Ford Circles Generating Arithmetic and Geometric Sequences Geometric Series Coil Geometric Series Coil Gifts Galore & Phoning friends Haunted House - Generating Terms of a Sequence Software Limits of Infinite Sequences Models of Geometric Series Models of Geometric Series Models of Geometric Series

		Pyramids SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Use Recursive Rules with Sequences and Functions
EXPECTATION	L2.2.2	Compute sums of finite arithmetic and geometric sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets

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Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.2	Sequences and Iteration
EXPECTATION	L2.2.3	Use iterative processes in such examples as computing compound interest or applying approximation

		A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set Compound Interest Compound Interests Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Functions involving e Geometric Series Coil Geometric Series Coil Geometric Square Root Construction IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series Models of Geometric Series PERCENT Ratio of Similarity Ratio of Similarity Ratio of Similarity Simple vs Compound Interest The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the

GRADE LEVEL EXPECTATION	L2.2	Sequences and Iteration
EXPECTATION	L2.2.4	Compute sums of infinite geometric sequences. (Recommended) A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.3	Measurement Units, Calculations, and Scales
EXPECTATION	L2.3.1	Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly. Volume of Prisms and Cylinders
EXPECTATION	L2.3.2	Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel A Sequence Approach to Logs A Sequence Approach to Logs

		A Sequence Approach to Logs Elementary Transcendental Functions and Their Inverses Exponential Decay Function Explorer 2D Functions Graphing Functions with Four Parameters Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Multiplication by Adding Logs Solving Logarithmic and Exponential Equations

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L2:	Calculation, Algorithms, and Estimation: Students calculate fluently, estimate proficiently, and describe and use algorithms in appropriate situations (e.g., approximating solutions to equations). They understand the
GRADE LEVEL EXPECTATION	L2.4	Understanding Error
EXPECTATION	L2.4.1	Determine what degree of accuracy is reasonable for measurements in a given situation; express accuracy through use of significant digits, error tolerance, or percent of error; describe how errors in measurements are magnified by computation; recognize accumulated error in applied situations. BOUNDS BOUNDS BOUNDS Boundaries EXPONENTS How Far is it PERCENT
STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false
GRADE LEVEL EXPECTATION	L3.1	Mathematical Reasoning
EXPECTATION	L3.1.1	Distinguish between inductive and deductive reasoning, identifying and providing examples of each.

		Algebra Wipeout Software Number Pyramids - Algebra Software
EXPECTATION	L3.1.2	Differentiate between statistical arguments (statements verified empirically using examples or data) and logical arguments based on the rules of logic. Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)
EXPECTATION	L3.1.3	Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics. Identify and give examples of each. An IMO Triangle Problem Analyze Conditional Statements Appling Deductive Reasoning Coordinate Proof Coordinate Proof Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euler Line Game of Buried Treasure Game of Buried Treasure Lines and Angles Parallel and Perpendicular Line Proofs Polygon Proof - Interior Angle Sums of Polygons (GSP) Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Thales' Theorem Triangle Proofs Triangle Review - Interior and Exterior Angles (GSP) Using Postulates and Diagrams

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false.
GRADE LEVEL EXPECTATION	L3.2	Language and Laws of Logic
EXPECTATION	L3.2.1	Know and use the terms of basic logic. An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams
EXPECTATION	L3.2.2	Use the connectives "not," "and," "or," and "if..., then," in mathematical and everyday settings. Know the truth table of each connective and how to logically negate statements involving these connectives. Analyze Conditional Statements Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs
EXPECTATION	L3.2.3	Use the quantifiers "there exists" and "all" in mathematical and everyday settings and know how to logically An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams

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Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false
GRADE LEVEL EXPECTATION	L3.2	Language and Laws of Logic
EXPECTATION	L3.2.4	Write the converse, inverse, and contrapositive of an "if..., then..." statement. Use the fact, in mathematical and everyday settings, that the contrapositive is logically equivalent to the original, while the inverse and Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs
STRAND / STANDARD CATEGORY	MI.L.	Quantitative Literacy and Logic (L)
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof: Students understand mathematical reasoning as being grounded in logic and proof and can distinguish mathematical arguments from other types of arguments. They can interpret arguments made about quantitative situations in the popular media. Students know the language and laws of logic and can apply them in both mathematical and everyday settings. They write proofs using direct and indirect methods and use counterexamples appropriately to show that statements are false
GRADE LEVEL EXPECTATION	L3.3	Proof
EXPECTATION	L3.3.1	Know the basic structure for the proof of an "if..., then..." statement (assuming the hypothesis and ending with the conclusion) and that proving the contrapositive is equivalent. Analyze Conditional Statements
EXPECTATION	L3.3.2	Construct proofs by contradiction. Use counterexamples, when appropriate, to disprove a statement. Tilted Squares
EXPECTATION	L3.3.3	Explain the difference between a necessary and a sufficient condition within the statement of a theorem. Determine the correct conclusions based on interpreting a theorem in which necessary or sufficient conditions Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP)

		Inside Space Transform - Combined Transformations (GSP)

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.1	Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables. Balancing Act Part II Changing Formulas Codebreaker 2 - Simplification Software Constructing Simple Arguments (Easiteach) Escape the Cave - Using Letters to Represent Unknown Numbers Software Expression Machine FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Newton's Law of Cooling Reflecting Function Plots Write and Evaluate Expressions Writing and Solving Ratios and Proportions

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)

STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.2	Know the definitions and properties of exponents and roots transition fluently between them, and apply them EXPONENTS EXPONENTS EXPONENTS INDICES A Introduction to Exponents Introduction to Exponents Negative Exponents and Parentheses Worksheet (1) Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (1) Positive Exponents and Parentheses Worksheet (2) Powerful Roughly the Answer Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.3	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product Algebra Quiz Difference of Squares EXPRESSIONS FACTORISE

		Factoring Binomials Factoring Polynomials Completely Factoring Trinomials Factoring Trinomials Using Algebra Tiles Integer Polynomial Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Operations with Polynomials (division) QUADRATICS QUADRATICS QUADRATICS QUADRATICSx What Expression

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas.
GRADE LEVEL EXPECTATION	A1.1	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.4	Add, subtract, multiply, and simplify polynomials and rational expressions. A Perfect Square Algebra Quiz Binomial Theorem Cube Conundrum Expansion of a Polynomial FRACTIONS A FRACTIONS A FRACTIONS A Intro to Multiplication of Binomials Introduction to Multiplication of Binomials Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software

		Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Matrices Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Multiplying Binomials Number Pyramids - Algebra Software Operations with Polynomials Operations with Polynomials (addition and subtraction) Operations with Polynomials (division) Operations with Polynomials (multiplication) Polynomial Long Multiplication QUADRATICS Recognizing Quadratics
EXPECTATION	A1.1.6	Transform exponential and logarithmic expressions into equivalent forms using the properties of exponents and logarithms, including the inverse relationship between exponents and logarithms. Solving Logarithmic and Exponential Equations
EXPECTATION	A1.1.7	Transform trigonometric expressions into equivalent forms using basic identities such as sin^2 theta + cos^2 theta = 1 and tan^2 theta + 1 = sec^2 theta (Recommended) Analytic Trigonometry Analytic Trigonometry Analytic Trigonometry Apply Double-Angle and Half Angle Formulas Apply Sum and Difference Formulas Identities in Calculus Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Verify Trigonometric Identities

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)

STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.1	Write equations and inequalities with one or two variables to represent mathematical or applied situations, Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models EQUATIONS Find the Number GRAPHS A Graphing Linear Inequalities Inequalities and Absolute Value Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Line Plot QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically Solving Inequalities Using the Number Line Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.3	Solve linear and quadratic equations and inequalities including systems of up to three linear equations with three unknowns. Justify steps in the solution, and apply the quadratic formula appropriately.

		Algebra Quiz
		Algebraic Solutions to Polynomial Equations
		Annotated Quadratic Polynomial
		Balancing Act Part II
		Completing the Square
		Complex Conjugates
		Evaluate the Determinant and Apply Cramer's Rule
		Find the Number
		Finding Numbers that satisfy two or more equations
		Finding Numbers that satisfy two or more equations
		Finding Solutions by Undoing Steps
		Finding Solutions by Undoing Steps
		Finding Solutions by Undoing Steps
		Functions
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		Graph of Inequalities
		Graphing Linear Inequalities
		Inequalities and Absolute Value
		Intro to Equations
		Intro to Equations
		Intro to Equations
		Introduction to Equations
		Matrices
		Methods of Solving Linear Systems of Equations and Inequalities
		Methods of Solving Quadratic
		Multivariate Linear Systems and Row Operations
		QUADRATICS
		QUADRATICS
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		QUADRATICSx
		Quadratic Formula and the Discriminant
		Real Zeros of Polynomial Functions

		Reviewing Quadratic Roots Reviewing Quadratic Roots SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS Solve It Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Solving Inequalities Using the Number Line Solving Inequalities Worksheet (1) Solving Inequalities Worksheet (2) Solving Inequalities Worksheet (3) Solving Inequalities Worksheet (4) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Try Try Try Again Using Inverse Matrices to solve Linear Systems Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations Using the Quadratic Formula an Interpreting the Discriminant
EXPECTATION	A1.2.4	Solve absolute value equations and inequalities, and justify steps in the solution. Inequalities and Absolute Value Solving Absolute Equations and Inequalities Solving Inequalities Using the Number Line

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas

GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.5	Solve polynomial equations and equations involving rational expressions, and justify steps in the solution. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra Functions Functions Real Zeros of Polynomial Functions

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.6	Solve power equations and equations including radical expressions, justify steps in the solution, and explain End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Simplifying Radical Expressions and Equations
EXPECTATION	A1.2.7	Solve exponential and logarithmic equations, and justify steps in the solution. Carbon Dating Functions Functions Newton's Law of Cooling Solving Logarithmic and Exponential Equations

EXPECTATION	A1.2.8	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. CO-ORD GEOM CO-ORD GEOM Changing Formulas TRANSPOSITION
EXPECTATION	A1.2.9	Know common formulas and apply appropriately in contextual situations. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CUBITP22 Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs PERCENT Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders

		Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A1:	Expressions, Equations, and Inequalities: Students recognize, construct, interpret, and evaluate expressions. They fluently transform symbolic expressions into equivalent forms. They determine appropriate techniques for solving each type of equation, inequality, or system of equations, apply the techniques correctly to solve, justify the steps in the solutions, and draw conclusions from the solutions. They know and apply common formulas
GRADE LEVEL EXPECTATION	A1.2	Solutions of Equations and Inequalities
EXPECTATION	A1.2.10	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Elementary Transcendental Functions and Their Inverses Evaluate Inverse Trigonometric Functions Function Explorer 2D Functions Illustrating Cosine with the Unit Circle II Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem
STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so
GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and A Balanced View Composition of Functions Composition of Functions Composition of Functions

		Defining and Graphing Relations Difference of Squares Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functional Geometry Functional Geometry Functions Functions and Relations Functions and Relations Functions and Relations Functions and Relations Functions in A Triangle Functions in A Triangle Horizontal Line Test, Vertical Line Test How do I look Increasing, Decreasing, and Constant Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Inverse Reflection Principle Iterations and functions Iterations and functions Mapping Diagrams Sum of Parts Tilted Squares Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.2	Read, interpret, and use function notation and evaluate a function at a value in its domain. FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Reflecting Function Plots Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs
EXPECTATION	A2.1.3	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations. A Balanced View A Perfect Square Analyze Arithmetic and Geometric Sequence and Series And So On Balancing Act Part II CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Changing Formulas Comparing Linear, Exponential and Quadratic Models Complex Zeros and the Fundamental Theorem of Algebra Composition of Functions Composition of Functions Composition of Functions Define and Use Sequences and Series Defining and Graphing Relations Domain and Range of Dynagraphs & Cartesian Graphs

Domain and Range of Dynagraphs & Cartesian Graphs
Domain and Range of Dynagraphs & Cartesian Graphs
EQUATIONS
Exlploring odd and even functions
Exlploring odd and even functions
Exlploring odd and even functions
Expression Machine
Find the Number
Finding Solutions by Undoing Steps
Finding Solutions by Undoing Steps
Finding Solutions by Undoing Steps
Functions
Functions
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GRAPHS A
GRAPHS A
Gifts Galore & Phoning friends
Graphing
Graphing Growth and Decay Functions
Graphing Linear Inequalities
Graphing Square Root Functions
How Slope is Measured
How Slope is Measured
How do I look
Intro to Equations
Intro to Equations
Intro to Equations
Introducing Functions as Dynagraphs
Introducing Functions as Dynagraphs
Introducing Functions as Dynagraphs
Introduction to Equations
Laws
Mapping Diagrams
Modeling Num as Segments & Area
Modeling Num as Segments & Area
Modeling Number as Segments and Areas
Modeling Two-Variable Data Part 1
Modeling Two-Variable Data Part 2
Modeling Two-Variable Data Part 3
Multiplication by Adding Logs
Multiplying Binomials
Power Functions and Their Graphs

		Pyramids QUADRATICSx Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Scientific Notation Worksheet (1) Scientific Notation Worksheet (2) Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Solve It Solving One-step, Two Step, And Multi Step equations Sum 17 Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations What Expression Write and Solve Equations and Inequalities
EXPECTATION	A2.1.4	Recognize that functions may be defined by different expressions over different intervals of their domains; Function Transformations Functions

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Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.5	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Geometric Series Coil Geometric Series Coil Geometric Square Root Construction IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series Models of Geometric Series Ratio of Similarity Ratio of Similarity Ratio of Similarity The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets Use Recursive Rules with Sequences and Functions

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.1	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.6	Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and

An Essential Singularity
Complex Zeros and the Fundamental Theorem of Algebra
Continuity
Cubic Equation
Defining the Limit
Defining the Limit
End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem
Exploring Derivatives: Slope of the Secant Line and Average Rate of Change
Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change
Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change
Exploring Derivatives: Slope of the secant line and average rate of change
Filling Bottles
Function Continuity
Function Continuity
Functions
Functions
Functions
Functions
GRAPHS A
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GRAPHS A
GRAPHS A
Graphing Quadratic Equations Using Roots
How do we find a Limit? Left hand/Right hand limits
How doe we find a Limit? (Left hand/Right hand limits)
Increasing, Decreasing, and Constant Functions
Limits of Infinite Sequences
Limits: Finite c, Finite L

		Limits: Finite c, Infinite L Limits: Infinite c, Finite L Limits: Infinite c, Infinite L Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Predicting a Velocity Plot Predicting a Velocity Plot QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Rational Functions Real Zeros of Polynomial Functions Reviewing Quadratic Roots Reviewing Quadratic Roots The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e). Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Filling Bottles Functions Functions Graph Classifier Software Increasing, Decreasing, and Constant Functions Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Predicting a Velocity Plot Predicting a Velocity Plot Rational Functions The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Velocity

		Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.2	Operations and Transformations
EXPECTATION	A2.2.2	Apply given transformations to basic functions and represent symbolically. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Derivatives Dilation of Functions Dilation of Functions Dilation of Functions Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game

EXPECTATION	A2.2.3	Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse . A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations
EXPECTATION	A2.2.4	If a function has an inverse, find the expression(s) for the inverse. (Recommended) A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

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Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.2	Operations and Transformations
EXPECTATION	A2.2.5	Write an expression for the composition of one function with another; recognize component functions when a function is a composition of other functions. (Recommended) Composition of Functions Composition of Functions Composition of Functions Composition of Functions Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.2	Operations and Transformations
EXPECTATION	A2.2.6	Know and interpret the function notation for inverses and verify that two functions are inverses using A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS

		FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

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Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so
GRADE LEVEL EXPECTATION	A2.3	Representations of Functions
EXPECTATION	A2.3.2	Describe the tabular pattern associated with functions having constant rate of change (linear); or variable And So On Comparing Linear, Exponential and Quadratic Models Filling Bottles Graphing Growth and Decay Functions Inverse Proportion Worksheet (3) Modeling Two-Variable Data Part 2 The Laboratory - Relationship Between Two Variables (Software)

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)

STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.4	Models of Real-world Situations Using Families of Functions
EXPECTATION	A2.4.1	Identify the family of function best suited for modeling a given real-world situation. Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Modeling Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3
EXPECTATION	A2.4.2	Adapt the general symbolic form of a function to one that fits the specification of a given situation by using the information to replace arbitrary constants with numbers. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere

		Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.4.3	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM

		Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A2:	Functions: Students understand Functions, their representations, and their attributes. They perform transformations, combine and compose Functions, and find inverses. Students classify Functions and know the characteristics of each family. They work with Functions with real coefficients fluently. Students construct or select a function to model a real-world situation in order to solve applied problems. They draw on their knowledge of families of Functions to do so.
GRADE LEVEL EXPECTATION	A2.4	Models of Real-world Situations Using Families of Functions
EXPECTATION	A2.4.4	Use methods of linear programming to represent and solve simple real-life problems. (Recommended) Application of Graphing Inequalities Application of Graphing Inequalities

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.1	Lines and Linear Functions
EXPECTATION	A3.1.1	Write the symbolic forms of linear functions (standard, point-slope, and slope-intercept) given appropriate CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept GRAPHS A

		Graphing Absolute Value Functions Graphing Absolute Value Functions Graphing Linear Inequalities Iterations and functions Iterations and functions LINES Line Plot Line up Modeling Two-Variable Data Part 1 Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Circumference Function The Circumference Function The Circumference Function The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns
EXPECTATION	A3.1.2	Graph lines (including those of the form x = h and y = k) given appropriate information. A Balanced View Comparing Linear, Exponential and Quadratic Models Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Finding the Inverse of a Function and the Inverse Composition Rule Function Transformations Functions and Relations Functions and Relations Functions and Relations GRAPHS A

