

Florida Virtual School - Pre-Calculus v7

Standards Report - Showing matching content units as of October 12, 2009, 8:31 am PDT

Grades: 9, 10, 11, 12

States: Michigan Curriculum Standards

Subjects: Mathematics

**Michigan Curriculum Standards
Mathematics
Grade 9 - Adopted 2007**

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	L1.1.6	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. Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models
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. Module 10: Lesson 03 Hyperbolas
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. Module 06: Lesson 03 Vectors in the Plane Module 06: Lesson 04a Vectors and Dot Products Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 04c Cross Products of Two Vectors
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	L2.1.3	<p>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.</p> <p>Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations</p>
EXPECTATION	L2.1.4	<p>Know that the complex number i is one of two solutions to $x^2 = -1$.</p> <p>Module 02: Lesson 04 Complex Numbers Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots</p>
EXPECTATION	L2.1.5	<p>Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers.</p> <p>Module 02: Lesson 04 Complex Numbers Module 02: Lesson 05a Fundamental Theorem of Algebra Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots</p>
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	<p>Find the nth term in arithmetic, geometric, or other simple sequences.</p> <p>Module 09: Lesson 01 Sequences and Summation Notation Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences</p>
EXPECTATION	L2.2.2	<p>Compute sums of finite arithmetic and geometric sequences.</p> <p>Module 09: Lesson 03 Geometric Sequences</p>
EXPECTATION	L2.2.3	<p>Use iterative processes in such examples as computing compound interest or applying approximation procedures.</p> <p>Module 03: Lesson 01 Exponential Functions and Their Graphs</p>
EXPECTATION	L2.2.4	<p>Compute sums of infinite geometric sequences. (Recommended)</p> <p>Module 09: Lesson 03 Geometric Sequences</p>
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	L2.3.2	<p>Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel measurements; solve applied problems.</p> <p>Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations</p>
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. Module 09: Lesson 04 Mathematical Induction
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. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A1.1.2	Know the definitions and properties of exponents and roots transition fluently between them, and apply them in algebraic expressions. Module 03: Lesson 01 Exponential Functions and Their Graphs
EXPECTATION	A1.1.3	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities. Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials
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. Module 03: Lesson 02 Logarithmic Functions and Their Graphs
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) Module 04: Lesson 03 Right Triangle Trigonometry Module 05: Lesson 01 Using Fundamental Identities Module 05: Lesson 02 Verifying Trigonometric Identities Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas
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. Module 02: Lesson 01 Quadratic Functions
EXPECTATION	A1.2.7	Solve exponential and logarithmic equations, and justify steps in the solution. Module 03: Lesson 04 Solving Exp. and Log. Equations
EXPECTATION	A1.2.10	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific intervals. Module 04: Lesson 07 Inverse Trigonometric Functions
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. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.1.2	Read, interpret, and use function notation and evaluate a function at a value in its domain. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.1.3	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations. Module 01: Lesson 01 Introduction to Functions Module 10: Lesson 03 Hyperbolas Module 10: Lesson 06 Graphs of Polar Equations Module 12: Lesson 01 Introduction to Limits
EXPECTATION	A2.1.4	Recognize that functions may be defined by different expressions over different intervals of their domains; such functions are piecewise-defined. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A2.1.5	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions. Module 09: Lesson 01 Sequences and Summation Notation

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. Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits
EXPECTATION	A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e). Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 07 Graphs of Rational Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
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	A2.2.1	Combine functions by addition, subtraction, multiplication, and division. Module 01: Lesson 04 Combinations of Functions
EXPECTATION	A2.2.2	Apply given transformations to basic functions and represent symbolically. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.2.3	Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs. Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.2.4	If a function has an inverse, find the expression(s) for the inverse. (Recommended) Module 01: Lesson 05 Inverse Functions
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) Module 01: Lesson 04 Combinations of Functions Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.2.6	Know and interpret the function notation for inverses and verify that two functions are inverses using composition. (Recommended)

		Module 01: Lesson 05 Inverse Functions
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	A2.3.1	Identify a function as a member of a family of functions based on its symbolic or graphical representation; recognize that different families of functions have different asymptotic behavior. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.3.3	Write the general symbolic forms that characterize each family of functions. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: 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-world situations.
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. Module 01: Lesson 03 Shift, Reflect, Stretch
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-world situations.
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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.

		Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations Module 03: Lesson 05 Exponential and Logarithmic Models
EXPECTATION	A3.2.3	Apply properties of exponential and logarithmic functions. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
EXPECTATION	A.3.2.5	Relate exponential and logarithmic functions to real phenomena, including half-life and doubling time. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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-world situations.
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 01: Lesson 03 Shift, Reflect, Stretch Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: 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-world situations.
GRADE LEVEL EXPECTATION	A3.5	Polynomial Functions
EXPECTATION	A3.5.1	Write the symbolic form and sketch the graph of simple polynomial functions. Module 02: Lesson 01 Quadratic Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 10: Lesson 04a Parametric Equations - Part 1

		Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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-world situations.
GRADE LEVEL EXPECTATION	A3.6	Rational Functions
EXPECTATION	A3.6.1	Write the symbolic form and sketch the graph of simple rational functions. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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-world situations.
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.2	Use the relationship between degree and radian measures to solve problems.

		Module 04: Lesson 01 Radian and Degree Measure
EXPECTATION	A3.7.3	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of $\pi/6$ and $\pi/4$. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.4	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location of maxima and minima. Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions Module 04: Lesson 07 Inverse Trigonometric Functions
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
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. Module 04: Lesson 03 Right Triangle Trigonometry
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, and area of all types of triangles. Module 06: Lesson 01 Law of Sines
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. Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models
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 θ using the formula $\text{Area} = (1/2) ab \sin \theta$. Module 06: Lesson 01 Law of Sines Module 06: Lesson 02a Law of Cosines Module 06: Lesson 02b Applying the Laws of Sines and Cosines
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
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	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. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas Module 10: Lesson 04a Parametric Equations - Part 1
EXPECTATION	G1.7.4	Know and use the relationship between the vertices and foci in an ellipse, the vertices and foci in a hyperbola, and the directrix and focus in a parabola, interpret these relationships in applied contexts. (Recommended) Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas
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. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions
GRADE LEVEL EXPECTATION	P1.2	Perform algebraic operations (including compositions) on functions and apply transformations (translations, reflections, and rescalings). Module 01: Lesson 03 Shift, Reflect, Stretch Module 01: Lesson 04 Combinations of Functions Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 07 Inverse Trigonometric Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 01: Lesson 04 Combinations of Functions Module 04: Lesson 07 Inverse Trigonometric 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 inverses. Module 01: Lesson 05 Inverse Functions
GRADE LEVEL EXPECTATION	P1.5	Determine whether two given functions are inverses, using composition. Module 01: Lesson 05 Inverse Functions
GRADE LEVEL EXPECTATION	P1.6	Identify and describe discontinuities of a function (e.g., greatest integer function, $1/x$) and how these relate to the graph. Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 04 Continuity at a Point
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. Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits
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. Module 03: Lesson 02 Logarithmic Functions and Their Graphs
GRADE LEVEL EXPECTATION	P2.2	Graph logarithmic functions. Graph translations and reflections of these functions. Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 04 Solving Exp. and Log. Equations Module 03: Lesson 05 Exponential and Logarithmic Models
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 Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms
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.

		Module 03: Lesson 04 Solving Exp. and Log. 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 involving exponential growth and decay. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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. Module 02: Lesson 01 Quadratic Functions
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's large-scale behavior. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 05a Fundamental Theorem of Algebra Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P4.3	Know and apply fundamental facts about polynomials: the Remainder Theorem, the Factor Theorem, and the Fundamental Theorem of Algebra. Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials
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. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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. Module 04: Lesson 01 Radian and Degree Measure Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions Module 04: Lesson 07 Inverse Trigonometric Functions
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions

		Module 04: Lesson 06 Graphs of Other Trig Functions
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. Module 04: Lesson 07 Inverse Trigonometric Functions
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). Module 04: Lesson 03 Right Triangle Trigonometry Module 05: Lesson 01 Using Fundamental Identities Module 05: Lesson 02 Verifying Trigonometric Identities Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas
GRADE LEVEL EXPECTATION	P6.5	Solve trigonometric equations using basic identities and inverse trigonometric functions. Module 05: Lesson 03a Solving Linear Trigonometric Equations Module 05: Lesson 03b Solving Trigonometric Equations Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas Module 06: Lesson 01 Law of Sines Module 06: Lesson 02a Law of Cosines
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.). Module 04: Lesson 03 Right Triangle Trigonometry Module 05: Lesson 01 Using Fundamental Identities Module 05: Lesson 02 Verifying Trigonometric Identities Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas
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 relate to the data set or situation. Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions
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 problems using vectors. Module 06: Lesson 03 Vectors in the Plane Module 06: Lesson 04c Cross Products of Two Vectors
GRADE LEVEL EXPECTATION	P7.2	Know and apply the algebraic and geometric definitions of the dot product of vectors. Module 06: Lesson 04a Vectors and Dot Products Module 06: Lesson 04b Vectors in 3 Dimensions
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. Module 09: Lesson 01 Sequences and Summation Notation Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences Module 09: Lesson 04 Mathematical Induction
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. Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences Module 09: Lesson 04 Mathematical Induction