		GRAPHS A Graphing Functions with Four Parameters How do I look Interactive Slope Introduction to Slope - A measure of Steepness Introduction to Slope: A measure of steepness Inverse Reflection Principle Iterations and functions Iterations and functions Polynomial Roots Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)

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Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.1	Lines and Linear Functions
EXPECTATION	A3.1.3	Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph. Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A

		GRAPHS A Graphing Functions with Four Parameters Interactive Slope Line Plot Polynomial Roots Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)
EXPECTATION	A3.1.4	Find an equation of the line parallel or perpendicular to given line, through a given point; understand and use the facts that non-vertical parallel lines have equal slopes, and that non-vertical perpendicular lines have CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form LINES Line up Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular

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STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.2	Exponential and Logarithmic Functions
EXPECTATION	A3.2.1	Write the symbolic form and sketch the graph of an exponential function given appropriate information. Carbon Dating Comparing Linear, Exponential and Quadratic Models

		Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.2	Interpret the symbolic forms and recognize the graphs of exponential and logarithmic functions; recognize the logarithmic function as the inverse of the exponential function. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions

		Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.3	Apply properties of exponential and logarithmic functions. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.4	Understand and use the fact that the base of an exponential function determines whether the function increases or decreases and understand how the base affects the rate of growth or decay. Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions involving e Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function

		Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A.3.2.5	Relate exponential and logarithmic functions to real phenomena, including half-life and doubling time. Carbon Dating Compound Interest Compound Interests Exploration versus Consumption Exponential Decay Functions involving e Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 PERCENT Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Simple vs Compound Interest Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.A.**	**Algebra and Functions (A)**
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.3	Quadratic Functions
EXPECTATION	A3.3.1	Write the symbolic form and sketch the graph of a quadratic function given appropriate information. Animated Projectile Motion

		Annotated Quadratic Polynomial
		Ballistic Trajectories
		Comparing Linear, Exponential and Quadratic Models
		Exploring Parabolas in Vertex Form
		Exploring Parabolas in Vertex Form
		Exploring Parabolas in Vertex Form
		Function Transformations
		Functions
		Functions
		GRAPHS A
		GRAPHS A
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		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		Graph and Solving Quadratic Inequalities
		Graphing Functions with Four Parameters
		Graphing Quadratic Equations
		Graphing Quadratic Equations
		Graphing Quadratic Equations Using Roots
		How do I look
		Methods of Solving Quadratic
		Modeling Two-Variable Data Part 2
		Parabolas in Factored Form
		Parabolas in Factored Form
		Parabolas in Factored Form
		Parabolas in Standard Form
		Parabolas in Standard Form
		Parabolas in Standard Form
		Polynomial Functions of Higher Degree (degrees greater than 2)
		Polynomial Roots
		Power Functions and Their Graphs
		QUADRATICSx
		Quadratic Equation
		Quadratic Formula and the Discriminant
		Real Zeros of Polynomial Functions
		Reflecting Function Plots
		Review of Parabolas
		Review of Parabolas
		Review of Parabolas

		Reviewing Quadratic Roots Reviewing Quadratic Roots Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Sum 17 Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using the Quadratic Formula an Interpreting the Discriminant

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Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.3	Quadratic Functions
EXPECTATION	A3.3.2	Identify the elements of a parabola (vertex, axis of symmetry, direction of opening) given its symbolic form or its graph, and relate these elements to the coefficient(s) of the symbolic form of the function. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Annotated Quadratic Polynomial Dilation of Functions Dilation of Functions Dilation of Functions Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graph and Solving Quadratic Inequalities

		Graphing Functions with Four Parameters Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Quadratic Equation Quadratic Practice Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Review of Parabolas Review of Parabolas Review of Parabolas Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game

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Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.3	Quadratic Functions
EXPECTATION	A3.3.4	Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function. GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Quadratic Equations Using Roots

		Polynomial Roots QUADRATICSx QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Reviewing Quadratic Roots Reviewing Quadratic Roots Using the Quadratic Formula an Interpreting the Discriminant

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.4	Power Functions
EXPECTATION	A3.4.1	Write the symbolic form and sketch the graph of power functions. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs

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Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.4	Power Functions
EXPECTATION	A3.4.2	Express direct and inverse relationships as functions and recognize their characteristics. Direct Proportion Worksheet (2) Finding out about graphs Functional Geometry

		Functional Geometry Functions in A Triangle Functions in A Triangle How do I look Inverse Proportion Worksheet (3) Inverse Square Laws Rates and Ratios Rates and Ratios Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Sense of Proportion The Circumference Function

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Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.4	Power Functions
EXPECTATION	A3.4.3	Analyze the graphs of power functions, noting reflectional or rotational symmetry. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Functions Functions Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Review of Parabolas Review of Parabolas Review of Parabolas

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.5	Polynomial Functions
EXPECTATION	A3.5.1	Write the symbolic form and sketch the graph of simple polynomial functions. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions

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Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.5	Polynomial Functions
EXPECTATION	A3.5.2	Understand the effects of degree, leading coefficient, and number of real zeros on the graphs of polynomial Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions

		Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions
EXPECTATION	A3.5.3	Determine the maximum possible number of zeros of a polynomial function, and understand the relationship between the x-intercepts of the graph and the factored form of the function. Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions

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Grade 12

STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.6	Rational Functions
EXPECTATION	A3.6.1	Write the symbolic form and sketch the graph of simple rational functions.

		Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically
EXPECTATION	A3.6.2	Analyze graphs of simple rational functions and understand the relationship between the zeros of the numerator and denominator and the function's intercepts, asymptotes, and domain. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically
STRAND / STANDARD CATEGORY	MI.A.	Algebra and Functions (A)
STANDARD	A3:	Families of Functions: Students study the symbolic and graphical forms of each function family. By recognizing the unique characteristics of each family, they can use them as tools for solving problems or for modeling real-
GRADE LEVEL EXPECTATION	A3.7	Trigonometric Functions
EXPECTATION	A3.7.1	Use the unit circle to define sine and cosine; approximate values of sine and cosine; use sine and cosine to define the remaining trigonometric functions; explain why the trigonometric functions are periodic. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle

		Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
EXPECTATION	A3.7.2	Use the relationship between degree and radian measures to solve problems. Angles Measured in Degrees and Radians
EXPECTATION	A3.7.3	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of pi/6 and pi/4. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
EXPECTATION	A3.7.4	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Continued Fraction Approximations of the Tangent Function Doppler Effect Elementary Transcendental Functions and Their Inverses

		Family of Curves, Tangents, and Intuition Function Explorer 2D Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle Inset Plot Magnifier Many Sine Curves Modeling Harmonic Motion Modeling Harmonic Motion Nested Trigonometric Function Plots Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP) Soil Temperature TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 Tetraviews of Elementary Functions The Cosecant Function (GSP) The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated

		Trigonometric Functions with Four Parameters
EXPECTATION	A3.7.5	Graph transformations of basic trigonometric functions (involving changes in period, amplitude, and midline) and understand the relationship between constants in the formula and the transformed graph. Doppler Effect Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Many Sine Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Sinusoids and Transformations (GSP) Soil Temperature Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 The Cosecant Function (GSP) Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions with Four Parameters Wave Interference

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.1	Solve multistep problems and construct proofs involving vertical angles, linear pairs of angles supplementary angles, complementary angles, and right angles. Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet Circle Geometry Worksheet Golden Ratio 1 Line up Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP) Types of Angles
EXPECTATION	G1.1.2	Solve multistep problems and construct proofs involving corresponding angles, alternate interior angles, alternate exterior angles, and same-side (consecutive) interior angles. Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Pantograph Linkage Parallel and Perpendicular Line Proofs Properties of Parallel Lines Properties of Parallel Lines

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Grade 12

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry

EXPECTATION	G1.1.3	Perform and justify constructions, including midpoint of a line segment and bisector of an angle, using
		A Rectangle with Maximum Area
		A Rectangle with Maximum Area
		A Triangle Area Problem
		A Triangle Area Problem
		Accurate Constructions - Animations Software
		Advanced Construction Napolean's Theorem
		Advanced Construction Napolean's Theorem
		Animation of Angle Properties - Angles on a Straight Line and in Triangles Software
		Application of Parabolas
		Application of Parabolas
		Compass Animations - Constructions Using Straight Edge and Compasses Software
		Compass Animations Software
		Constructing Templates for the Platonic Solids
		Constructing Templates for the Platonic Solids
		Constructing Templates for the Platonic Solids
		Creating Complex Design's
		Creating Complex Design's
		Ellipse
		Ellipse Projects
		Ellipse Projects
		Ellipse Projects
		Ellipse Projects
		Ellipse- Check for understanging the definition
		Ellipse- Check for understanging the definition
		Ellipse- Check for understanging the definition
		Ellipse- Check for understanging the definition
		Ellispse -Eccentricty
		Euclid's Proposition 1 - Equilateral Triangles
		Euclid's Proposition 1 - Equilateral Triangles
		Exploring the Euler Segment
		Exploring the Euler Segment
		Functions in A Triangle
		Functions in A Triangle
		Hyperbola
		Hyperbola
		Hyperbola
		Lines and Angles
		Morley's Triangle - Application of Angle Trisection
		Morley's Triangle - Application of Angle Trisection
		Off at a Tangent - Exploring the Tangent to a Circle (GSP)
		Parabola
		Parabola

		Parabola Parabola Properties of Parallel Lines Properties of Parallel Lines Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Some Ellipse Relationships Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals Trisecting an Angle Trisecting an Angle Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular Using the Equilateral Triangle - Surfer & Spotter Using the Equilateral Triangle - Surfer & Spotter

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.4	Given a line and a point, construct a line through the point that is parallel to the original line using straightedge and compass. Given a line and a point, construct a line through the point that is perpendicular to the original line. Justify the steps of the constructions. Accurate Constructions - Animations Software Compass Animations - Constructions Using Straight Edge and Compasses Software Off at a Tangent - Exploring the Tangent to a Circle (GSP) Properties of Parallel Lines Properties of Parallel Lines Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.5	Given a line segment in terms of its endpoints in the coordinate plane, determine its length and midpoint. Determining the Origin Determining the Origin AREA AREA AREA CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Cycle Ride Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Determining the Origin Distance between 2 points Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.1	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.6	Recognize Euclidean geometry as an axiom system. Know the key axioms and understand the meaning of and distinguish between undefined terms, axioms, definitions, and theorems. Lines and Angles

		Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Thales' Theorem Using Postulates and Diagrams
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry and Trigonometry (G)**
STANDARD	**G1:**	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures.
GRADE LEVEL EXPECTATION	**G1.2**	Triangles and Their Properties
EXPECTATION	**G1.2.1**	Prove that the angle sum of a triangle is 180 degrees and that an exterior angle of a triangle is the sum of the [illegible] ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet Calculating Exterior Angles of Triangles Worksheet Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles Polygon Problems - Exterior Angles of Polygons (GSP) Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP)

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.2	Triangles and Their Properties
EXPECTATION	G1.2.2	Construct and justify arguments and solve multistep problems involving angle measure, side length, perimeter,
		ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA AREA AREA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software CIRCLES CIRCLESX Calculating Angles in Polygons Worksheet Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles PERCENT Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Related Rates: Triangle Angle and Area TRIGONOMETRY Tilted Squares Triangle Area and Perimeters Triangle Area and Perimeters Write and Evaluate Expressions

EXPECTATION	G1.2.3	Know a proof of the Pythagorean Theorem, and use the Pythagorean Theorem and its converse to solve Coordinate Proof Coordinate Proof Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Divide and Rule - Dividing Line Segments in a Given Ratio (GSP). Pythagorean Theorem Pythagorean Theorem 3D Pythagorean Triples Round the Bend Sum of Parts TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares

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Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.2	Triangles and Their Properties
EXPECTATION	G1.2.4	Prove and use the relationships among the side lengths and the angles of 30 degrees - 60 degrees - 90 degrees triangles and 45 degrees - 45 degrees - 90 degrees triangles. ANGLE04PZDH

		ANGLE04ZDH The 30-60 Right Triangle The 30-60 Right Triangle

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.2	Triangles and Their Properties
EXPECTATION	G1.2.5	Solve multistep problems and construct proofs about the properties of medians, altitudes, perpendicular bisectors to the sides of a triangle, and the angle bisectors of a triangle. Using a straightedge and compass, An IMO Triangle Problem Euler Line Investigating the Properties of Excircles of a Triangle Investigating the Properties of Excircles of a Triangle Morley's Triangle - Application of Angle Trisection Morley's Triangle - Application of Angle Trisection Triangle Inequalities Triangle Inequalities Using the Equilateral Triangle - Surfer & Spotter Using the Equilateral Triangle - Surfer & Spotter

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.3	Triangles and Trigonometry
EXPECTATION	G1.3.1	Define the sine, cosine, and tangent of acute angles in a right triangle as ratios of sides. Solve problems about angles, side lengths, or areas using trigonometric ratios in right triangles. ANGLE04PZDH ANGLE04ZDH

		Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle The 30-60 Right Triangle The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem

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STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.3	Triangles and Trigonometry

EXPECTATION	G1.3.2	Know and use the Law of Sines and the Law of Cosines and use them to solve problems. Find the area of a triangle with sides a and b and included angle theta using the formula Area = (1/2) absin theta. ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA CIRCLES CIRCLESX Law of Cosines Law of Sines Related Rates: Triangle Angle and Area TRIGONOMETRY TRIGONOMETRY The Law of Cosines The Law of Cosines The Law of Sines The Law of Sines
EXPECTATION	G1.3.3	Determine the exact values of sine, cosine, and tangent for 0 degrees, 30 degrees, 45 degrees, 60 degrees, and their integer multiples and apply in various contexts. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Composing Trigonometric and Inverse Trigonometric Functions Continued Fraction Approximations of the Tangent Function How Far Can One See from a Height? Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY

		TRIGONOMETRY The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Trigonometric Ratios Trigonometric Ratios Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)

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Grade 12

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures.
GRADE LEVEL EXPECTATION	G1.4	Quadrilaterals and Their Properties
EXPECTATION	G1.4.1	Solve multistep problems and construct proofs involving angle measure, side length, diagonal length, perimeter, and area of squares, rectangles, parallelograms, kites, and trapezoids. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA Area Review BOUNDS Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Exterior and Interior Angles of Regular Polygons Worksheet Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Tilted Squares Write and Evaluate Expressions

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.4	Quadrilaterals and Their Properties
EXPECTATION	G1.4.2	Solve multistep problems and construct proofs involving quadrilaterals using Euclidean methods or coordinate Coordinate Proof Coordinate Proof
EXPECTATION	G1.4.3	Describe and justify hierarchical relationships among quadrilaterals. Analyze Conditional Statements Golden Ratio 1 Special Midpoint Quadrilaterals Special Midpoint Quadrilaterals Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals
EXPECTATION	G1.4.4	Prove theorems about the interior and exterior angle sums of a quadrilateral. ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA Calculating Angles in Polygons Worksheet Calculating Exterior Angles of Triangles Worksheet Exterior and Interior Angles of Regular Polygons Worksheet Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Polygon Problems - Exterior Angles of Polygons (GSP) Triangle Review - Interior and Exterior Angles (GSP)
EXPECTATION	G1.4.5	Understand the definition of a cyclic quadrilateral and know and use the basic properties of cyclic Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space

		Transform - Combined Transformations (GSP)
STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.5	Other Polygons and Their Properties
EXPECTATION	G1.5.1	Know and use subdivision or circumscription methods to find areas of polygons. Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Pick's Theorem

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.5	Other Polygons and Their Properties
EXPECTATION	G1.5.2	Know, justify, and use formulas for the perimeter and area of a regular n-gon and formulas to find interior and exterior angles of a regular n-gon and their sums. Calculating Angles in Polygons Worksheet Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Exterior and Interior Angles of Regular Polygons Worksheet Golden Ratio 1 Interior & Exterior Angles Polygon Proof - Interior Angle Sums of Polygons (GSP)

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Grade 12

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures
GRADE LEVEL EXPECTATION	G1.6	Circles and Their Properties
EXPECTATION	G1.6.1	Solve multistep problems involving circumference and area of circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) Arc Resolution Area of a Circle from Segments CIRCLESX Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Finding Volume of Cylinder and Sphere Introduction to Radians Introduction to Radians Introduction to Radians Keeping on Track Length of a Coiled Rope The Circumference Function The Circumference Function The Circumference Function The Cycloid The Cycloid Two Wheel Belt What's my surface? Write and Evaluate Expressions
EXPECTATION	G1.6.2	Solve problems and justify arguments about chords and lines tangent to circles. ANGLE ANGLE ANGLE Ford Circles Hyperbola Hyperbola Hyperbola Inscribed Angle Subtended Chord Intersecting Circles Off at a Tangent - Exploring the Tangent to a Circle (GSP)

		Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Thales' Theorem The Statue of Regiomontanus Two Wheel Belt
EXPECTATION	G1.6.3	Solve problems and justify arguments about central angles, inscribed angles, and triangles in circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) ANGLE ANGLE ANGLE ANGLE Circle Geometry Worksheet Inscribed Angle Subtended Chord Properties of Circles Part 2 (GSP) Thales' Theorem
EXPECTATION	G1.6.4	Know and use properties of arcs and sectors and find lengths of arcs and areas of sectors. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) Arc Resolution CIRCLES CIRCLESX CIRCLESX Circle Geometry Worksheet Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Thales' Theorem

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Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G1:	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures.
GRADE LEVEL EXPECTATION	G1.7	Conic Sections and Their Properties
EXPECTATION	G.1.7.1	Find an equation of a circle given its center and radius; given the equation of a circle, find its center and

		Conic Sections - Writing Equations of Circles Defining and Graphing Relations
EXPECTATION	G1.7.2	Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones. Application of Parabolas Application of Parabolas Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition
EXPECTATION	G1.7.3	Graph ellipses and hyperbolas with axes parallel to the x- and y-axes, given equations.

		Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations
EXPECTATION	G1.7.4	Know and use the relationship between the vertices and foci in and ellipse, the vertices and foci in a hyperbola, and the directrix and focus in a parabola, interpret these relationships in applied contexts. (Recommended) Application of Parabolas Application of Parabolas Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Sum 17

		Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition
STRAND / STANDARD CATEGORY	**MI.G.**	**Geometry and Trigonometry (G)**
STANDARD	**G1:**	Figures and Their Properties: Students represent basic geometric figures, polygons, and conic sections and apply their definitions and properties in solving problems and justifying arguments, including constructions and representations in the coordinate plane. Students represent three-dimensional figures, understand the concepts of volume and surface area, and use them to solve problems. They know and apply properties of common three-dimensional figures.
GRADE LEVEL EXPECTATION	**G1.8**	Three- Dimensional Figures
EXPECTATION	**G1.8.1**	Solve multistep problems involving surface area and volume of pyramids, prisms, cones, cylinders,
		3-D Shape Explorer - Surface Area of Rectangular Prisms Software 3D Shape Builder Software AREA AREA BOUNDS Cylinder Hemisphere Cone FORMULAE Finding Volume of Cylinder and Sphere Missing Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Unfolding Prism Nets Animation (Curved Shape) Unfolding Prism Nets Animation (L Shape) Unfolding Prism Nets Animation (T Shape) Unfolding a Cylinder (Animation) Unfolding a Rectangular Prism - W Shape (Animation) Unfolding a Rectangular Prism - T Shape (Animation) Unfolding a Square-based Pyramid (Animation) VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones What's my surface?

Grade 12

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G2:	Relationships Between Figures: Students use and justify relationships between lines, angles, area and volume formulas, and 2- and 3-dimensional representations. They solve problems and provide proofs about congruence
GRADE LEVEL EXPECTATION	G2.1	Relationships Between Area and Volume Formulas
EXPECTATION	G2.1.1	Know and demonstrate the relationships between the area formula of a triangle, the area formula of a parallelogram, and the area formula of a trapezoid. Area of a Circle from Segments Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons
EXPECTATION	G2.1.2	Know and demonstrate the relationships between the area formulas of various quadrilaterals. Area of a Circle from Segments Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons
STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G2:	Relationships Between Figures: Students use and justify relationships between lines, angles, area and volume formulas, and 2- and 3-dimensional representations. They solve problems and provide proofs about congruence
GRADE LEVEL EXPECTATION	G2.2	Relationships Between Two-dimensional and Three-dimensional Representations
EXPECTATION	G2.2.1	Identify or sketch a possible three-dimensional figure, given two-dimensional views. Create a two-dimensional representation of a three-dimensional figure. 3-D Shape Explorer - Surface Area of Rectangular Prisms Software 3D Shape Builder Software
EXPECTATION	G2.2.2	Identify or sketch cross sections of three-dimensional figures. Identify or sketch solids formed by revolving two- 3-D Shape Explorer - Surface Area of Rectangular Prisms Software Which Model

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G2:	Relationships Between Figures: Students use and justify relationships between lines, angles, area and volume formulas, and 2- and 3-dimensional representations. They solve problems and provide proofs about congruence
GRADE LEVEL EXPECTATION	G2.3	Congruence and Similarity
EXPECTATION	G2.3.1	Prove that triangles are congruent using the SSS, SAS, ASA, and AAS criteria, and that right triangles, are congruent using the hypotenuse-leg criterion. Appling Deductive Reasoning CONGRUENCE Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.2	Use theorems about congruent triangles to prove additional theorems and solve problems, with and without Appling Deductive Reasoning CONGRUENCE Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.3	Prove that triangles are similar by using SSS, SAS, and AA conditions for similarity. Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.4	Use theorems about similar triangles to solve problems with and without use of coordinates. Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.5	Know and apply the theorem stating that the effect of a scale factor of k relating one two-dimensional figure to another or one three-dimensional figure to another, on the length, area, and volume of the figures is to

		AREA AREA Area and Volume of Similar Shapes Worksheet (2). Area and Volume of Similar Shapes Worksheet (1). Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Cube Conundrum Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle Surface Area and Volumes of Spheres Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) What is the Meaning of Multiplication What is the Meaning of Multiplication

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Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G3:	Transformations of Figures in the Plane: Students will solve problems about distance-preserving transformations and shape-preserving transformations. The transformations will be described synthetically
GRADE LEVEL EXPECTATION	G3.1	Distance-preserving Transformations: Isometries
EXPECTATION	G3.1.1	Define reflection, rotation, translation, and glide reflection and find the image of a figure under a given Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Multiplication

		Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Reflection-Shortest Path Application of Reflection-Shortest Path Application of Translation - Block Design Application of Translation- Block Design Application of Translation- Block Design Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Critical Thinking - Shortest Path- Laser Critical Thinking - Shortest Path- Laser Fishy Transformations - Combined Transformations (GSP) Game of Buried Treasure Game of Buried Treasure Kaleidoscopic Polygons MATRICES Matrix Transformations: "F" Practice Shortest Path - Feed and Water Practice Shortest Path - Feed and Water Proportional Triangle Nesting Reflection in Geometry and Algebra Reflection in Geometry and Algebra Reflections over Intersecting Lines Reflections over Intersecting Lines Reflections over Intersecting Lines Reflections over Two Parallel lines Reflections over Two Parallel lines Reflections over Two Parallel lines Rotation in the Coordinate Plane Rotation in the Coordinate Plane Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations Transformations Transformations Translate to Enlarge - Dilation of 2-D Shapes (GSP) Translation in the Coordinate Plane Translation in the Coordinate Plane Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects

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Grade 12

STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G3:	Transformations of Figures in the Plane: Students will solve problems about distance-preserving transformations and shape-preserving transformations. The transformations will be described synthetically
GRADE LEVEL EXPECTATION	G3.1	Distance-preserving Transformations: Isometries
EXPECTATION	G3.1.2	Given two figures that are images of each other under an isometry, find the isometry and describe it Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations
EXPECTATION	G3.1.3	Find the image of a figure under the composition of two or more isometries and determine whether the resulting figure is a reflection, rotation, translation, or glide reflection image of the original figure. Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations
STRAND / STANDARD CATEGORY	MI.G.	Geometry and Trigonometry (G)
STANDARD	G3:	Transformations of Figures in the Plane: Students will solve problems about distance-preserving transformations and shape-preserving transformations. The transformations will be described synthetically
GRADE LEVEL EXPECTATION	G3.2	Shape-preserving Transformations: Dilations and Isometries
EXPECTATION	G3.2.1	Know the definition of dilation and find the image of a figure under a given dilation. AREA AREA Application of Matrix Operations Application of Matrix Operations

		Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP) Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects
EXPECTATION	G3.2.2	Given two figures that are images of each other under some dilation, identify the center and magniture of the [illegible] AREA AREA Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom

		Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP) Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects What is the Meaning of Multiplication What is the Meaning of Multiplication
EXPECTATION	G3.2.3	Find the image of a figure under the composition of a dilation and an isometry. (Recommended) Application of Translation - Block Design Application of Translation- Block Design Application of Translation- Block Design Fishy Transformations - Combined Transformations (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations

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Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and

GRADE LEVEL EXPECTATION	S1.1	Producing and Interpreting Plots
EXPECTATION	S1.1.1	Construct and interpret dot plots, histograms, relative frequency histograms, bar graphs, basic control charts, and box plots with appropriate labels and scales; determine which kinds of plots are appropriate for different types of data; compare data sets and interpret differences based on graphs and summary statistics. Assumptions Box and Whisker HISTOGRAMS How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Relate

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Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.1	Producing and Interpreting Plots
EXPECTATION	S1.1.2	Given a distribution of a variable in a data set, describe its shape, including symmetry or skewness, and state how the shape is related to measures of center (mean and median) and measures of variation (range and standard deviation) with particular attention to the effects of outliers on these measures. Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION How Do They Compare Normal Distributions

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Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and

GRADE LEVEL EXPECTATION	S1.2	Measures of Center and Variation
EXPECTATION	S1.2.1	Calculate and interpret measures of center including: mean, median, and mode; explain uses, advantages and disadvantages of each measure given a particular set of data and its context. AVERAGE Assumptions Box and Whisker C-FREQUENCY DEVIATION DEVIATION How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV QUARTILES QUARTILES QUARTILES QUARTILES TABLES D Use Measures of Central Tendency

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Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.2	Measures of Center and Variation
EXPECTATION	S1.2.3	Compute and interpret measures of variation, including percentiles, quartiles, interquartile range, variance, Box and Whisker C-FREQUENCY DEVIATION DEVIATION Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Normal Distributions QUARTILES QUARTILES QUARTILES

		QUARTILES TABLES D

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Mathematics

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.3	The Normal Distribution
EXPECTATION	S1.3.1	Explain the concept of distribution and the relationship between summary statistics for a data set and Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Normal Distributions

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Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.3	The Normal Distribution
EXPECTATION	S1.3.2	Describe characteristics of the normal distribution, including its shape and the relationships among its mean, How Do They Compare Normal Distributions
EXPECTATION	S1.3.3	Know and use the fact that about 68%, 95%, and 99.7% of the data lie within one, two, and three standard deviations of the mean, respectively in a normal distribution. How Do They Compare Normal Distributions

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Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S1:	Univariate Data - Examining Distributions: Students plot and analyze univariate data by considering the shape of distributions and analyzing outliers; they find and interpret commonly-used measures of center and
GRADE LEVEL EXPECTATION	S1.3	The Normal Distribution
EXPECTATION	S1.3.4	Calculate z-scores, use z-scores to recognize outliers, and use z-scores to make informed decisions. Normal Distributions

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S2:	Bivariate Data - Examining Relationships: Students plot and interpret bivariate data by constructing scatterplots, recognizing linear and nonlinear patterns, and interpreting correlation coefficients; they fit and
GRADE LEVEL EXPECTATION	S2.1	Scatterplots and Correlation
EXPECTATION	S2.1.2	Given a scatterplot, identify patterns, clusters, and outliers. Recognize no correlation, weak correlation, and Analyzing Predictions (Easiteach) Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV Predicting with Linear Models Randomness in the Digits of Pi Randomness in the Digits of Square Roots Relate SCATTERGRAMS

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Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S2:	Bivariate Data - Examining Relationships: Students plot and interpret bivariate data by constructing scatterplots, recognizing linear and nonlinear patterns, and interpreting correlation coefficients; they fit and

GRADE LEVEL EXPECTATION	S2.1	Scatterplots and Correlation
EXPECTATION	S2.1.3	Estimate and interpret Pearson's correlation coefficient for a scatterplot of a bivariate data set. Recognize that correlation measures the strength of linear association. Analyzing Predictions (Easiteach) Predicting with Linear Models Relate SCATTERGRAMS

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Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S2:	Bivariate Data - Examining Relationships: Students plot and interpret bivariate data by constructing scatterplots, recognizing linear and nonlinear patterns, and interpreting correlation coefficients; they fit and
GRADE LEVEL EXPECTATION	S2.2	Linear Regression
EXPECTATION	S2.2.1	For bivariate data that appear to form a linear pattern, find the least squares regression line by estimating visually and by calculating the equation of the regression line. Interpret the slope of the equation for a Analyzing Predictions (Easiteach) Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3

		Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S2.2.2	Use the equation of the least squares regression line to make appropriate predictions. Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 SCATTERGRAMS The Circumference Function The Circumference Function The Circumference Function

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Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S3:	Samples, Surveys, and Experiments: Students understand and apply sampling and various sampling methods, examine surveys and experiments, identify bias in methods of conducting surveys, and learn strategies to
GRADE LEVEL EXPECTATION	S3.1	Data Collection and Analysis

EXPECTATION	S3.1.1	Know the meanings of a sample from a population and a census of a population, and distinguish between Comparing Methods of Data Collection (Easiteach) TABLES D
EXPECTATION	S3.1.2	Identify possible sources of bias in data collection and sampling methods and simple experiments; describe how such bias can be reduced and controlled by random sampling; explain the impact of such bias on conclusions made from analysis of the data; and know the effect of replication on the precision of estimates. Comparing Methods of Data Collection (Easiteach) TABLES D
EXPECTATION	S3.1.3	Distinguish between an observational study and an experimental study, and identify, in context, the Determining Line of Fit Determining Line of Fit Determining Line of Fit Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S3.1.4	Design simple experiments or investigations to collect data to answer questions of interest; interpret and Determining Line of Fit Determining Line of Fit Determining Line of Fit Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S3.1.5	Understand methods of sampling, including random sampling, stratified sampling, and convenience samples, and be able to determine, in context, the advantages and disadvantages of each. (Recommended) Comparing Methods of Data Collection (Easiteach) TABLES D

EXPECTATION	S3.1.6	Explain the importance of randomization, double-blind protocols, replication, and the placebo effect in designing experiments and interpreting the results of studies. (Recommended) Comparing Methods of Data Collection (Easiteach) TABLES D
EXPECTATION	S3.1.7.	Explain the basic ideas of statistical process control, including recording data from a process over time. How Do They Compare Relate
EXPECTATION	S3.1.8.	Read and interpret basic control charts; detect patterns and departures from patterns. (Recommended) How Do They Compare Relate
STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting
GRADE LEVEL EXPECTATION	S4.1	Probability
EXPECTATION	S4.1.1	Understand and construct sample spaces in simple situations. Find Probabilities Using Permutations and Combinations Fractions Are Fun Sort It

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting
GRADE LEVEL EXPECTATION	S4.1	Probability
EXPECTATION	S4.1.2	Define mutually exclusive events, independent events, dependent events, compound events, complementary events and conditional probabilities; and use the definitions to compute probabilities. Chance It

		Construct and Interpret Binomial Distribution Counting Principle Permutations Dice Roller & Penny Flipper Find Probabilities and Odds Find Probabilities of Compound Events Finding Probabilities Disjoint and Overlapping Events Finding Probability of Independent and Dependent Events Leads in Coin Tossing PROBABILITY PROBABILITY Sort It The Birthday Problem Two Dice with Histogram What Chance Have I got
EXPECTATION	S4.1.3	Design and carry out an appropriate simulation using random digits to estimate answers to questions about probability; estimate probabilities using results of a simulation; compare results of simulations to theoretical probabilities. (Recommended) Dice Roller & Penny Flipper Experimental and Theoretical Probability Forest Fire Simulation Using a Randomized Hexagonal Automaton Leads in Coin Tossing The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?
STRAND / STANDARD CATEGORY	**MI.S.**	**Statistics and Probability (S)**
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting principles.
GRADE LEVEL EXPECTATION	S4.2	Application and Representation
EXPECTATION	S4.2.1	Compute probabilities of events using tree diagrams, formulas for combinations and permutations, Venn diagrams, or other organizational tools. Adds to One Construct and Interpret Binomial Distribution Dice Roller & Penny Flipper Expectations for Roulette Find Probabilities and Odds Leads in Coin Tossing PROBABILITY PROBABILITY

		The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?

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STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability (S)
STANDARD	S4:	Probability Models and Probability Calculation: Students understand probability and find probabilities in various situations, including those involving compound events, using diagrams, tables, geometric models and counting
GRADE LEVEL EXPECTATION	S4.2	Application and Representation
EXPECTATION	S4.2.2	Apply probability concepts to practical situations, in such settings as finance, health, ecology, or Assumptions
STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.1	Know and use a definition of a function to decide if a given relation is a function. Defining and Graphing Relations Difference of Squares FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functional Geometry Functional Geometry Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test How do I look Increasing, Decreasing, and Constant Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs

		Introducing Functions as Dynagraphs Inverse Reflection Principle Iterations and functions Iterations and functions Sum of Parts Tilted Squares Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.2	Perform algebraic operations (including compositions) on functions and apply transformations (translations,
		Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Composition of Functions Composition of Functions Composition of Functions Composition of Functions Derivatives Dilation of Functions Dilation of Functions Dilation of Functions Finding the Inverse of a Function and the Inverse Composition Rule Function Transformations Functions and Relations Functions and Relations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Introduction to Translating Functions

		Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.3	Write an expression for the composition of one given function with another and find the domain, range, and graph of the composite function. Recognize components when a function is composed of two or more elementary functions Composition of Functions Composition of Functions Composition of Functions Composition of Functions Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.4	Determine whether a function (given symbolically or graphically) has an inverse and express the inverse (symbolically, if the function is given symbolically, or graphically, if given graphically) if it exists. Know and interpret the function notation for its

		A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations
GRADE LEVEL EXPECTATION	P1.5	Determine whether two given functions are inverses, using composition. A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.6	Identify and describe discontinuities of a function (e.g., greatest integer function, 1/x) and how these relate Cases of Discontiuity Continuity Function Continuity Function Continuity
GRADE LEVEL EXPECTATION	P1.8	Explain how the rates of change of functions in different families (e.g., linear functions, exponential functions, etc.) differ, referring to graphical representations. And So On Comparing Linear, Exponential and Quadratic Models Filling Bottles Graphing Growth and Decay Functions Inverse Proportion Worksheet (3) Modeling Two-Variable Data Part 2 The Laboratory - Relationship Between Two Variables (Software)

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.7	Understand the concept of limit of a function as x approaches a number or infinity. Use the idea of limit to analyze a graph as it approaches an asymptote. Compute limits of simple functions (e.g., find the limit as x An Essential Singularity Continuity Defining the Limit Defining the Limit Exploring Derivatives: Slope of the Secant Line and Average Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change Exploring Derivatives: Slope of the secant line and average rate of change Function Continuity Function Continuity How do we find a Limit? Left hand/Right hand limits How doe we find a Limit? (Left hand/Right hand limits)

		Limits of Infinite Sequences Limits: Finite c, Finite L Limits: Finite c, Infinite L Limits: Infinite c, Finite L Limits: Infinite c, Infinite L Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P2:	Exponential and Logarithmic Functions
GRADE LEVEL EXPECTATION	P2.1	Use the inverse relationship between exponential and logarithmic functions to solve equations and problems. Solving Logarithmic and Exponential Equations
GRADE LEVEL EXPECTATION	P2.2	Graph logarithmic functions. Graph translations and reflections of these functions. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Elementary Transcendental Functions and Their Inverses Exponential Decay Function Explorer 2D Functions Graphing Functions with Four Parameters Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Multiplication by Adding Logs Solving Logarithmic and Exponential Equations

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P2:	Exponential and Logarithmic Functions
GRADE LEVEL EXPECTATION	P2.3	Compare the large-scale behavior of exponential and logarithmic functions with different bases and recognize that different growth rates are visible in the graphs of the functions

		A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
GRADE LEVEL EXPECTATION	P2.4	Solve exponential and logarithmic equations when possible, (e.g. 5^x=3^(x+1)). For those that cannot be solved analytically, use graphical methods to find approximate solutions. Carbon Dating Functions Functions Newton's Law of Cooling Solving Logarithmic and Exponential Equations
GRADE LEVEL EXPECTATION	P2.5	Explain how the parameters of an exponential or logarithmic model relate to the data set or situation being modeled. Find an exponential or logarithmic function to model a given data set or situation. Solve problems Carbon Dating Exploration versus Consumption Exponential Decay Functions Functions involving e GRAPHS A

		Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Representing Inverse Variation Graphically Representing Inverse Variation Graphically Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.P.**	**Precalculus**
STANDARD	**P3:**	Quadratic Functions
GRADE LEVEL EXPECTATION	**P3.1**	Solve quadratic-type equations (e.g. e^(2x) - 4 e^(x+4)=0) by substitution. Algebra Quiz Annotated Quadratic Polynomial Completing the Square Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Methods of Solving Quadratic QUADRATICS QUADRATICS QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Solving Equations Using Graphs Worksheet (1)

		Solving Equations Using Graphs Worksheet (2) Try Try Try Again Using the Quadratic Formula an Interpreting the Discriminant

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P3:	Quadratic Functions
GRADE LEVEL EXPECTATION	P3.2	Apply quadratic functions and their graphs in the context of motion under gravity and simple optimization ' ' Ballistic Trajectories Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form
GRADE LEVEL EXPECTATION	P3.3	Explain how the parameters of an exponential or logarithmic model relate to the data set or situation being modeled. Find a quadratic function to model a given data set or situation. Ballistic Trajectories Comparing Linear, Exponential and Quadratic Models Exponential Decay Functions GRAPHS A Graphing Growth and Decay Functions Lily Pond Newton's Law of Cooling Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P4:	Polynomial Functions

GRADE LEVEL EXPECTATION	P4.2	Solve polynomial equations and inequalities of degree greater than or equal to three. Graph polynomial functions given in factored form using zeros and their multiplicities, testing the sign-on intervals and analyzing the function behavior near the zeros. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Function Transformations Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters How do I look Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P5:	Rational Functions and Difference Quotients
GRADE LEVEL EXPECTATION	P5.1	Solve equations and inequalities involving rational functions. Graph rational functions given in factored form using zeros, identifying asymptotes, analyzing their behavior for large x values, and testing intervals. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P5:	Rational Functions and Difference Quotients
GRADE LEVEL EXPECTATION	P5.3	Know and apply the definition and geometric interpretation of difference quotient. Simplify difference quotients and interpret difference quotients as rates of change and slopes of secant lines. DIFFERENTIATION DIFFERENTIATION Exploring Derivatives: Slope of the Secant Line and Average Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change Exploring Derivatives: Slope of the secant line and average rate of change Rate of Change Rate of Change Secant Approximations Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Tangent to a Curve

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P6:	Trigonometric Functions
GRADE LEVEL EXPECTATION	P6.1	Define (using the unit circle), graph, and use all trigonometric functions of any angle. Convert between radian and degree measure. Calculate arc lengths in given circles. A Tangent Tracer Angles Measured in Degrees and Radians Comparing Sine and Cosine Comparing Sine and Cosine Continued Fraction Approximations of the Tangent Function Doppler Effect Elementary Transcendental Functions and Their Inverses Family of Curves, Tangents, and Intuition Function Explorer 2D

		Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle Inset Plot Magnifier Many Sine Curves Modeling Harmonic Motion Modeling Harmonic Motion Nested Trigonometric Function Plots Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP) Soil Temperature TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 Tetraviews of Elementary Functions The Cosecant Function (GSP) The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated Trigonometric Functions with Four Parameters Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)

GRADE LEVEL EXPECTATION	P6.2	Graph transformations of the sine and cosine functions (involving changes in amplitude, period, midline, and phase) and explain the relationship between constants in the formula and transformed graph. Doppler Effect Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Many Sine Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Sinusoids and Transformations (GSP) Soil Temperature Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 The Cosecant Function (GSP) Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions with Four Parameters Wave Interference

GRADE LEVEL EXPECTATION	P6.3	Know basic properties of the inverse trigonometric functions sin^-1 x, cos^-1 x, tan^-1 x, including their domains and ranges. Recognize their graphs. Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Elementary Transcendental Functions and Their Inverses Evaluate Inverse Trigonometric Functions Function Explorer 2D Functions Illustrating Cosine with the Unit Circle II Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem
GRADE LEVEL EXPECTATION	P6.4	Know the basic trigonometric identities for sine, cosine, and tangent (e.g., the Pythagorean identities, sum and difference formulas, co-functions relationships, double-angle and half-angle formulas). Analytic Trigonometry Analytic Trigonometry Analytic Trigonometry Apply Double-Angle and Half Angle Formulas Apply Sum and Difference Formulas Identities in Calculus Verify Trigonometric Identities
GRADE LEVEL EXPECTATION	P6.5	Solve trigonometric equations using basic identities and inverse trigonometric functions. Composing Trigonometric and Inverse Trigonometric Functions Solve Trigonometric Equations Two Wheel Belt
GRADE LEVEL EXPECTATION	P6.6	Prove trigonometric identities and derive some of the basic ones (e.g., double-angle formula from sum and difference formulas, half-angle formula from double-angle formula, etc.). Analytic Trigonometry Analytic Trigonometry Analytic Trigonometry Apply Double-Angle and Half Angle Formulas Apply Sum and Difference Formulas Identities in Calculus Verify Trigonometric Identities
GRADE LEVEL EXPECTATION	P6.7	Find a sinusoidal function to model a given data set or situation and explain how the parameters of the model A Tangent Tracer

		Comparing Sine and Cosine Comparing Sine and Cosine Doppler Effect Elementary Transcendental Functions and Their Inverses Family of Curves, Tangents, and Intuition Function Explorer 2D Function Transformations Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle Many Sine Curves Modeling Harmonic Motion Modeling Harmonic Motion Nested Trigonometric Function Plots Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP) Soil Temperature Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03

		The Cosecant Function (GSP) Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated Trigonometric Functions with Four Parameters
STRAND / STANDARD CATEGORY	**MI.P.**	**Precalculus**
STANDARD	**P7:**	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	**P7.1**	Perform operations (addition, subtraction, and multiplication by scalars) on vectors in the plane. Solve applied Block on a Frictionless Inclined Plane CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Forces on a Simple Pendulum How to Add and Subtract Vectors How to Add and Subtract Vectors How to Add and Subtract Vectors VECTORS VECTORS Vector Cross Product Vector Cross Product Vector Operations in Three Dimensions
GRADE LEVEL EXPECTATION	**P7.2**	Know and apply the algebraic and geometric definitions of the dot product of vectors. Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Vector Cross Product Vector Cross Product Vector Operations in Three Dimensions

STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P7:	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	P7.3	Know the definitions of matrix addition and multiplication. Add, subtract, and multiply matrices. Multiply a Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Multiplication Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Basic Matrix Operations MATRICES MATRICES MATRICES MATRICES MATRICES MATRICES MATRICES Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P7:	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	P7.5	Define the inverse of a matrix and compute the inverse of two-by-two and three-by-three matrices when they Using Inverse Matrices to solve Linear Systems
GRADE LEVEL EXPECTATION	P7.6	Explain the role of determinants in solving systems of linear equations using matrices and compute determinants of two-by-two and three-by-three matrices. EQUATIONS EQUATIONS Evaluate the Determinant and Apply Cramer's Rule Fitting Polynomial Functions Fitting Polynomial Functions

		Fitting Polynomial Functions Matrices Multivariate Linear Systems and Row Operations PUZSQC40 Using Inverse Matrices to solve Linear Systems

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P7:	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	P7.7	Write systems of two and three linear equations in matrix form. Solve such systems using Gaussian elimination EQUATIONS EQUATIONS Evaluate the Determinant and Apply Cramer's Rule Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Matrices Multivariate Linear Systems and Row Operations PUZSQC40 Using Inverse Matrices to solve Linear Systems
GRADE LEVEL EXPECTATION	P7.8	Represent and solve systems of inequalities in two variables and apply these methods in linear programming Application of Graphing Inequalities Application of Graphing Inequalities Graph of Inequalities Solving Inequalities Using the Number Line
STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P8:	Sequences, Series, and Mathematical Induction
GRADE LEVEL EXPECTATION	P8.1	Know, explain, and use sigma and factorial notation. COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS

		COMBINATIONS COMBINATIONS Combinations and the Binomial Theorem Counting Principle Permutations DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Define and Use Sequences and Series Factorial Find Probabilities Using Permutations and Combinations Mathematical Induction Series: A Few Examples Series: Steps on a Number Line
GRADE LEVEL EXPECTATION	P8.2	Given an arithmetic, geometric, or recursively defined sequence, write an expression for the nth term when possible. Write a particular term of a sequence when given the nth term. And So On Define and Use Sequences and Series EQUATIONS Gifts Galore & Phoning friends Make a Difference Pyramids SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax
GRADE LEVEL EXPECTATION	P8.3	Understand, explain, and use the formulas for the sums of finite arithmetic and geometric sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil

		Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets
GRADE LEVEL EXPECTATION	P8.4	Compute the sums of infinite geometric series. Understand and apply the convergence criterion for geometric A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets
GRADE LEVEL EXPECTATION	P8.5	Understand and explain the principle of mathematical induction and prove statements using mathematical A Visual Proof of Nicomachus' Theorem Discrete Mathematics Mathematical Induction PROOF RADICALS Sum of Three Triangular Numbers
GRADE LEVEL EXPECTATION	P8.6	Prove the binomial theorem using mathematical induction. Show its relationships to Pascal's triangle and to combinations. Use the binomial theorem to find terms in the expansion of a binomial to a power greater than Binomial Theorem

		Binomial Theorem Christmas Stocking Identity Combinations and the Binomial Theorem Cube Conundrum DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Expansion of a Polynomial Pascal's Triangle
STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P9:	Polar Coordinates, Parameterizations, and Conic Sections
GRADE LEVEL EXPECTATION	P9.1	Convert between polar and rectangular coordinates. Graph functions given in polar coordinates. Introduction to Polar Coordinates Introduction to Polar Coordinates Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Polar Coordinates
GRADE LEVEL EXPECTATION	P9.2	Write complex numbers in polar form. Know and use De Moivre's Theorem. De Moivre's Theorem and nth Roots Introduction to Polar Coordinates Introduction to Polar Coordinates Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Polar Coordinates Proving Identities -Disproving Non - Identities

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STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P9:	Polar Coordinates, Parameterizations, and Conic Sections
GRADE LEVEL EXPECTATION	P9.3	Evaluate parametric equations for given values of the parameter. Generalized Arrhenius Function Mbius Monorail

		Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.4	Convert between parametric and rectangular forms of equations. Generalized Arrhenius Function Mbius Monorail Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.5	Graph curves described by parametric equations and find parametric equations for a given graph. Generalized Arrhenius Function Mbius Monorail Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.6	Use parametric equations in applied contexts (e.g., orbits and projectiles) to model situations and solve ' ' Generalized Arrhenius Function Mbius Monorail Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations

		Modeling Linear Motion Using Parametric Equations Parametric Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Relations and Inverse Relations Projectile Motion
GRADE LEVEL EXPECTATION	P9.7	Know, explain, and apply the locus definitions of parabolas, ellipses, and hyperbolas and recognize these conic Application of Parabolas Application of Parabolas Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Sum 17 Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition

		Using Geometry to Create Parabolas by Definition
GRADE LEVEL EXPECTATION	P9.8	Identify parabolas, ellipses, and hyperbolas from equations, write the equations in standard form, and sketch an appropriate graph of the conic section. Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations Interactive Conics
GRADE LEVEL EXPECTATION	P9.9	Derive the equation for a conic section from given geometric information (e.g., find the equation of an ellipse given its two axes). Identify key characteristics (e.g. foci and asymptotes) of a conic section from its equation or graph. Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations Interactive Conics

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S1:	Exploring Univariate and Bivariate Data
GRADE LEVEL EXPECTATION	S1.2	Compute and interpret the within-group and between-group variation when comparing two or more data sets. How Do They Compare Relate
GRADE LEVEL EXPECTATION	S1.3	Compute residuals and use plots of residuals to assess the adequacy of a simple linear regression model. How Do They Compare Relate

GRADE LEVEL EXPECTATION	S1.4	Identify influential points in a bivariate data set and predict and verify the effect of their removal on the least- Interpret Stem and Leaf, Histograms, and Box and Whisker Plots
GRADE LEVEL EXPECTATION	S1.5	When applicable, use logarithmic and power transformations to achieve linearity and use the transformed data Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs
GRADE LEVEL EXPECTATION	S1.6	Explore categorical data via contingency tables, computing and interpreting marginal, joint, and conditional relative frequencies and examining measures of association. C-FREQUENCY
STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S2:	Sampling and Study Design
GRADE LEVEL EXPECTATION	S2.1	Describe the strengths and weaknesses of sampling methods, including simple random sampling, stratified random sampling, convenience sampling, voluntary response, and cluster sampling. Recognize potential Comparing Methods of Data Collection (Easiteach) TABLES D

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S2:	Sampling and Study Design
GRADE LEVEL EXPECTATION	S2.2	Critically assess the validity of conclusions drawn from surveys such as political polls, recognizing possible biases such as size bias and non-response bias and understanding the role of question formulation. Comparing Methods of Data Collection (Easiteach) How Do They Compare Relate TABLES D

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S2:	Sampling and Study Design
GRADE LEVEL EXPECTATION	S2.3	Know and recognize in context the concepts of treatment group, control group, and experimental unit and demonstrate the importance of double-blind protocol, random assignment, experimental unit, and replication. Comparing Methods of Data Collection (Easiteach) TABLES D
GRADE LEVEL EXPECTATION	S2.4	Understand and describe how to implement completely randomized and randomized block designs (including matched-pair designs), recognizing when and how blocking can lower variability. How Do They Compare Relate

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.1	Know the subjective and relative frequency interpretations of probabilities, including an informal Experimental and Theoretical Probability

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.2	Use basic probability rules such as the addition rule, law of total probability, and complement rule to compute Chance It Counting Principle Permutations Find Probabilities of Compound Events Finding Probabilities Disjoint and Overlapping Events PROBABILITY PROBABILITY Sort It

		Two Dice with Histogram What Chance Have I got
GRADE LEVEL EXPECTATION	S3.3	Use Bayes' Theorem to solve conditional probability problems, with emphasis on the interpretation of results. Sort It

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.5	Compute the expected value and standard deviation of discrete random variables and know the effect of a linear transformation of a random variable on its mean and standard deviation. DEVIATION DEVIATION Expectations for Roulette Normal Distributions

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.6	Apply standard discrete distributions, including the binomial, geometric, and hypergeometric. Christmas Stocking Identity Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Normal Distributions

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S3:	Probability Models
GRADE LEVEL EXPECTATION	S3.8	Use tables and technology to determine probabilities and percentiles of normal distributions. How Do They Compare Normal Distributions
GRADE LEVEL EXPECTATION	S3.9	Use simulation methods to answer questions about probability models that are too complex for analytical treatment at this level, e.g., interacting particle system models. Dice Roller & Penny Flipper Forest Fire Simulation Using a Randomized Hexagonal Automaton Leads in Coin Tossing The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S4:	Sampling Distributions
GRADE LEVEL EXPECTATION	S4.1	Given the mean and standard deviation of each random variable in a set of random variables, compute the mean of the sum and, assuming independence, compute the variance and standard deviation of the sum. How Do They Compare Relate
GRADE LEVEL EXPECTATION	S4.6	Compute control limits for commonly used control charts and use these to assess whether a process is out of How Do They Compare Relate

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability

STANDARD	S5:	Point and Interval Estimation
GRADE LEVEL EXPECTATION	S5.1	Compute bias, variance, and mean squared error of estimators of the mean and proportion. Comparing Methods of Data Collection (Easiteach) TABLES D

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.1	Know the terminology and logic of significance testing, including null and alternative hypotheses, p-value, How Do They Compare Relate

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.2	Assuming a normal model and known standard deviation, carry out a significance test for a single mean, with emphasis on understanding the computation and interpretation of the p-value, and compute the power curve How Do They Compare Normal Distributions

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.3	Carry out (large sample) significance tests for one proportion and the difference of two proportions, with emphasis on proper interpretation of results. How Do They Compare Relate

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.6	Assuming a normal model and known standard deviation, compute the sample size necessary to achieve a pre-specified power at a pre-specified value of the population mean. How Do They Compare Normal Distributions

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S6:	Significance Testing
GRADE LEVEL EXPECTATION	S6.7	Demonstrate, in the context of specific studies, the understanding that a result can be statistically significant while of insignificant practical importance and that a failure to reject a null hypothesis may be due to low power and does not necessarily imply the null hypothesis is true. How Do They Compare Relate

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S7:	Inference for Regression
GRADE LEVEL EXPECTATION	S7.1	Know the statistical model for regression, including linearity, normality of errors, and constancy of error variance. Analyzing Predictions (Easiteach) Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points

		Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S7:	Inference for Regression
GRADE LEVEL EXPECTATION	S7.3	Test hypotheses about the slope of a regression line, with emphasis on interpretation of results. Analyzing Predictions (Easiteach) Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression

		Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.S.	Statistics and Probability
STANDARD	S8:	Assessing Assumptions of Statistical Models
GRADE LEVEL EXPECTATION	S8.2	In the context of specific studies, recognize aspects of study design that either support or offer evidence Comparing Methods of Data Collection (Easiteach)
GRADE LEVEL EXPECTATION	S8.3	Demonstrate knowledge of the possible effects of incorrect assumptions (i.e., improperly specified models) on inferential procedures and of the robustness of inferential procedures to departures from specified How Do They Compare Relate

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.1.	Know the different properties that hold in different number systems and recognize that the applicable properties change in the transition from the positive integers to all integers, to the rational numbers, and to

		Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Reason Using Properties from Algebra Subtracting Integers Subtracting Integers Subtracting Integers The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication What is the Meaning of Multiplication

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.2.	Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Identity Elements and Inverses

		Identity Elements and Inverses Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.3.	Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations. Adding Integers Adding Integers Adding Integers Application of Operation Properties Application of Operation Properties Associative Property Commutative Property Identity Elements and Inverses Identity Elements and Inverses Into Multiplying Integers Into Multiplying Integers Into Multiplying Integers Laws Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Negative Numbers - Adding and Subtracting Negative Numbers Software Scale the Wall Solve It Subtracting Integers Subtracting Integers Subtracting Integers

		The Associative Property The Commutative Property The Distributive Property The Distributive Property What is the Meaning of Multiplication What is the Meaning of Multiplication
EXPECTATION	L1.1.4.	Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number by a number less than 0, a number between 0 and 1, and a number greater than 1. EXPONENTS EXPONENTS EXPONENTS EXPONENTS EXPONENTS Fractional Parts of Powers of Rationals INVERSES Into Multiplying Integers Into Multiplying Integers Into Multiplying Integers Negative Exponents and Parentheses Worksheet (1) Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (2) Powerful RADICALS Rules with Negative Exponents Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.5.	Justify numerical relationships. Finding the Inverse of a Function and the Inverse Composition Rule

		Functions and Relations Functions and Relations

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.2.	Representations and Relationships
EXPECTATION	L1.2.2.	Interpret representations that reflect absolute value relationships. Inequalities and Absolute Value Solving Absolute Equations and Inequalities Solving Inequalities Using the Number Line
EXPECTATION	L1.2.4.	Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media. AVERAGE Analyzing Predictions (Easiteach) Box and Whisker C-FREQUENCY COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS DEVIATION DEVIATION DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Determining Line of Fit Determining Line of Fit Determining Line of Fit Functional Geometry Functional Geometry

		Functions in A Triangle Functions in A Triangle Games Galore HISTOGRAMS Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MEAN MOVING AV Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Linear Motion Using Parametric Equations Modeling Two-Variable Data Part 1 Normal Distributions PROBABILITY PROBABILITY Pick and Mix Family QUARTILES QUARTILES QUARTILES QUARTILES Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS TABLES D TABLES D The Circumference Function The Circumference Function The Circumference Function

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers

EXPECTATION	L2.1.2.	Calculate fluently with numerical expressions involving exponents; use the rules of exponents; evaluate numerical expressions involving rational and negative exponents; transition easily between roots and EXPONENTS EXPONENTS EXPONENTS Evaluate nth Roots Get In Lane Order of Operations Order of Operations Order of Operations Positive Exponents and Parentheses Worksheet (1) Switch - Calculations Software

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.4.	Know that the imaginary number i is one of two solutions to x^2 = -1. Game of Buried Treasure Game of Buried Treasure Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers Proving Identities -Disproving Non - Identities

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities

GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.1.	Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables. Balancing Act Part II Changing Formulas Codebreaker 2 - Simplification Software Constructing Simple Arguments (Easiteach) Escape the Cave - Using Letters to Represent Unknown Numbers Software Expression Machine FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Newton's Law of Cooling Reflecting Function Plots Write and Evaluate Expressions Writing and Solving Ratios and Proportions

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.2.	Know the properties of exponents and roots and apply them in algebraic expressions. EXPONENTS EXPONENTS EXPONENTS INDICES A Introduction to Exponents Introduction to Exponents Negative Exponents and Parentheses Worksheet (1)

		Negative Exponents and Parentheses Worksheet (2) Operations with Negative Exponents Worksheet Positive Exponents and Parentheses Worksheet (1) Positive Exponents and Parentheses Worksheet (2) Powerful Roughly the Answer Zero and Negative Exponents Zero and Negative Exponents Zero and Negative Exponents

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.3.	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities. Algebra Quiz Difference of Squares EXPRESSIONS FACTORISE Factoring Binomials Factoring Polynomials Completely Factoring Trinomials Factoring Trinomials Using Algebra Tiles Integer Polynomial Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Operations with Polynomials (division) QUADRATICS QUADRATICS QUADRATICS QUADRATICSx

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.1.	Write equations and inequalities with one or two variables to represent mathematical or applied situations, Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models EQUATIONS Find the Number GRAPHS A Graphing Linear Inequalities Inequalities and Absolute Value Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Line Plot QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically Solving Inequalities Using the Number Line Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A1:	Expressions, Equations, and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.3.	Solve linear and quadratic equations and inequalities including systems of up to three linear equations with three unknowns. Justify steps in the solution, and apply the quadratic formula appropriately. Algebra Quiz Algebraic Solutions to Polynomial Equations Annotated Quadratic Polynomial

		Balancing Act Part II
		Completing the Square
		Complex Conjugates
		Evaluate the Determinant and Apply Cramer's Rule
		Find the Number
		Finding Numbers that satisfy two or more equations
		Finding Numbers that satisfy two or more equations
		Finding Solutions by Undoing Steps
		Finding Solutions by Undoing Steps
		Finding Solutions by Undoing Steps
		Functions
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		Graph of Inequalities
		Graphing Linear Inequalities
		Inequalities and Absolute Value
		Intro to Equations
		Intro to Equations
		Intro to Equations
		Introduction to Equations
		Matrices
		Methods of Solving Linear Systems of Equations and Inequalities
		Methods of Solving Quadratic
		Multivariate Linear Systems and Row Operations
		QUADRATICS
		QUADRATICS
		QUADRATICSx
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		QUADRATICSx
		QUADRATICSx
		Quadratic Formula and the Discriminant
		Real Zeros of Polynomial Functions
		Reviewing Quadratic Roots
		Reviewing Quadratic Roots
		SIMULTANEOUS
		SIMULTANEOUS

		SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS SIMULTANEOUS Solve It Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Solving Inequalities Using the Number Line Solving Inequalities Worksheet (1) Solving Inequalities Worksheet (2) Solving Inequalities Worksheet (3) Solving Inequalities Worksheet (4) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Try Try Try Again Using Inverse Matrices to solve Linear Systems Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations Using the Quadratic Formula an Interpreting the Discriminant
EXPECTATION	A1.2.4.	Solve absolute value equations and inequalities and justify steps in the solution. Inequalities and Absolute Value Solving Absolute Equations and Inequalities Solving Inequalities Using the Number Line
EXPECTATION	A1.2.6.	Solve power equations and equations including radical expressions; justify steps in the solution, and explain End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Intro to Solutions to Equations Intro to Solutions to Equations Introduction to Solutions to Equations Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Simplifying Radical Expressions and Equations
EXPECTATION	A1.2.8.	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable.

		CO-ORD GEOM CO-ORD GEOM Changing Formulas TRANSPOSITION

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1.	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and A Balanced View Composition of Functions Composition of Functions Composition of Functions Defining and Graphing Relations Difference of Squares Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functional Geometry Functional Geometry Functions Functions and Relations Functions and Relations Functions and Relations Functions and Relations Functions in A Triangle Functions in A Triangle Horizontal Line Test, Vertical Line Test How do I look

		Increasing, Decreasing, and Constant Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Inverse Reflection Principle Iterations and functions Iterations and functions Mapping Diagrams Sum of Parts Tilted Squares Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

Michigan Curriculum Standards

Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation and evaluate a function at a value in its domain. FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Reflecting Function Plots Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations.

A Perfect Square
Analyze Arithmetic and Geometric Sequence and Series
And So On
Balancing Act Part II
CO-ORD GEOM
CO-ORD GEOM
CO-ORD GEOM
Changing Formulas
Comparing Linear, Exponential and Quadratic Models
Composition of Functions
Composition of Functions
Composition of Functions
Define and Use Sequences and Series
Domain and Range of Dynagraphs & Cartesian Graphs
Domain and Range of Dynagraphs & Cartesian Graphs
Domain and Range of Dynagraphs & Cartesian Graphs
EQUATIONS
Find the Number
Finding Solutions by Undoing Steps
Finding Solutions by Undoing Steps
Finding Solutions by Undoing Steps
GRAPHS A
GRAPHS A
GRAPHS A
GRAPHS A
GRAPHS A
Gifts Galore & Phoning friends
Graphing
Graphing Linear Inequalities
How Slope is Measured
How Slope is Measured
How do I look
Intro to Equations
Intro to Equations
Intro to Equations
Introducing Functions as Dynagraphs
Introducing Functions as Dynagraphs
Introducing Functions as Dynagraphs
Introduction to Equations
Laws
Modeling Num as Segments & Area
Modeling Num as Segments & Area
Modeling Number as Segments and Areas

		Modeling Two-Variable Data Part 1 Multiplication by Adding Logs Multiplying Binomials Pyramids QUADRATICSx Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Scientific Notation Worksheet (1) Scientific Notation Worksheet (2) Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Solve It Solving One-step, Two Step, And Multi Step equations Sum 17 Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations What Expression Write and Solve Equations and Inequalities
EXPECTATION	A2.1.4.	Recognize that functions may be defined by different expressions over different intervals of their domains; Function Transformations Functions

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.5.	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Geometric Series Coil Geometric Series Coil Geometric Square Root Construction IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series Models of Geometric Series Ratio of Similarity Ratio of Similarity Ratio of Similarity The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets Use Recursive Rules with Sequences and Functions

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.6.	Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and

An Essential Singularity
Complex Zeros and the Fundamental Theorem of Algebra
Continuity
Cubic Equation
Defining the Limit
Defining the Limit
End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem
Exploring Derivatives: Slope of the Secant Line and Average Rate of Change
Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change
Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change
Exploring Derivatives: Slope of the secant line and average rate of change
Filling Bottles
Function Continuity
Function Continuity
Functions
Functions
Functions
Functions
GRAPHS A
GRAPHS A
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GRAPHS A
Graphing Quadratic Equations Using Roots
How do we find a Limit? Left hand/Right hand limits
How doe we find a Limit? (Left hand/Right hand limits)
Increasing, Decreasing, and Constant Functions
Limits of Infinite Sequences
Limits: Finite c, Finite L
Limits: Finite c, Infinite L
Limits: Infinite c, Finite L
Limits: Infinite c, Infinite L
Polynomial Fitter
Polynomial Functions of Higher Degree (degrees greater than 2)
Polynomial Roots
Predicting a Velocity Plot

		Predicting a Velocity Plot QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Rational Functions Real Zeros of Polynomial Functions Reviewing Quadratic Roots Reviewing Quadratic Roots The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.1.7.	Identify and interpret the key features of a function from its graph or its formula(s). Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Filling Bottles Functions Functions Graph Classifier Software Increasing, Decreasing, and Constant Functions Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Predicting a Velocity Plot Predicting a Velocity Plot Rational Functions The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.2.	Apply given transformations to parent functions and represent symbolically. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Derivatives Dilation of Functions Dilation of Functions Dilation of Functions Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game
EXPECTATION	A2.2.3.	Determine whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse . A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule

		Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.3.	Representations of Functions
EXPECTATION	A2.3.2.	Describe the tabular pattern associated with functions having a constant rate of change (linear); or variable And So On Comparing Linear, Exponential and Quadratic Models Filling Bottles Graphing Growth and Decay Functions Inverse Proportion Worksheet (3) Modeling Two-Variable Data Part 2 The Laboratory - Relationship Between Two Variables (Software)

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Grade 12

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.4.	Models of Real-World Situations Using Families of Functions
EXPECTATION	A2.4.1.	Identify the family of function best suited for modeling a given real-world situation.

		Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Modeling Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3
EXPECTATION	A2.4.2.	Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions

		Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.4.3.	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons

		Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
STRAND / STANDARD CATEGORY	**MI.AI.**	**Algebra I**
STANDARD	**A3:**	Families of Functions
GRADE LEVEL EXPECTATION	**A3.1.**	Lines and Linear Functions
EXPECTATION	**A3.1.1.**	Write the symbolic forms of linear functions (standard, point-slope, and slope-intercept) given appropriate CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM

		CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Determine Equation Using y = mx + b Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept GRAPHS A Graphing Absolute Value Functions Graphing Absolute Value Functions Graphing Linear Inequalities Iterations and functions Iterations and functions LINES Line Plot Line up Modeling Two-Variable Data Part 1 Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Circumference Function The Circumference Function The Circumference Function The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns
EXPECTATION	A3.1.2.	Graph lines (including those of the form x = h and y = k) given appropriate information. A Balanced View Comparing Linear, Exponential and Quadratic Models Determine Equation Using y = mx + b

		Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Finding the Inverse of a Function and the Inverse Composition Rule Function Transformations Functions and Relations Functions and Relations Functions and Relations GRAPHS A GRAPHS A Graphing Functions with Four Parameters How do I look Interactive Slope Introduction to Slope - A measure of Steepness Introduction to Slope: A measure of steepness Inverse Reflection Principle Iterations and functions Iterations and functions Polynomial Roots Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.1.	Lines and Linear Functions
EXPECTATION	A3.1.3.	Relate the coefficients in a linear function to the slope and x- and y- intercepts of its graph. Determine Equation Using y = mx + b

		Determine Equation Using y=mx +b Determine Equation Using y=mx +b Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Determining Equation of a Line Using the Slope Intercept Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Interactive Slope Line Plot Polynomial Roots Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach)
EXPECTATION	A3.1.4.	Find an equation of the line parallel or perpendicular to given line, through a given point; understand and use the facts that non-vertical parallel lines have equal slopes, and that non-vertical perpendicular lines have slopes that multiply to give -1 CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form Determining Equation of a Line Using Point Slope Form LINES Line up Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.2.	Exponential and Logarithmic Functions
EXPECTATION	A3.2.1.	Write the symbolic form and sketch the graph of an exponential function given appropriate information. Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.4.	Understand and use the fact that the base of an exponential function determines whether the function increases or decreases and how base affects the rate of growth or decay. Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions involving e Graphing Functions with Four Parameters

		Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Newton's Law of Cooling Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.5.	Relate exponential functions to real phenomena, including half-life and doubling time. Carbon Dating Compound Interest Compound Interests Exploration versus Consumption Exponential Decay Functions involving e Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 PERCENT Semi log Graphs Semi log Graphs Semi log Graphs Semi log Graphs Simple vs Compound Interest Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.AI.**	**Algebra I**
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.3.	Quadratic Functions
EXPECTATION	A3.3.1.	Write the symbolic form and sketch the graph of a quadratic function given appropriate information.

Animated Projectile Motion
Annotated Quadratic Polynomial
Ballistic Trajectories
Comparing Linear, Exponential and Quadratic Models
Exploring Parabolas in Vertex Form
Exploring Parabolas in Vertex Form
Exploring Parabolas in Vertex Form
Function Transformations
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Graph and Solving Quadratic Inequalities
Graphing Functions with Four Parameters
Graphing Quadratic Equations
Graphing Quadratic Equations
Graphing Quadratic Equations Using Roots
How do I look
Methods of Solving Quadratic
Modeling Two-Variable Data Part 2
Parabolas in Factored Form
Parabolas in Factored Form
Parabolas in Factored Form
Parabolas in Standard Form
Parabolas in Standard Form
Parabolas in Standard Form
Polynomial Functions of Higher Degree (degrees greater than 2)
Polynomial Roots
Power Functions and Their Graphs
QUADRATICSx
Quadratic Equation
Quadratic Formula and the Discriminant
Real Zeros of Polynomial Functions
Reflecting Function Plots
Review of Parabolas

		Review of Parabolas Review of Parabolas Reviewing Quadratic Roots Reviewing Quadratic Roots Solving Equations Using Graphs Worksheet (1) Solving Equations Using Graphs Worksheet (2) Sum 17 Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using the Quadratic Formula an Interpreting the Discriminant

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.3.	Quadratic Functions
EXPECTATION	A3.3.2.	Identify the elements of a parabola (vertex, axis of symmetry, direction of opening) given its symbolic form or its graph, and relate these elements to the coefficient(s) of the symbolic form of the function. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Annotated Quadratic Polynomial Dilation of Functions Dilation of Functions Dilation of Functions Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A

		GRAPHS A Graph and Solving Quadratic Inequalities Graphing Functions with Four Parameters Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Parabolas in Factored Form Parabolas in Factored Form Parabolas in Factored Form Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Quadratic Equation Quadratic Practice Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Review of Parabolas Review of Parabolas Review of Parabolas Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.3.	Quadratic Functions
EXPECTATION	A3.3.4.	Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function. GRAPHS A GRAPHS A GRAPHS A GRAPHS A

		Graphing Quadratic Equations Using Roots Polynomial Roots QUADRATICSx QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Reviewing Quadratic Roots Reviewing Quadratic Roots Using the Quadratic Formula an Interpreting the Discriminant

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.4.	Power Functions
EXPECTATION	A3.4.1.	Write the symbolic form and sketch the graph of power functions. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Functions Functions Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.4.	Power Functions
EXPECTATION	A3.4.2.	Express directly and inversely proportional relationships as functions and recognize their characteristics. Direct Proportion Worksheet (2) Finding out about graphs Functional Geometry