GRADE LEVEL EXPECTATION	P8.3	Understand, explain, and use the formulas for the sums of finite arithmetic and geometric sequences. Module 09: Lesson 03 Geometric Sequences
GRADE LEVEL EXPECTATION	P8.4	Compute the sums of infinite geometric series. Understand and apply the convergence criterion for geometric series. Module 09: Lesson 03 Geometric Sequences
GRADE LEVEL EXPECTATION	P8.5	Understand and explain the principle of mathematical induction and prove statements using mathematical induction. Module 09: Lesson 04 Mathematical Induction
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. Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots Module 10: Lesson 05 Polar Coordinates
GRADE LEVEL EXPECTATION	P9.2	Write complex numbers in polar form. Know and use De Moivre's Theorem. Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots Module 10: Lesson 05 Polar Coordinates
GRADE LEVEL EXPECTATION	P9.3	Evaluate parametric equations for given values of the parameter. Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.4	Convert between parametric and rectangular forms of equations. Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.5	Graph curves described by parametric equations and find parametric equations for a given graph. Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.6	Use parametric equations in applied contexts (e.g., orbits and projectiles) to model situations and solve problems. Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.7	Know, explain, and apply the locus definitions of parabolas, ellipses, and hyperbolas and recognize these conic sections in applied situations. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas
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. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas
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. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas
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 $x^2 = -1$. Module 02: Lesson 04 Complex Numbers Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots
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. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A1.1.2.	Know the properties of exponents and roots and apply them in algebraic expressions. Module 03: Lesson 01 Exponential Functions and Their Graphs
EXPECTATION	A1.1.3.	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities. Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials
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. Module 02: Lesson 01 Quadratic Functions
STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1.	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation and evaluate a function at a value in its domain. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words and

		translate among representations. Module 10: Lesson 03 Hyperbolas
EXPECTATION	A2.1.4.	Recognize that functions may be defined by different expressions over different intervals of their domains; such functions are piecewise-defined. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A2.1.5.	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions. Module 09: Lesson 01 Sequences and Summation Notation
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. Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits
EXPECTATION	A2.1.7.	Identify and interpret the key features of a function from its graph or its formula(s). Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 07 Graphs of Rational Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.1.	Combine functions by addition, subtraction, multiplication, and division. Module 01: Lesson 04 Combinations of Functions
EXPECTATION	A2.2.2.	Apply given transformations to parent functions and represent symbolically. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.2.3.	Determine whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs. Module 01: Lesson 05 Inverse Functions
STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.3.	Representations of Functions

EXPECTATION	A2.3.1.	Identify a function as a member of a family of functions based on its symbolic or graphical representation; recognize that different families of functions have different asymptotic behavior. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.3.3.	Write the general symbolic forms that characterize each family of functions. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 01: Lesson 03 Shift, Reflect, Stretch
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
EXPECTATION	A3.2.5.	Relate exponential functions to real phenomena, including half-life and doubling time. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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.

		Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 01: Lesson 03 Shift, Reflect, Stretch Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: 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. Module 02: Lesson 01 Quadratic Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 10: Lesson 03 Hyperbolas
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. Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations
EXPECTATION	L2.1.5.	Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers. Module 02: Lesson 04 Complex Numbers Module 02: Lesson 05a Fundamental Theorem of Algebra Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots
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. Module 09: Lesson 01 Sequences and Summation Notation Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences
EXPECTATION	L2.2.2.	Compute sums of finite arithmetic and geometric sequences. Module 09: Lesson 03 Geometric Sequences
EXPECTATION	L2.2.3.	Use iterative processes in such examples as computing compound interest or applying approximation procedures. Module 03: Lesson 01 Exponential Functions and Their Graphs
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 measurements; solve applied problems. Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations
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. Module 01: Lesson 01 Introduction to Functions
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. Module 03: Lesson 02 Logarithmic Functions and Their Graphs