		Functional Geometry Functions in A Triangle Functions in A Triangle How do I look Inverse Proportion Worksheet (3) Inverse Square Laws Rates and Ratios Rates and Ratios Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Sense of Proportion The Circumference Function

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.4.	Power Functions
EXPECTATION	A3.4.3.	Analyze the graphs of power functions, noting reflectional or rotational symmetry. End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Exploring Parabolas in Vertex Form Functions Functions Parabolas in Standard Form Parabolas in Standard Form Parabolas in Standard Form Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Review of Parabolas Review of Parabolas Review of Parabolas

STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.5.	Polynomial Functions
EXPECTATION	A3.5.1.	Write the symbolic form and sketch the graph of simple polynomial functions. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.5.	Polynomial Functions
EXPECTATION	A3.5.2.	Understand the effects of degree, leading coefficient, and number of real zeros on the graphs of polynomial Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions

		Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions
EXPECTATION	A3.5.3.	Determine the maximum possible number of zeroes of a polynomial function and understand the relationship between the x-intercepts of the graph and the factored form of the function. Complex Zeros and the Fundamental Theorem of Algebra Cubic Equation End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Evaluating and Graphing Polynomial Functions Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Power Functions and Their Graphs Real Zeros of Polynomial Functions
STRAND / STANDARD CATEGORY	**MI.AI.**	**Algebra I**
STANDARD	S2:	Bivariate Data-Examining Relationships
GRADE LEVEL EXPECTATION	S2.1.	Scatter plots and Correlation
EXPECTATION	S2.1.2.	Given a scatter plot, identify patterns, clusters, and outliers. Recognize no correlation, weak correlation, and Analyzing Predictions (Easiteach) Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV Predicting with Linear Models Randomness in the Digits of Pi Randomness in the Digits of Square Roots

		Relate SCATTERGRAMS

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	S2:	Bivariate Data-Examining Relationships
GRADE LEVEL EXPECTATION	S2.1.	Scatter plots and Correlation
EXPECTATION	S2.1.3.	Estimate and interpret Pearson's correlation coefficient for a scatter plot of a bivariate data set. Recognize that correlation measures the strength of linear association. Analyzing Predictions (Easiteach) Predicting with Linear Models Relate SCATTERGRAMS

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STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	S2:	Bivariate Data-Examining Relationships
GRADE LEVEL EXPECTATION	S2.2.	Linear Regression
EXPECTATION	S2.2.1.	For bivariate data that appear to form a linear pattern, find the least squares regression line by estimating visually and by calculating the equation of the regression line. Interpret the slope of the equation for a regression line. Analyzing Predictions (Easiteach) Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Functional Geometry Functional Geometry

		Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 Predicting with Linear Models SCATTERGRAMS SCATTERGRAMS SCATTERGRAMS Simple Best-Fit Line The Circumference Function The Circumference Function The Circumference Function
EXPECTATION	S2.2.2.	Use the equation of the least squares regression line to make appropriate predictions. Determining Line of Fit Determining Line of Fit Determining Line of Fit Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle Linear Regression Linear Regression Linear Regression Modeling Modeling Two-Variable Data Part 1 Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3 SCATTERGRAMS The Circumference Function The Circumference Function The Circumference Function

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.2.	Representations and Relationships
EXPECTATION	L1.2.1.	Use mathematical symbols to represent quantitative relationships and situations. A Perfect Square Balancing Act Part II Changing Formulas Comparing Linear, Exponential and Quadratic Models Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Domain and Range of Dynagraphs & Cartesian Graphs Find the Number GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Graphing Linear Inequalities Laws Line Plot Multiplication by Adding Logs Multiplying Binomials QUADRATICSx Representing Inverse Variation Graphically Representing Inverse Variation Graphically Solve It Solving One-step, Two Step, And Multi Step equations Write and Solve Equations and Inequalities

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.3.	Counting and Probabilistic Reasoning

EXPECTATION	L1.3.1.	Describe, explain, and apply various counting techniques; relate combinations to Pascal's triangle; know when Binomial Theorem COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS COMBINATIONS Christmas Stocking Identity Combinations and the Binomial Theorem Counting Principle Permutations DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Find Probabilities Using Permutations and Combinations Let's Count On Pascal's Triangle Pick and Mix Family
EXPECTATION	L1.3.2.	Define and interpret commonly used expressions of probability. Experimental and Theoretical Probability

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.3.	Explain the exponential relationship between a number and its base 10 logarithm, and use it to relate rules of logarithms to those of exponents in expressions involving numbers. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Multiplication by Adding Logs Properties of Logarithms

		Solving Logarithmic and Exponential Equations

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.1.	Calculation Using Real and Complex Numbers
EXPECTATION	L2.1.5.	Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers. Complex Conjugates Expansion of a Polynomial Multiplication of Complex Numbers Multiplication of Complex Numbers Multiplication of Complex Numbers Powers of Complex Numbers Powers of Complex Numbers Properties and Operations of Real Numbers
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.2.	Sequences and Iteration
EXPECTATION	L2.2.1.	Find the nth term in arithmetic, geometric, or other simple sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series And So On Area Ratios - Squares Define and Use Sequences and Series EQUATIONS Ford Circles Generating Arithmetic and Geometric Sequences Geometric Series Coil Geometric Series Coil

		Gifts Galore & Phoning friends Haunted House - Generating Terms of a Sequence Software Limits of Infinite Sequences Models of Geometric Series Models of Geometric Series Models of Geometric Series Pyramids SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Use Recursive Rules with Sequences and Functions
EXPECTATION	L2.2.2.	Compute sums of finite arithmetic and geometric sequences. A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Analyze Arithmetic and Geometric Sequence and Series Cantor Set Define and Use Sequences and Series Discrete Mathematics Find Sums of Infinite Geometric Series Geometric Series Geometric Series Coil Geometric Series Coil Mathematical Induction PROGRESSIONS PROGRESSIONS PROGRESSIONS Series: A Few Examples The Cantor Sequence with Bits The Sum of Two Cantor Sets

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation

GRADE LEVEL EXPECTATION	L2.2.	Sequences and Iteration
EXPECTATION	L2.2.3.	Use iterative processes in such examples as computing compound interest or applying approximation A Geometric Series Coil A Geometric Series Staircase A Geometric Series Staircase A Geometric Series Staircase Cantor Set Compound Interest Compound Interests Crafting a Hat Curve Crafting a Hat Curve Exploring Properties of the Sierpinski Gasket Fractal Exploring Properties of the Sierpinski Gasket Fractal Ford Circles Functions involving e Geometric Series Coil Geometric Series Coil Geometric Square Root Construction IFS: Rotation, Translation, and Scaling Introduction to the Logistic Function Introduction to the Logistic Function Iterations and functions Iterations and functions Models of Geometric Series Models of Geometric Series Models of Geometric Series PERCENT Ratio of Similarity Ratio of Similarity Ratio of Similarity Simple vs Compound Interest The Cantor Sequence with Bits The Chaos Game The Chaos Game The Chaos Game The Sum of Two Cantor Sets
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation

GRADE LEVEL EXPECTATION	L2.3.	Measurement Units, Calculations, and Scales
EXPECTATION	L2.3.2.	Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Elementary Transcendental Functions and Their Inverses Exponential Decay Function Explorer 2D Functions Graphing Functions with Four Parameters Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Multiplication by Adding Logs Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	L2:	Calculation, Algorithms, and Estimation
GRADE LEVEL EXPECTATION	L2.4.	Understanding Error
EXPECTATION	L2.4.1.	Determine what degree of accuracy is reasonable for measurements in a given situation; express accuracy through use of significant digits, error tolerance, or percent of error; describe how errors in measurements are magnified by computation; recognize accumulated error in applied situations. BOUNDS BOUNDS BOUNDS Boundaries EXPONENTS How Far is it PERCENT

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II

STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.1.	Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables. Balancing Act Part II Changing Formulas Codebreaker 2 - Simplification Software Constructing Simple Arguments (Easiteach) Escape the Cave - Using Letters to Represent Unknown Numbers Software Expression Machine FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Functions Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Newton's Law of Cooling Reflecting Function Plots Write and Evaluate Expressions Writing and Solving Ratios and Proportions

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.1.	Construction, Interpretation, and Manipulation of Expressions
EXPECTATION	A1.1.4.	Add, subtract, multiply, and simplify polynomials and rational expressions. A Perfect Square Algebra Quiz Binomial Theorem Cube Conundrum Expansion of a Polynomial FRACTIONS A

		FRACTIONS A FRACTIONS A Intro to Multiplication of Binomials Introduction to Multiplication of Binomials Matching Expressions 3 - Expanding Parentheses Software Matching Expressions 4 - Expanding Parentheses Software Matching Expressions Memory 3 - Expanding Parentheses Software Matching Expressions Memory 4 - Expanding Parentheses Software Matrices Modeling Num as Segments & Area Modeling Num as Segments & Area Modeling Number as Segments and Areas Multiplying Binomials Multiplying Binomials Multiplying Binomials Multiplying Binomials Number Pyramids - Algebra Software Operations with Polynomials Operations with Polynomials (addition and subtraction) Operations with Polynomials (division) Operations with Polynomials (multiplication) Polynomial Long Multiplication QUADRATICS Recognizing Quadratics
EXPECTATION	A1.1.6.	Transform exponential and logarithmic expressions into equivalent forms using the properties of exponents and logarithms, including the inverse relationship between exponents and logarithms. Solving Logarithmic and Exponential Equations
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.5.	Solve polynomial equations and equations involving rational expressions and justify steps in the solution. Algebraic Solutions to Polynomial Equations Complex Zeros and the Fundamental Theorem of Algebra Functions Functions Real Zeros of Polynomial Functions

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.7.	Solve exponential and logarithmic equations and justify steps in the solution. Carbon Dating Functions Functions Newton's Law of Cooling Solving Logarithmic and Exponential Equations
EXPECTATION	A1.2.8.	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable, CO-ORD GEOM CO-ORD GEOM Changing Formulas TRANSPOSITION
EXPECTATION	A1.2.9.	Know common formulas and apply appropriately in contextual situations. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CUBITP22 Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons FORMULAE

		Finding Volume of Cylinder and Sphere Finding out about graphs PERCENT Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A1:	Expressions, Equations and Inequalities
GRADE LEVEL EXPECTATION	A1.2.	Solutions of Equations and Inequalities
EXPECTATION	A1.2.10.	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Elementary Transcendental Functions and Their Inverses Evaluate Inverse Trigonometric Functions Function Explorer 2D Functions Illustrating Cosine with the Unit Circle II Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1.	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function, and
		A Balanced View
		Composition of Functions
		Composition of Functions
		Composition of Functions
		Defining and Graphing Relations
		Difference of Squares
		Domain and Range of Dynagraphs & Cartesian Graphs
		Domain and Range of Dynagraphs & Cartesian Graphs
		Domain and Range of Dynagraphs & Cartesian Graphs
		FUNCTIONS
		FUNCTIONS
		FUNCTIONS
		FUNCTIONS
		FUNCTIONS
		Finding the Inverse of a Function and the Inverse Composition Rule
		Functional Geometry
		Functional Geometry
		Functions
		Functions and Relations
		Functions and Relations
		Functions and Relations
		Functions and Relations
		Functions in A Triangle
		Functions in A Triangle
		Horizontal Line Test, Vertical Line Test
		How do I look
		Increasing, Decreasing, and Constant Functions
		Introducing Functions as Dynagraphs
		Introducing Functions as Dynagraphs
		Introducing Functions as Dynagraphs
		Inverse Reflection Principle
		Iterations and functions
		Iterations and functions
		Mapping Diagrams

		Sum of Parts Tilted Squares Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation, and evaluate a function at a value in its domain. FUNCTIONS FUNCTIONS FUNCTIONS FUNCTIONS Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Introducing Functions as Dynagraphs Reflecting Function Plots Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words, and translate among representations. A Perfect Square Analyze Arithmetic and Geometric Sequence and Series And So On Balancing Act Part II CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM

		Changing Formulas
		Comparing Linear, Exponential and Quadratic Models
		Composition of Functions
		Composition of Functions
		Composition of Functions
		Define and Use Sequences and Series
		Domain and Range of Dynagraphs & Cartesian Graphs
		Domain and Range of Dynagraphs & Cartesian Graphs
		Domain and Range of Dynagraphs & Cartesian Graphs
		EQUATIONS
		Find the Number
		Finding Solutions by Undoing Steps
		Finding Solutions by Undoing Steps
		Finding Solutions by Undoing Steps
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		GRAPHS A
		Gifts Galore & Phoning friends
		Graphing
		Graphing Linear Inequalities
		How Slope is Measured
		How Slope is Measured
		How do I look
		Intro to Equations
		Intro to Equations
		Intro to Equations
		Introducing Functions as Dynagraphs
		Introducing Functions as Dynagraphs
		Introducing Functions as Dynagraphs
		Introduction to Equations
		Laws
		Modeling Num as Segments & Area
		Modeling Num as Segments & Area
		Modeling Number as Segments and Areas
		Modeling Two-Variable Data Part 1
		Multiplication by Adding Logs
		Multiplying Binomials
		Pyramids
		QUADRATICSx
		Representing Direct Variation Algebraically and Graphically
		Representing Direct Variation Algebraically and graphically
		Representing Direct Variation Algebraically and graphically

		Representing Inverse Variation Graphically Representing Inverse Variation Graphically SEQPUZ08 SEQPUZ25 SEQUENCES A SEQUENCES A SEQUENCES A SEQUENCES Ax Scientific Notation Worksheet (1) Scientific Notation Worksheet (2) Slope Solutions - Exploring the Slopes of Linear Functions (GSP(R)) Solve It Solving One-step, Two Step, And Multi Step equations Sum 17 Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Transition Between Dynagaphs to Cartesian Graphs Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Dynagaphs to Explore Function Composition Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Points on the Coordinate Plane to Create Patterns Using Rabbit Races to Solve Equations Using Rabbit Races to Solve Equations What Expression Write and Solve Equations and Inequalities
EXPECTATION	A2.1.6.	Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and An Essential Singularity Complex Zeros and the Fundamental Theorem of Algebra Continuity Cubic Equation Defining the Limit Defining the Limit End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Exploring Derivatives: Slope of the Secant Line and Average Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous Rate of Change Exploring Derivatives: Slope of the Tangent and Instantaneous rate of change Exploring Derivatives: Slope of the secant line and average rate of change Filling Bottles Function Continuity

		Function Continuity Functions Functions Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Quadratic Equations Using Roots How do we find a Limit? Left hand/Right hand limits How doe we find a Limit? (Left hand/Right hand limits) Increasing, Decreasing, and Constant Functions Limits of Infinite Sequences Limits: Finite c, Finite L Limits: Finite c, Infinite L Limits: Infinite c, Finite L Limits: Infinite c, Infinite L Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Polynomial Roots Predicting a Velocity Plot Predicting a Velocity Plot QUADRATICSx Quadratic Equation Quadratic Formula and the Discriminant Rational Functions Real Zeros of Polynomial Functions Reviewing Quadratic Roots Reviewing Quadratic Roots The Laboratory - Relationship Between Two Variables (Software) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Using the Concept of a Limit to Define Integral and Derivative of a Function Using the Concept of a Limit to Define Integral and Derivative of a Function Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.1.7.	Identify and interpret the key features of a function from its graph or its formula(s). Cycle Ride Determine Equation Using y = mx + b Determine Equation Using y=mx +b

		Determine Equation Using y=mx +b End Behavior of Polynomial Functions, Zeros of Polynomial Functions, Intermediate Value Theorem Filling Bottles Functions Functions Graph Classifier Software Increasing, Decreasing, and Constant Functions Interactive Slope Polynomial Fitter Polynomial Functions of Higher Degree (degrees greater than 2) Predicting a Velocity Plot Predicting a Velocity Plot Projectile Motion Rational Functions Systems of Equations Worksheet (10) Systems of Equations Worksheet (7) Systems of Equations Worksheet (8) Systems of Equations Worksheet (9) The Laboratory - Relationship Between Two Variables (Software) The Plot Thickens This and That by Graph - Systems of Equations (Easiteach) Using a Graph to Describe your travels for the day Using a Graph to Describe your travels for the day Velocity Visualizing Change - Velocity Zeno's Paradox: Achilles and the Tortoise

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.2.	Apply given transformations to parent functions, and represent symbolically. Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Absolute Value of Functions Related to Reflection Derivatives

		Dilation of Functions Dilation of Functions Dilation of Functions Function Transformations GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Introduction to Translating Functions Reflecting Function Plots Reflection of Functions Reflection of Functions Reflection of Functions Transformation Challenge - Group Game Transformation Challenge - Group Game Transformation Challenge - Group Game
EXPECTATION	A2.2.3.	Recognize whether a function (given in tabular or graphical form) has an inverse, and recognize simple inverse .
		A Balanced View Composition of Functions Composition of Functions Composition of Functions FUNCTIONS FUNCTIONS Finding the Inverse of a Function and the Inverse Composition Rule Functions and Relations Functions and Relations Functions and Relations Functions and Relations Horizontal Line Test, Vertical Line Test Inverse Reflection Principle Inverses of Functions Inverses of Functions Inverses of Functions Mapping Diagrams Parametric Relations and Inverse Relations

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.4.	Models of Real-World Situations Using Families of Functions
EXPECTATION	A2.4.1.	Identify the family of functions best suited for modeling a given real-world situation. Fitting Noisy Data Fitting Polynomial Functions Fitting Polynomial Functions Fitting Polynomial Functions Fitting a Curve to Five Points Modeling Modeling Two-Variable Data Part 2 Modeling Two-Variable Data Part 3
EXPECTATION	A2.4.2.	Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere

		Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
EXPECTATION	A2.4.3.	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. A Rectangle with Maximum Area A Rectangle with Maximum Area AREA AREA AREA AREA AREA BOUNDS BOUNDS CIRCLESX CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM

		Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Cylinder Hemisphere Cone Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Distance between 2 points FORMULAE Finding Volume of Cylinder and Sphere Finding out about graphs Functions Methods of Solving Quadratic PERCENT QUADRATICSx QUADRATICSx Quadratic Formula and the Discriminant Real Zeros of Polynomial Functions Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Representing Inverse Variation Graphically Representing Inverse Variation Graphically Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones Triangle Area and Perimeters Triangle Area and Perimeters Using the Quadratic Formula an Interpreting the Discriminant VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones Write and Evaluate Expressions Writing and Solving Ratios and Proportions Zeno's Paradox: Achilles and the Tortoise
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	**A3:**	Families of Functions

GRADE LEVEL EXPECTATION	A3.2.	Exponential and Logarithmic Functions
EXPECTATION	A3.2.2.	Interpret the symbolic forms and recognize the graphs of exponential and logarithmic functions. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations
EXPECTATION	A3.2.3.	Apply properties of exponential and logarithmic functions. A Sequence Approach to Logs A Sequence Approach to Logs A Sequence Approach to Logs Carbon Dating Comparing Linear, Exponential and Quadratic Models Elementary Transcendental Functions and Their Inverses Exploration versus Consumption Exponential Decay Function Explorer 2D Function Transformations Functions Functions

		Graphing Functions with Four Parameters Graphing Growth and Decay Functions Introduction to the Logistic Function Introduction to the Logistic Function Lily Pond Modeling Two-Variable Data Part 3 Multiplication by Adding Logs Newton's Law of Cooling Slopes of Exponential Functions Slopes of Exponential Functions Slopes of Exponential Functions Solving Logarithmic and Exponential Equations

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A3:	Families of Functions
GRADE LEVEL EXPECTATION	A3.6.	Rational Functions
EXPECTATION	A3.6.1.	Write the symbolic form and sketch the graph of simple rational functions. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically
EXPECTATION	A3.6.2.	Analyze graphs of simple rational functions and understand the relationship between the zeros of the numerator and denominator, and the function's intercepts, asymptotes, and domain. Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A

		Rational Functions Representing Inverse Variation Graphically Representing Inverse Variation Graphically
STRAND / STANDARD CATEGORY	**MI.AII.**	**Algebra II**
STANDARD	**A3:**	Families of Functions
GRADE LEVEL EXPECTATION	**A3.7.**	Trigonometric Functions
EXPECTATION	**A3.7.1.**	Use the unit circle to define sine and cosine; approximate values of sine and cosine; use sine and cosine to define the remaining trigonometric functions; explain why the trigonometric functions are periodic. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
EXPECTATION	**A3.7.2.**	Use the relationship between degree and radian measures to solve problems. Angles Measured in Degrees and Radians
EXPECTATION	**A3.7.3.**	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of pi/6 and pi/4. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle

		Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)
EXPECTATION	A3.7.4.	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine Continued Fraction Approximations of the Tangent Function Doppler Effect Elementary Transcendental Functions and Their Inverses Family of Curves, Tangents, and Intuition Function Explorer 2D Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle

		Inset Plot Magnifier Many Sine Curves Modeling Harmonic Motion Modeling Harmonic Motion Nested Trigonometric Function Plots Rational Harmonics Sinusoidal Spirals Sinusoids and Transformations (GSP) Soil Temperature TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 Tetraviews of Elementary Functions The Cosecant Function (GSP) The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions Illustrated Trigonometric Functions with Four Parameters
EXPECTATION	A3.7.5.	Graph transformations of basic trigonometric functions (involving changes in period, amplitude, phase, and midline) and understand the relationship between constants in the formula and the transformed graph. Doppler Effect Function Transformations Functions Functions GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A GRAPHS A Graphing Functions with Four Parameters Harmonic Oscillation Many Sine Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves Parametric Functions, Plotting Curves

		Plotting Functions in Both Cartesian and Polar Coordinate Systems Plotting Functions in Both Cartesian and Polar Coordinate Systems Products of Sinusoidal Functions Products of Sinusoidal Functions Products of Sinusoidal Functions Sinusoids and Transformations (GSP) Soil Temperature Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions Sums of Sinusoidal Functions TRIGONOMETRY TRIGONOMETRY TRIGPCS01 TRIGPCS03 The Cosecant Function (GSP) Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Translate and Reflect Trigonometric Graphs Trigonometric Functions with Four Parameters Wave Interference

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.7.	Conic Sections and Their Properties
EXPECTATION	G1.7.1.	Find an equation of a circle given its center and radius; given the equation of a circle, find its center and Conic Sections - Writing Equations of Circles Defining and Graphing Relations
EXPECTATION	G1.7.2.	Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones. Application of Parabolas Application of Parabolas

		Circles and Ellipses Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Conic Sections: The Double Cone Defining and Graphing Relations Drawing an Ellipse Using Circles and Lines Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty Hyperbola Hyperbola Hyperbola Interactive Conics Parabola Parabola Parabola Parabola Parabolic Envelope from Congruent Triangles Some Ellipse Relationships Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition Using Geometry to Create Parabolas by Definition
EXPECTATION	**G1.7.3** .	Graph ellipses and hyperbolas with axes parallel to the x- and y-axes, given equations. Conic Section Curves Conic Sections - Writing Equations of Circles Conic Sections - Writing Equations of Ellipses Conic Sections - Writing Equations of Hyperbolas Conic Sections: Move Foci Conic Sections: Polar Equations Defining and Graphing Relations

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.1.	Producing and Interpreting Plots
EXPECTATION	S1.1.1.	Construct and interpret dot plots, histograms, relative frequency histograms, bar graphs, basic control charts, and box plots with appropriate labels and scales; determine which kinds of plots are appropriate for different types of data; compare data sets and interpret differences based on graphs and summary statistics. Assumptions Box and Whisker HISTOGRAMS How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Relate
EXPECTATION	S1.1.2.	Given a distribution of a variable in a data set, describe its shape, including symmetry or skewness, and state how the shape is related to measures of center (mean and median) and measures of variation (range and standard deviation) with particular attention to the effects of outliers on these measures. Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION How Do They Compare Normal Distributions
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.2.	Measures of Center and Variation
EXPECTATION	S1.2.1.	Calculate and interpret measures of center including: mean, median, and mode; explain uses, advantages and disadvantages of each measure given a particular set of data and its context. AVERAGE Assumptions Box and Whisker C-FREQUENCY DEVIATION DEVIATION

		How Do They Compare Interpret Stem and Leaf, Histograms, and Box and Whisker Plots MOVING AV QUARTILES QUARTILES QUARTILES QUARTILES TABLES D Use Measures of Central Tendency

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.2.	Measures of Center and Variation
EXPECTATION	S1.2.3.	Compute and interpret measures of variation, including percentiles, quartiles, interquartile range, variance, Box and Whisker C-FREQUENCY DEVIATION DEVIATION Interpret Stem and Leaf, Histograms, and Box and Whisker Plots Normal Distributions QUARTILES QUARTILES QUARTILES QUARTILES TABLES D

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Mathematics

Grade 12

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions

GRADE LEVEL EXPECTATION	S1.3.	The Normal Distribution
EXPECTATION	S1.3.1.	Explain the concept of distribution and the relationship between summary statistics for a data set and Construct and Interpret Binomial Distribution DISTRIBUTION DISTRIBUTION DISTRIBUTION DISTRIBUTION Normal Distributions

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.3.	The Normal Distribution
EXPECTATION	S1.3.2.	Describe characteristics of the normal distribution, including its shape and the relationships among its mean, How Do They Compare Normal Distributions
EXPECTATION	S1.3.3.	Know and use the fact that about 68%, 95%, and 99.7% of the data lie within one, two, and three standard deviations of the mean, respectively in a normal distribution. How Do They Compare Normal Distributions

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S1:	Univariate Data-Examining Distributions
GRADE LEVEL EXPECTATION	S1.3.	The Normal Distribution
EXPECTATION	S1.3.4.	Calculate z-scores, use z-scores to recognize outliers, and use z-scores to make informed decisions.

		Normal Distributions
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S3:	Samples, Surveys and Experiments
GRADE LEVEL EXPECTATION	S3.1.	Data Collection and Analysis
EXPECTATION	S3.1.1.	Know the meanings of a sample from a population and a census of a population, and distinguish between Comparing Methods of Data Collection (Easiteach) TABLES D

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S3:	Samples, Surveys and Experiments
GRADE LEVEL EXPECTATION	S3.1.	Data Collection and Analysis
EXPECTATION	S3.1.2.	Identify possible sources of bias in data collection, sampling methods and simple experiments; describe how such bias can be reduced and controlled by random sampling; explain the impact of such bias on conclusions made from analysis of the data; and know the effect of replication on the precision of estimates. Comparing Methods of Data Collection (Easiteach) TABLES D

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Grade 12

STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S3:	Samples, Surveys and Experiments
GRADE LEVEL EXPECTATION	S3.1.	Data Collection and Analysis
EXPECTATION	S3.1.3.	Distinguish between an observational study and an experimental study, and identify, in context, the Determining Line of Fit Determining Line of Fit

		Determining Line of Fit Functional Geometry Functional Geometry Functions in A Triangle Functions in A Triangle The Circumference Function The Circumference Function The Circumference Function
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations
GRADE LEVEL EXPECTATION	S4.1.	Probability
EXPECTATION	S4.1.1.	Understand and construct sample spaces in simple situations Find Probabilities Using Permutations and Combinations Fractions Are Fun Sort It

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations
GRADE LEVEL EXPECTATION	S4.1.	Probability
EXPECTATION	S4.1.2.	Define mutually exclusive events, independent events, dependent events, compound events, complementary events, and conditional probabilities; and use the definitions to compute probabilities. Chance It Construct and Interpret Binomial Distribution Counting Principle Permutations Dice Roller & Penny Flipper Find Probabilities and Odds Find Probabilities of Compound Events Finding Probabilities Disjoint and Overlapping Events Finding Probability of Independent and Dependent Events Leads in Coin Tossing PROBABILITY

		PROBABILITY Sort It The Birthday Problem Two Dice with Histogram What Chance Have I got
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations
GRADE LEVEL EXPECTATION	S4.2.	Application and Representation
EXPECTATION	S4.2.1.	Compute probabilities of events using tree diagrams, formulas for combinations and permutations, Venn Adds to One Construct and Interpret Binomial Distribution Dice Roller & Penny Flipper Expectations for Roulette Find Probabilities and Odds Leads in Coin Tossing PROBABILITY PROBABILITY The Birthday Problem Two Dice with Histogram What is the Probability? What is the Probability?

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STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	S4:	Probability Models and Calculations
GRADE LEVEL EXPECTATION	S4.2.	Application and Representation
EXPECTATION	S4.2.2.	Apply probability concepts to practical situations, in such settings as finance, health, ecology, or epidemiology Assumptions

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.1.	Number Systems and Number Sense
EXPECTATION	L1.1.6.	Explain the importance of the irrational numbers square root of 2 an square root of 3 in basic right triangle trigonometry, and the importance of pi because of its role in circle relationships. ANGLE04PZDH ANGLE04ZDH Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle The 30-60 Right Triangle The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem

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Grade 12

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L1:	Reasoning About Numbers, Systems, and Quantitative Situations
GRADE LEVEL EXPECTATION	L1.2.	Representations and Relationships
EXPECTATION	L1.2.3.	Use vectors to represent quantities that have magnitude and direction, interpret direction and magnitude of a vector numerically, and calculate the sum and difference of two vectors. Block on a Frictionless Inclined Plane CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Exploring Vector Projections and Dot Product Exploring vector projections & dot product Exploring vector projections & dot product Forces on a Simple Pendulum How to Add and Subtract Vectors How to Add and Subtract Vectors How to Add and Subtract Vectors Introduction to Vectors Introduction to Vectors Introduction to Vectors VECTORS VECTORS Vector Cross Product Vector Cross Product Vector Operations in Three Dimensions Vector Projections

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L2:	Calculation, Algorithms, and Estimation

GRADE LEVEL EXPECTATION	L2.3.	Measurement Units, Calculations, and Scales
EXPECTATION	L2.3.1.	Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly. Volume of Prisms and Cylinders

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof
GRADE LEVEL EXPECTATION	L3.1.	Mathematical Reasoning
EXPECTATION	L3.1.1.	Distinguish between inductive and deductive reasoning, identifying and providing examples of each. Appling Deductive Reasoning Boundaries Critical Thinking - Dividing Land Critical Thinking - Dividing Land Cube Conundrum Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Short cut to Finding Areas of dot-paper polygons Short cut to finding areas of dot-paper polygons Tilted Squares Triangle Proofs Using Inductive Reasoning
EXPECTATION	L3.1.2.	Differentiate between statistical arguments (statements verified empirically using examples or data) and logical arguments based on the rules of logic. Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)

EXPECTATION	L3.1.3.	Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics. Identify and give examples of each. An IMO Triangle Problem Analyze Conditional Statements Appling Deductive Reasoning Coordinate Proof Coordinate Proof Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euler Line Game of Buried Treasure Game of Buried Treasure Lines and Angles Parallel and Perpendicular Line Proofs Polygon Proof - Interior Angle Sums of Polygons (GSP) Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Thales' Theorem Triangle Proofs Triangle Review - Interior and Exterior Angles (GSP) Using Postulates and Diagrams

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Mathematics

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof
GRADE LEVEL EXPECTATION	L3.2.	Language and Laws of Logic
EXPECTATION	L3.2.1.	Know and use the terms of basic logic. An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs

		Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams
EXPECTATION	L3.2.2.	Use the connectives "not," "and," "or," and "if..., then," in mathematical and everyday settings. Know the truth table of each connective and how to logically negate statements involving these connectives. Analyze Conditional Statements Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs
EXPECTATION	L3.2.3.	Use the quantifiers "there exists" and "all" in mathematical and everyday settings and know how to logically An IMO Triangle Problem Appling Deductive Reasoning Euler Line Parallel and Perpendicular Line Proofs Prove Angle Pair Relationships Prove Statements about Segments and Angles Reason Using Properties from Algebra Setting up Proofs - Given, Prove, Statement, Reason Triangle Proofs Using Inductive Reasoning Using Postulates and Diagrams
EXPECTATION	L3.2.4.	Write the converse, inverse, and contrapositive of an "If..., then..." statement. Use the fact, in mathematical and everyday settings, that the contrapositive is logically equivalent to the original while the inverse and Parallel Lines in a Triangle Parallel Lines in a Triangle Parallel and Perpendicular Line Proofs

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	L3:	Mathematical Reasoning, Logic, and Proof

GRADE LEVEL EXPECTATION	L3.3.	Proof
EXPECTATION	L3.3.1.	Know the basic structure for the proof of an "If..., then..." statement (assuming the hypothesis and ending with the conclusion) and that proving the contrapositive is equivalent. Analyze Conditional Statements
EXPECTATION	L3.3.2.	Construct proofs by contradiction. Use counter-examples, when appropriate, to disprove a statement. Tilted Squares
EXPECTATION	L3.3.3.	Explain the difference between a necessary and a sufficient condition within the statement of a theorem. Determine the correct conclusions based on interpreting a theorem in which necessary or sufficient conditions Finding Volume of Cylinder and Sphere Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Inside Space Transform - Combined Transformations (GSP)
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.1.	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.1.	Solve multistep problems and construct proofs involving vertical angles, linear pairs of angles, supplementary angles, complementary angles, and right angles. Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet Circle Geometry Worksheet Golden Ratio 1 Line up Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP) Types of Angles
EXPECTATION	G1.1.2.	Solve multistep problems and construct proofs involving corresponding angles, alternate interior angles, alternate exterior angles, and same-side (consecutive) interior angles. Animation of Angle Properties - Angles on a Straight Line and in Triangles Software

		Pantograph Linkage Parallel and Perpendicular Line Proofs Properties of Parallel Lines Properties of Parallel Lines

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Grade 12

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.1.	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.3.	Perform and justify constructions, including midpoint of a line segment and bisector of an angle, using A Rectangle with Maximum Area A Rectangle with Maximum Area A Triangle Area Problem A Triangle Area Problem Accurate Constructions - Animations Software Advanced Construction Napolean's Theorem Advanced Construction Napolean's Theorem Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Application of Parabolas Application of Parabolas Compass Animations - Constructions Using Straight Edge and Compasses Software Compass Animations Software Constructing Templates for the Platonic Solids Constructing Templates for the Platonic Solids Constructing Templates for the Platonic Solids Creating Complex Design's Creating Complex Design's Ellipse Ellipse Projects Ellipse Projects Ellipse Projects Ellipse Projects Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellipse- Check for understanging the definition Ellispse -Eccentricty

		Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exploring the Euler Segment Exploring the Euler Segment Functions in A Triangle Functions in A Triangle Hyperbola Hyperbola Hyperbola Lines and Angles Morley's Triangle - Application of Angle Trisection Morley's Triangle - Application of Angle Trisection Off at a Tangent - Exploring the Tangent to a Circle (GSP) Parabola Parabola Parabola Parabola Properties of Parallel Lines Properties of Parallel Lines Reflecting Without the Reflect Command: The Algebra of Reflection Reflecting Without the Reflect Command: The Algebra of Reflection Some Ellipse Relationships Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals Trisecting an Angle Trisecting an Angle Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular Using the Equilateral Triangle - Surfer & Spotter Using the Equilateral Triangle - Surfer & Spotter
EXPECTATION	G1.1.4.	Given a line and a point, construct a line through the point that is parallel to the original line using straightedge and compass. Given a line and a point, construct a line through the point that is perpendicular to Accurate Constructions - Animations Software Compass Animations - Constructions Using Straight Edge and Compasses Software Off at a Tangent - Exploring the Tangent to a Circle (GSP) Properties of Parallel Lines Properties of Parallel Lines Using Slope to Determine if Lines are Parallel or Perpendicular Using Slope to Determine if lines are Parallel or Perpendicular
EXPECTATION	G1.1.5.	Given a line segment in terms of its endpoints in the coordinate plane, determine its length and midpoint.

		Determining the Origin Determining the Origin AREA AREA AREA CO-ORD GEOM CO-ORD GEOM CO-ORD GEOM Cycle Ride Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Determining the Origin Distance between 2 points Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.1.	Lines and Angles; Basic Euclidean and Coordinate Geometry
EXPECTATION	G1.1.6.	Recognize Euclidean geometry as an axiom system. Know the key axioms and understand the meaning of and distinguish between undefined terms, axioms, definitions, and theorems. Lines and Angles Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Prove Angle Pair Relationships Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Thales' Theorem Using Postulates and Diagrams
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties

EXPECTATION	G1.2.1.	Prove that the angle sum of a triangle is 180 degrees and that an exterior angle of a triangle is the sum of the ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software Calculating Angles in Polygons Worksheet Calculating Exterior Angles of Triangles Worksheet Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles Polygon Problems - Exterior Angles of Polygons (GSP) Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Triangle Review - Interior and Exterior Angles (GSP)

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties
EXPECTATION	G1.2.2.	Construct and justify arguments and solve multistep problems involving angle measure, side length, perimeter, ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA AREA AREA Animation of Angle Properties - Angles on a Straight Line and in Triangles Software

		CIRCLES CIRCLESX Calculating Angles in Polygons Worksheet Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Euclid's Proposition 1 - Equilateral Triangles Euclid's Proposition 1 - Equilateral Triangles Exterior and Interior Angles of Regular Polygons Worksheet Find the Number Golden Ratio 1 Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Oriented Triangle Angles PERCENT Polygon Proof - Interior Angle Sums of Polygons (GSP) Polytiles Software Prove It - Distinguishing Between Practical Demonstration and Proof (GSP) Related Rates: Triangle Angle and Area TRIGONOMETRY Tilted Squares Triangle Area and Perimeters Triangle Area and Perimeters Write and Evaluate Expressions
EXPECTATION	G1.2.3	Know a proof of the Pythagorean Theorem, and use the Pythagorean Theorem and its converse to solve multi-
		Coordinate Proof Coordinate Proof Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Divide and Rule - Dividing Line Segments in a Given Ratio (GSP). Pythagorean Theorem Pythagorean Theorem 3D Pythagorean Triples Round the Bend Sum of Parts TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3)

		The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4) The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties
EXPECTATION	G1.2.4.	Prove and use the relationships among the side lengths and the angles of 30 degree - 60 degree - 90 degrees triangles and 45 degree - 45 degree - 90 degree triangles. ANGLE04PZDH ANGLE04ZDH The 30-60 Right Triangle The 30-60 Right Triangle

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.2.	Triangles and Their Properties
EXPECTATION	G1.2.5.	Solve multistep problems and construct proofs about the properties of medians, altitudes and perpendicular bisectors to the sides of a triangle, and the angle bisectors of a triangle. Using a straightedge and compass, Advanced Construction Napolean's Theorem Advanced Construction Napolean's Theorem An IMO Triangle Problem Euler Line Exploring the Euler Segment Exploring the Euler Segment

		Investigating the Properties of Excircles of a Triangle Investigating the Properties of Excircles of a Triangle Morley's Triangle - Application of Angle Trisection Morley's Triangle - Application of Angle Trisection Triangle Inequalities Triangle Inequalities Using the Equilateral Triangle - Surfer & Spotter Using the Equilateral Triangle - Surfer & Spotter
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.3.	Triangles and Trigonometry
EXPECTATION	G1.3.1.	Define the sine, cosine, and tangent of acute angles in a right triangle as ratios of sides. Solve problems about angles, side lengths, or areas using trigonometric ratios in right triangles. ANGLE04PZDH ANGLE04ZDH Calculating the Path of a Point on a Sliding Ladder Composing Trigonometric and Inverse Trigonometric Functions Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Demonstrating and Use of the Pythagorean Theorem Difference of Squares Distance between 2 points Functions How Far Can One See from a Height? SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The 30-60 Right Triangle The 30-60 Right Triangle The Pythagorean Theorem - 2D Problems Worksheet (2) The Pythagorean Theorem - 2D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (1) The Pythagorean Theorem - 3D Problems Worksheet (2) The Pythagorean Theorem - 3D Problems Worksheet (3) The Pythagorean Theorem - 3D Problems Worksheet (4)

		The Pythagorean Theorem - Finding the 3rd Side Worksheet The Pythagorean Theorem - Finding the Third Side Worksheet (3) Tilted Squares Trigonometric Ratios Trigonometric Ratios Using Trigonometry to Solve a Real Time Problem Using Trigonometry to Solve a Real Time Problem

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.3.	Triangles and Trigonometry
EXPECTATION	G1.3.2.	Know and use the Law of Sines and the Law of Cosines and use them to solve problems. Find the area of a triangle with sides a and b and included angle theta using the formula Area = (1/2) absin theta. ANGLE04RA ANGLE04RB ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA CIRCLES CIRCLESX Law of Cosines Law of Sines Related Rates: Triangle Angle and Area TRIGONOMETRY TRIGONOMETRY The Law of Cosines The Law of Cosines The Law of Sines The Law of Sines
EXPECTATION	G1.3.3.	Determine the exact values of sine, cosine, and tangent for 0 degrees, 30 degrees, 45 degrees, 60 degrees, and their integer multiples and apply in various contexts. A Tangent Tracer Comparing Sine and Cosine Comparing Sine and Cosine

		Composing Trigonometric and Inverse Trigonometric Functions Continued Fraction Approximations of the Tangent Function How Far Can One See from a Height? Illustrating Cosecant with the Unit Circle Illustrating Cosine with the Unit Circle Illustrating Cosine with the Unit Circle II Illustrating Cotangent with the Unit Circle Illustrating Secant with the Unit Circle Illustrating Sine with the Unit Circle Illustrating Tangent with the Unit Circle Illustrating Trigonometric Curves with the Unit Circle SOHCAHTOA Triangle TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY TRIGONOMETRY The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions The Unit Circle and the Six Circular Functions Transformation of Circular Functions Transformation of Circular Functions Transformations of Circular Functions Trigonometric Functions Illustrated Trigonometric Ratios Trigonometric Ratios Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP)

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.4.	Quadrilaterals and Their Properties
EXPECTATION	G1.4.1.	Solve multistep problems and construct proofs involving angle measure, side length, diagonal length, perimeter, and area of squares, rectangles, parallelograms, kites, and trapezoids. A Rectangle with Maximum Area A Rectangle with Maximum Area

		AREA AREA Area Review BOUNDS Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Exterior and Interior Angles of Regular Polygons Worksheet Representing Direct Variation Algebraically and Graphically Representing Direct Variation Algebraically and graphically Representing Direct Variation Algebraically and graphically Tilted Squares Write and Evaluate Expressions

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Mathematics

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.4.	Quadrilaterals and Their Properties
EXPECTATION	G1.4.2.	Solve multistep problems and construct proofs involving quadrilaterals using Euclidean methods or coordinate Coordinate Proof Coordinate Proof
EXPECTATION	G1.4.3.	Describe and justify hierarchical relationships among quadrilaterals. Analyze Conditional Statements Golden Ratio 1 Special Midpoint Quadrilaterals Special Midpoint Quadrilaterals Summarizing Properties of Quadrilaterals Summarizing Properties of Quadrilaterals
EXPECTATION	G1.4.4.	Prove theorems about the interior and exterior angle sums of a quadrilateral. ANGLE04XAA ANGLE04XAH ANGLE04XAHB ANGLE04ZDA Calculating Angles in Polygons Worksheet

		Calculating Exterior Angles of Triangles Worksheet Exterior and Interior Angles of Regular Polygons Worksheet Interior & Exterior Angles Interior and Exterior Angles of a Triangle (GSP) Polygon Problems - Exterior Angles of Polygons (GSP) Triangle Review - Interior and Exterior Angles (GSP)
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.5.	Other Polygons and Their Properties
EXPECTATION	G1.5.1.	Know and use subdivision or circumscription methods to find areas of polygons. Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Pick's Theorem

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.5.	Other Polygons and Their Properties
EXPECTATION	G1.5.2.	Know, justify, and use formulas for the perimeter and area of a regular n-gon and formulas to find interior and exterior angles of a regular n-gon and their sums. Calculating Angles in Polygons Worksheet Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Exterior and Interior Angles of Regular Polygons Worksheet Golden Ratio 1 Interior & Exterior Angles Polygon Proof - Interior Angle Sums of Polygons (GSP)

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.6.	Circles and Their Properties
EXPECTATION	G1.6.1.	Solve multistep problems involving circumference and area of circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) Arc Resolution Area of a Circle from Segments CIRCLESX Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons Finding Volume of Cylinder and Sphere Introduction to Radians Introduction to Radians Introduction to Radians Keeping on Track Length of a Coiled Rope The Circumference Function The Circumference Function The Circumference Function The Cycloid The Cycloid Two Wheel Belt What's my surface? Write and Evaluate Expressions
EXPECTATION	G1.6.2.	Solve problems and justify arguments about chords and lines tangent to circles. ANGLE ANGLE ANGLE Ford Circles Hyperbola Hyperbola Hyperbola Inscribed Angle Subtended Chord Intersecting Circles Off at a Tangent - Exploring the Tangent to a Circle (GSP) Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP)

		Thales' Theorem The Statue of Regiomontanus Two Wheel Belt
EXPECTATION	G1.6.3.	Solve problems and justify arguments about central angles, inscribed angles, and triangles in circles. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) ANGLE ANGLE ANGLE ANGLE Circle Geometry Worksheet Inscribed Angle Subtended Chord Properties of Circles Part 2 (GSP) Thales' Theorem
EXPECTATION	G1.6.4.	Know and use properties of arcs and sectors, and find lengths of arcs and areas of sectors. A Slice of the Action - Lengths of Arcs and Areas of Sectors of Circles (GSP) Arc Resolution CIRCLES CIRCLESX CIRCLESX Circle Geometry Worksheet Properties of Circles Part 1 (GSP) Properties of Circles Part 2 (GSP) Thales' Theorem

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.8.	Three-dimensional Figures
EXPECTATION	G1.8.1.	Solve multistep problems involving surface area and volume of pyramids, prisms, cones, cylinders, AREA AREA BOUNDS Cylinder Hemisphere Cone

		FORMULAE Finding Volume of Cylinder and Sphere Missing Surface Area and Volumes of Spheres Surface Area of Prisms and Cylinders Surface Area of Pyramids and Cones VOLUME 3D VOLUME 3D VOLUME 3D VOLUME 3D Volume of Prisms and Cylinders Volume of Pyramids and Cones What's my surface?

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G2:	Relationships Between Figures
GRADE LEVEL EXPECTATION	G2.1.	Relationships Between Area and Volume Formulas
EXPECTATION	G2.1.1.	Know and demonstrate the relationships between the area formula of a triangle, the area formula of a parallelogram, and the area formula of a trapezoid. Area of a Circle from Segments Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons
EXPECTATION	G2.1.2.	Know and demonstrate the relationships between the area formulas of various quadrilaterals. Area of a Circle from Segments Critical Thinking - Application of Area Formulas Critical Thinking - Application of Area Formulas Derivation of Area of Circle Using Polygons Derivation of Area of Circle using Polygons
STRAND / STANDARD CATEGORY	MI.G.	Geometry

STANDARD	G2:	Relationships Between Figures
GRADE LEVEL EXPECTATION	G2.2.	Relationships Between Two-dimensional and Three-dimensional Representations
EXPECTATION	G2.2.1.	Identify or sketch a possible three-dimensional figure, given two-dimensional views. Create a two-dimensional representation of a three-dimensional figure. 3-D Shape Explorer - Surface Area of Rectangular Prisms Software 3D Shape Builder Software
EXPECTATION	G2.2.2.	Identify or sketch cross sections of three-dimensional figures. Identify or sketch solids formed by revolving two- 3-D Shape Explorer - Surface Area of Rectangular Prisms Software Which Model
STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G2:	Relationships Between Figures
GRADE LEVEL EXPECTATION	G2.3.	Congruence and Similarity
EXPECTATION	G2.3.1.	Prove that triangles are congruent using the SSS, SAS, ASA, and AAS criteria and that right triangles are congruent using the hypotenuse-leg criterion. Appling Deductive Reasoning CONGRUENCE Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.2.	Use theorems about congruent triangles to prove additional theorems and solve problems, with and without Appling Deductive Reasoning CONGRUENCE Congruent Conditions - Establishing the Congruence of Triangles (GSP) Setting up Proofs - Given, Prove, Statement, Reason Triangle Congruence Triangle Congruence Triangle Proofs
EXPECTATION	G2.3.3.	Prove that triangles are similar by using SSS, SAS, and AA conditions for similarity.

		Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.4.	Use theorems about similar triangles to solve problems with and without use of coordinates. Similar Triangles - AA Similarity Similar Triangles - AA Similarity Similar Triangles - SSS, SAS, SSA Similar Triangles - SSS, SAS, SSA
EXPECTATION	G2.3.5.	Know and apply the theorem stating that the effect of a scale factor of k relating one two-dimensional figure to another or one three-dimensional figure to another, on the length, area, and volume of the figures, is to multiply each by k, k^2, and k^3, respectively. AREA AREA Area and Volume of Similar Shapes Worksheet (2). Area and Volume of Similar Shapes Worksheet (1). Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Cube Conundrum Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle Surface Area and Volumes of Spheres Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) What is the Meaning of Multiplication What is the Meaning of Multiplication

Grade 12

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G3:	Transformations of Figures in the Plane
GRADE LEVEL EXPECTATION	G3.1.	Distance-preserving Transformations Isometries
EXPECTATION	G3.1.1.	Define reflection, rotation, translation, and glide reflection and find the image of a figure under a given
		Application of Matrix Multiplication
		Application of Matrix Multiplication
		Application of Matrix Multiplication
		Application of Matrix Operations
		Application of Matrix Operations
		Application of Matrix Operations
		Application of Reflection-Shortest Path
		Application of Reflection-Shortest Path
		Application of Translation - Block Design
		Application of Translation- Block Design
		Application of Translation- Block Design
		Crazy Paving 1 - Translate Shapes on a Grid Software
		Crazy Paving 2 - Translate Shapes on a Grid Software
		Critical Thinking - Shortest Path- Laser
		Critical Thinking - Shortest Path- Laser
		Fishy Transformations - Combined Transformations (GSP)
		Game of Buried Treasure
		Game of Buried Treasure
		Kaleidoscopic Polygons
		MATRICES
		Matrix Transformations: "F"
		Practice Shortest Path - Feed and Water
		Practice Shortest Path - Feed and Water
		Proportional Triangle Nesting
		Reflection in Geometry and Algebra
		Reflection in Geometry and Algebra
		Reflections over Intersecting Lines
		Reflections over Intersecting Lines
		Reflections over Intersecting Lines
		Reflections over Two Parallel lines
		Reflections over Two Parallel lines
		Reflections over Two Parallel lines
		Rotation in the Coordinate Plane
		Rotation in the Coordinate Plane

		Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations Transformations Transformations Translate to Enlarge - Dilation of 2-D Shapes (GSP) Translation in the Coordinate Plane Translation in the Coordinate Plane Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects

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STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G3:	Transformations of Figures in the Plane
GRADE LEVEL EXPECTATION	G3.1.	Distance-preserving Transformations Isometries
EXPECTATION	G3.1.2.	Given two figures that are images of each other under an isometry, find the isometry and describe it Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations
EXPECTATION	G3.1.3.	Find the image of a figure under the composition of two or more isometries and determine whether the resulting figure is a reflection, rotation, translation, or glide reflection image of the original figure. Crazy Paving 1 - Translate Shapes on a Grid Software Crazy Paving 2 - Translate Shapes on a Grid Software Fishy Transformations - Combined Transformations (GSP) Growth - Enlargement of 2-D Shapes (GSP) Transform - Combined Transformations (GSP) Transformation Scene - Combinations of Translations, Reflections and Rotations (GSP) Transformations

STRAND / STANDARD CATEGORY	MI.G.	Geometry
STANDARD	G3:	Transformations of Figures in the Plane
GRADE LEVEL EXPECTATION	G3.2.	Shape-preserving Transformations: Dilations and Isometries
EXPECTATION	G3.2.1.	Know the definition of dilation and find the image of a figure under a given dilation. AREA AREA Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP) Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects
EXPECTATION	G3.2.2.	Given two figures that are images of each other under some dilation, identify the center and magnitude of the

		AREA AREA Application of Matrix Operations Application of Matrix Operations Application of Matrix Operations Application of Proportional Reasoning Application of Proportional Reasoning Connecting Area and Ratio Connecting Area and Ratio Connecting Area and Ratio Constructing a Pentograph Constructing a Pentograph Global Warming Zoom Grow On - Dilation of 2-D Shapes with Positive, Whole-Number Scale Factors (GSP) Growth - Enlargement of 2-D Shapes (GSP) Helicopter Rescue - Scales Software Introducing Proportion Introducing Proportion Introducing Proportion Introduction to Quadratic Equations Investigating Similar Polygons using dilations Investigating Similar Polygons using dilations Matrix Transformations: "F" Pantograph Linkage Parallel Lines in a Triangle Parallel Lines in a Triangle Ratio of Similarity Ratio of Similarity Ratio of Similarity Transform - Combined Transformations (GSP) Translate to Enlarge - Dilation of 2-D Shapes (GSP) Use Enlargements - Solving Problems Using Scale Drawing and Dilation (GSP) Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4X4 Matrices to Perform Transformations of 3D Objects Using 4x4 Matrices to Perform Transformations of 3D Objects What is the Meaning of Multiplication What is the Meaning of Multiplication

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