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. Module 03: Lesson 04 Solving Exp. and Log. Equations
EXPECTATION	A1.2.10.	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific intervals. Module 04: Lesson 07 Inverse Trigonometric Functions
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 identify its domain and range. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation, and evaluate a function at a value in its domain. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words, and translate among representations. Module 10: Lesson 03 Hyperbolas
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. Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits
EXPECTATION	A2.1.7.	Identify and interpret the key features of a function from its graph or its formula(s). Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 07 Graphs of Rational Functions
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II

STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.1.	Combine functions by addition, subtraction, multiplication, and division. Module 01: Lesson 04 Combinations of Functions
EXPECTATION	A2.2.2.	Apply given transformations to parent functions, and represent symbolically. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.2.3.	Recognize whether a function (given in tabular or graphical form) has an inverse, and recognize simple inverse pairs. Module 01: Lesson 05 Inverse Functions
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.3.	Representations of Functions
EXPECTATION	A2.3.1.	Identify a function as a member of a family of functions based on its symbolic or graphical representation; recognize that different families of functions have different asymptotic behavior. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.3.3.	Write the general symbolic forms that characterize each family of functions. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations Module 03: Lesson 05 Exponential and Logarithmic Models
EXPECTATION	A3.2.3.	Apply properties of exponential and logarithmic functions. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms

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. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.2.	Use the relationship between degree and radian measures to solve problems. Module 04: Lesson 01 Radian and Degree Measure
EXPECTATION	A3.7.3.	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of $\pi/6$ and $\pi/4$. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.4.	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location of maxima and minima. Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions Module 04: Lesson 07 Inverse Trigonometric Functions
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II

STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.7.	Conic Sections and Their Properties
EXPECTATION	G1.7.2.	Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas Module 10: Lesson 04a Parametric Equations - Part 1
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 and square root of 3 in basic right triangle trigonometry, and the importance of pi because of its role in circle relationships. Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models
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. Module 06: Lesson 03 Vectors in the Plane Module 06: Lesson 04a Vectors and Dot Products Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 04c Cross Products of Two Vectors
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. Module 04: Lesson 03 Right Triangle Trigonometry
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, and area of all types of triangles. Module 06: Lesson 01 Law of Sines

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. Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models
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 $Area = (1/2) ab \sin \theta$. Module 06: Lesson 01 Law of Sines Module 06: Lesson 02a Law of Cosines Module 06: Lesson 02b Applying the Laws of Sines and Cosines
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions

**Michigan Curriculum Standards
Mathematics
Grade 10 - Adopted 2007**

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	L1.1.6	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. Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models
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.

		Module 10: Lesson 03 Hyperbolas
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. Module 06: Lesson 03 Vectors in the Plane Module 06: Lesson 04a Vectors and Dot Products Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 04c Cross Products of Two Vectors
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	L2.1.3	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. Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations
EXPECTATION	L2.1.4	Know that the complex number i is one of two solutions to $x^2 = -1$. Module 02: Lesson 04 Complex Numbers Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots
EXPECTATION	L2.1.5	Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers. Module 02: Lesson 04 Complex Numbers Module 02: Lesson 05a Fundamental Theorem of Algebra Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots
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 n th term in arithmetic, geometric, or other simple sequences. Module 09: Lesson 01 Sequences and Summation Notation Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences
EXPECTATION	L2.2.2	Compute sums of finite arithmetic and geometric sequences. Module 09: Lesson 03 Geometric Sequences
EXPECTATION	L2.2.3	Use iterative processes in such examples as computing compound interest or applying approximation procedures. Module 03: Lesson 01 Exponential Functions and Their Graphs
EXPECTATION	L2.2.4	Compute sums of infinite geometric sequences. (Recommended) Module 09: Lesson 03 Geometric Sequences

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	L2.3.2	Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel measurements; solve applied problems. Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations
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. Module 09: Lesson 04 Mathematical Induction
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. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A1.1.2	Know the definitions and properties of exponents and roots transition fluently between them, and apply them in algebraic expressions. Module 03: Lesson 01 Exponential Functions and Their Graphs
EXPECTATION	A1.1.3	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities. Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials
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. Module 03: Lesson 02 Logarithmic Functions and Their Graphs
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) Module 04: Lesson 03 Right Triangle Trigonometry Module 05: Lesson 01 Using Fundamental Identities Module 05: Lesson 02 Verifying Trigonometric Identities Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas
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. Module 02: Lesson 01 Quadratic Functions
EXPECTATION	A1.2.7	Solve exponential and logarithmic equations, and justify steps in the solution. Module 03: Lesson 04 Solving Exp. and Log. Equations
EXPECTATION	A1.2.10	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific intervals. Module 04: Lesson 07 Inverse Trigonometric Functions
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. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.1.2	Read, interpret, and use function notation and evaluate a function at a value in its domain.

		Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.1.3	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations. Module 01: Lesson 01 Introduction to Functions Module 10: Lesson 03 Hyperbolas Module 10: Lesson 06 Graphs of Polar Equations Module 12: Lesson 01 Introduction to Limits
EXPECTATION	A2.1.4	Recognize that functions may be defined by different expressions over different intervals of their domains; such functions are piecewise-defined. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A2.1.5	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions. Module 09: Lesson 01 Sequences and Summation Notation
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. Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits
EXPECTATION	A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e). Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 07 Graphs of Rational Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
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	A2.2.1	Combine functions by addition, subtraction, multiplication, and division. Module 01: Lesson 04 Combinations of Functions
EXPECTATION	A2.2.2	Apply given transformations to basic functions and represent symbolically. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs

		Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.2.3	Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs. Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.2.4	If a function has an inverse, find the expression(s) for the inverse. (Recommended) Module 01: Lesson 05 Inverse Functions
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) Module 01: Lesson 04 Combinations of Functions Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.2.6	Know and interpret the function notation for inverses and verify that two functions are inverses using composition. (Recommended) Module 01: Lesson 05 Inverse Functions
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	A2.3.1	Identify a function as a member of a family of functions based on its symbolic or graphical representation; recognize that different families of functions have different asymptotic behavior. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.3.3	Write the general symbolic forms that characterize each family of functions. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: 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-world situations.
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.

		Module 01: Lesson 03 Shift, Reflect, Stretch
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-world situations.
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations Module 03: Lesson 05 Exponential and Logarithmic Models
EXPECTATION	A3.2.3	Apply properties of exponential and logarithmic functions. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
EXPECTATION	A.3.2.5	Relate exponential and logarithmic functions to real phenomena, including half-life and doubling time. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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-world situations.
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 01: Lesson 03 Shift, Reflect, Stretch

		Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: 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-world situations.
GRADE LEVEL EXPECTATION	A3.5	Polynomial Functions
EXPECTATION	A3.5.1	Write the symbolic form and sketch the graph of simple polynomial functions. Module 02: Lesson 01 Quadratic Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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-world situations.
GRADE LEVEL EXPECTATION	A3.6	Rational Functions
EXPECTATION	A3.6.1	Write the symbolic form and sketch the graph of simple rational functions. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits

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-world situations.
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.2	Use the relationship between degree and radian measures to solve problems. Module 04: Lesson 01 Radian and Degree Measure
EXPECTATION	A3.7.3	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of $\pi/6$ and $\pi/4$. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.4	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location of maxima and minima. Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions Module 04: Lesson 07 Inverse Trigonometric Functions
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
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. Module 04: Lesson 03 Right Triangle Trigonometry
STRAND / STANDARD	MI.G.	Geometry and Trigonometry (G)

CATEGORY		
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, and area of all types of triangles. Module 06: Lesson 01 Law of Sines
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. Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models
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 θ using the formula $\text{Area} = (1/2) ab \sin \theta$. Module 06: Lesson 01 Law of Sines Module 06: Lesson 02a Law of Cosines Module 06: Lesson 02b Applying the Laws of Sines and Cosines
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
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	G1.7.2	Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain

		<p>how they are related to cones.</p> <p>Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas Module 10: Lesson 04a Parametric Equations - Part 1</p>
EXPECTATION	G1.7.4	<p>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)</p> <p>Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas</p>
STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P1:	Functions
GRADE LEVEL EXPECTATION	P1.1	<p>Know and use a definition of a function to decide if a given relation is a function.</p> <p>Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions</p>
GRADE LEVEL EXPECTATION	P1.2	<p>Perform algebraic operations (including compositions) on functions and apply transformations (translations, reflections, and rescalings).</p> <p>Module 01: Lesson 03 Shift, Reflect, Stretch Module 01: Lesson 04 Combinations of Functions Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 07 Inverse Trigonometric Functions Module 10: Lesson 01 Introduction to Conics: Parabolas</p>
GRADE LEVEL EXPECTATION	P1.3	<p>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.</p> <p>Module 01: Lesson 04 Combinations of Functions Module 04: Lesson 07 Inverse Trigonometric Functions</p>
GRADE LEVEL EXPECTATION	P1.4	<p>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 inverses.</p> <p>Module 01: Lesson 05 Inverse Functions</p>
GRADE LEVEL EXPECTATION	P1.5	<p>Determine whether two given functions are inverses, using composition.</p> <p>Module 01: Lesson 05 Inverse Functions</p>
GRADE LEVEL EXPECTATION	P1.6	<p>Identify and describe discontinuities of a function (e.g., greatest integer function, $1/x$) and how these relate to the graph.</p> <p>Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 04 Continuity at a Point</p>
GRADE LEVEL EXPECTATION	P1.7	<p>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.</p> <p>Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits</p>
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. Module 03: Lesson 02 Logarithmic Functions and Their Graphs
GRADE LEVEL EXPECTATION	P2.2	Graph logarithmic functions. Graph translations and reflections of these functions. Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 04 Solving Exp. and Log. Equations Module 03: Lesson 05 Exponential and Logarithmic Models
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 Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms
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. Module 03: Lesson 04 Solving Exp. and Log. 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 involving exponential growth and decay. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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. Module 02: Lesson 01 Quadratic Functions
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's large-scale behavior. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 05a Fundamental Theorem of Algebra Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P4.3	Know and apply fundamental facts about polynomials: the Remainder Theorem, the Factor Theorem, and the Fundamental Theorem of Algebra. Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials
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. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
STRAND /	MI.P.	Precalculus

STANDARD CATEGORY		
STANDARD	P6:	Trigonometric Functions
GRADE LEVEL EXPECTATION	P6.1	<p>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.</p> <p>Module 04: Lesson 01 Radian and Degree Measure Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions Module 04: Lesson 07 Inverse Trigonometric Functions</p>
GRADE LEVEL EXPECTATION	P6.2	<p>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.</p> <p>Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions</p>
GRADE LEVEL EXPECTATION	P6.3	<p>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.</p> <p>Module 04: Lesson 07 Inverse Trigonometric Functions</p>
GRADE LEVEL EXPECTATION	P6.4	<p>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).</p> <p>Module 04: Lesson 03 Right Triangle Trigonometry Module 05: Lesson 01 Using Fundamental Identities Module 05: Lesson 02 Verifying Trigonometric Identities Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas</p>
GRADE LEVEL EXPECTATION	P6.5	<p>Solve trigonometric equations using basic identities and inverse trigonometric functions.</p> <p>Module 05: Lesson 03a Solving Linear Trigonometric Equations Module 05: Lesson 03b Solving Trigonometric Equations Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas Module 06: Lesson 01 Law of Sines Module 06: Lesson 02a Law of Cosines</p>
GRADE LEVEL EXPECTATION	P6.6	<p>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.).</p> <p>Module 04: Lesson 03 Right Triangle Trigonometry Module 05: Lesson 01 Using Fundamental Identities Module 05: Lesson 02 Verifying Trigonometric Identities Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas</p>
GRADE LEVEL EXPECTATION	P6.7	<p>Find a sinusoidal function to model a given data set or situation and explain how the parameters of the model relate to the data set or situation.</p> <p>Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions</p>
STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P7:	Vectors, Matrices, and Systems of Equations
GRADE LEVEL EXPECTATION	P7.1	<p>Perform operations (addition, subtraction, and multiplication by scalars) on vectors in the plane. Solve applied problems using vectors.</p> <p>Module 06: Lesson 03 Vectors in the Plane Module 06: Lesson 04c Cross Products of Two Vectors</p>
GRADE LEVEL EXPECTATION	P7.2	<p>Know and apply the algebraic and geometric definitions of the dot product of vectors.</p>

		Module 06: Lesson 04a Vectors and Dot Products Module 06: Lesson 04b Vectors in 3 Dimensions
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. Module 09: Lesson 01 Sequences and Summation Notation Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences Module 09: Lesson 04 Mathematical Induction
GRADE LEVEL EXPECTATION	P8.2	Given an arithmetic, geometric, or recursively defined sequence, write an expression for the n th term when possible. Write a particular term of a sequence when given the n th term. Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences Module 09: Lesson 04 Mathematical Induction
GRADE LEVEL EXPECTATION	P8.3	Understand, explain, and use the formulas for the sums of finite arithmetic and geometric sequences. Module 09: Lesson 03 Geometric Sequences
GRADE LEVEL EXPECTATION	P8.4	Compute the sums of infinite geometric series. Understand and apply the convergence criterion for geometric series. Module 09: Lesson 03 Geometric Sequences
GRADE LEVEL EXPECTATION	P8.5	Understand and explain the principle of mathematical induction and prove statements using mathematical induction. Module 09: Lesson 04 Mathematical Induction
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. Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots Module 10: Lesson 05 Polar Coordinates
GRADE LEVEL EXPECTATION	P9.2	Write complex numbers in polar form. Know and use De Moivre's Theorem. Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots Module 10: Lesson 05 Polar Coordinates
GRADE LEVEL EXPECTATION	P9.3	Evaluate parametric equations for given values of the parameter. Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.4	Convert between parametric and rectangular forms of equations. Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.5	Graph curves described by parametric equations and find parametric equations for a given graph. Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.6	Use parametric equations in applied contexts (e.g., orbits and projectiles) to model situations and solve problems. Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.7	Know, explain, and apply the locus definitions of parabolas, ellipses, and hyperbolas and recognize these conic sections in applied situations.

		Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas
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. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas
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. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas
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 $x^2 = -1$. Module 02: Lesson 04 Complex Numbers Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots
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. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A1.1.2.	Know the properties of exponents and roots and apply them in algebraic expressions. Module 03: Lesson 01 Exponential Functions and Their Graphs
EXPECTATION	A1.1.3.	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities. Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials
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. Module 02: Lesson 01 Quadratic Functions
STRAND / STANDARD CATEGORY	MI.AI.	Algebra I

STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1.	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation and evaluate a function at a value in its domain. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations. Module 10: Lesson 03 Hyperbolas
EXPECTATION	A2.1.4.	Recognize that functions may be defined by different expressions over different intervals of their domains; such functions are piecewise-defined. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A2.1.5.	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions. Module 09: Lesson 01 Sequences and Summation Notation
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. Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits
EXPECTATION	A2.1.7.	Identify and interpret the key features of a function from its graph or its formula(s). Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 07 Graphs of Rational Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.1.	Combine functions by addition, subtraction, multiplication, and division.

		Module 01: Lesson 04 Combinations of Functions
EXPECTATION	A2.2.2.	Apply given transformations to parent functions and represent symbolically. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.2.3.	Determine whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs. Module 01: Lesson 05 Inverse Functions
STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.3.	Representations of Functions
EXPECTATION	A2.3.1.	Identify a function as a member of a family of functions based on its symbolic or graphical representation; recognize that different families of functions have different asymptotic behavior. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.3.3.	Write the general symbolic forms that characterize each family of functions. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 01: Lesson 03 Shift, Reflect, Stretch
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
EXPECTATION	A3.2.5.	Relate exponential functions to real phenomena, including half-life and doubling time. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 01: Lesson 03 Shift, Reflect, Stretch Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: 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. Module 02: Lesson 01 Quadratic Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials

		Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 10: Lesson 03 Hyperbolas
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. Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations
EXPECTATION	L2.1.5.	Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers. Module 02: Lesson 04 Complex Numbers Module 02: Lesson 05a Fundamental Theorem of Algebra Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots
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. Module 09: Lesson 01 Sequences and Summation Notation Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences
EXPECTATION	L2.2.2.	Compute sums of finite arithmetic and geometric sequences. Module 09: Lesson 03 Geometric Sequences
EXPECTATION	L2.2.3.	Use iterative processes in such examples as computing compound interest or applying approximation procedures. Module 03: Lesson 01 Exponential Functions and Their Graphs
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 measurements; solve applied problems.

		Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations
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. Module 01: Lesson 01 Introduction to Functions
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. Module 03: Lesson 02 Logarithmic Functions and Their Graphs
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. Module 03: Lesson 04 Solving Exp. and Log. Equations
EXPECTATION	A1.2.10.	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific intervals. Module 04: Lesson 07 Inverse Trigonometric Functions
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 identify its domain and range. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation, and evaluate a function at a value in its domain. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words, and translate among representations. Module 10: Lesson 03 Hyperbolas
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

		<p>function as x approaches positive or negative infinity, given the symbolic and graphical representations.</p> <p>Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits</p>
EXPECTATION	A2.1.7.	<p>Identify and interpret the key features of a function from its graph or its formula(s).</p> <p>Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 07 Graphs of Rational Functions</p>
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.1.	<p>Combine functions by addition, subtraction, multiplication, and division.</p> <p>Module 01: Lesson 04 Combinations of Functions</p>
EXPECTATION	A2.2.2.	<p>Apply given transformations to parent functions, and represent symbolically.</p> <p>Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas</p>
EXPECTATION	A2.2.3.	<p>Recognize whether a function (given in tabular or graphical form) has an inverse, and recognize simple inverse pairs.</p> <p>Module 01: Lesson 05 Inverse Functions</p>
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.3.	Representations of Functions
EXPECTATION	A2.3.1.	<p>Identify a function as a member of a family of functions based on its symbolic or graphical representation; recognize that different families of functions have different asymptotic behavior.</p> <p>Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas</p>
EXPECTATION	A2.3.3.	<p>Write the general symbolic forms that characterize each family of functions.</p> <p>Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions</p>

		Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations Module 03: Lesson 05 Exponential and Logarithmic Models
EXPECTATION	A3.2.3.	Apply properties of exponential and logarithmic functions. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms
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. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.2.	Use the relationship between degree and radian measures to solve problems. Module 04: Lesson 01 Radian and Degree Measure
EXPECTATION	A3.7.3.	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of $\pi/6$ and $\pi/4$. Module 04: Lesson 02 Trig Functions: The Unit Circle

		Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.4.	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location of maxima and minima. Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions Module 04: Lesson 07 Inverse Trigonometric Functions
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.7.	Conic Sections and Their Properties
EXPECTATION	G1.7.2.	Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas Module 10: Lesson 04a Parametric Equations - Part 1
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 and square root of 3 in basic right triangle trigonometry, and the importance of pi because of its role in circle relationships. Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models
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. Module 06: Lesson 03 Vectors in the Plane Module 06: Lesson 04a Vectors and Dot Products Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 04c Cross Products of Two Vectors
STRAND / STANDARD	MI.G.	Geometry

CATEGORY		
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. Module 04: Lesson 03 Right Triangle Trigonometry
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, and area of all types of triangles. Module 06: Lesson 01 Law of Sines
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. Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models
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 $\text{Area} = (1/2) ab \sin \theta$. Module 06: Lesson 01 Law of Sines Module 06: Lesson 02a Law of Cosines Module 06: Lesson 02b Applying the Laws of Sines and Cosines
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions

**Michigan Curriculum Standards
Mathematics
Grade 11 - Adopted 2007**

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	L1.1	Number Systems and Number Sense

EXPECTATION		
EXPECTATION	L1.1.6	<p>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.</p> <p>Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models</p>
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	<p>Use mathematical symbols to represent quantitative relationships and situations.</p> <p>Module 10: Lesson 03 Hyperbolas</p>
EXPECTATION	L1.2.3	<p>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.</p> <p>Module 06: Lesson 03 Vectors in the Plane Module 06: Lesson 04a Vectors and Dot Products Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 04c Cross Products of Two Vectors</p>
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	L2.1.3	<p>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.</p> <p>Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations</p>
EXPECTATION	L2.1.4	<p>Know that the complex number i is one of two solutions to $x^2 = -1$.</p> <p>Module 02: Lesson 04 Complex Numbers Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots</p>
EXPECTATION	L2.1.5	<p>Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers.</p> <p>Module 02: Lesson 04 Complex Numbers Module 02: Lesson 05a Fundamental Theorem of Algebra Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots</p>
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 n th term in arithmetic, geometric, or other simple sequences. Module 09: Lesson 01 Sequences and Summation Notation Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences
EXPECTATION	L2.2.2	Compute sums of finite arithmetic and geometric sequences. Module 09: Lesson 03 Geometric Sequences
EXPECTATION	L2.2.3	Use iterative processes in such examples as computing compound interest or applying approximation procedures. Module 03: Lesson 01 Exponential Functions and Their Graphs
EXPECTATION	L2.2.4	Compute sums of infinite geometric sequences. (Recommended) Module 09: Lesson 03 Geometric Sequences
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	L2.3.2	Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel measurements; solve applied problems. Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations
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. Module 09: Lesson 04 Mathematical Induction
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. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A1.1.2	Know the definitions and properties of exponents and roots transition fluently between them, and apply them in algebraic expressions. Module 03: Lesson 01 Exponential Functions and Their Graphs
EXPECTATION	A1.1.3	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities. Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials
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. Module 03: Lesson 02 Logarithmic Functions and Their Graphs
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) Module 04: Lesson 03 Right Triangle Trigonometry Module 05: Lesson 01 Using Fundamental Identities Module 05: Lesson 02 Verifying Trigonometric Identities Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas
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. Module 02: Lesson 01 Quadratic Functions
EXPECTATION	A1.2.7	Solve exponential and logarithmic equations, and justify steps in the solution. Module 03: Lesson 04 Solving Exp. and Log. Equations
EXPECTATION	A1.2.10	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific intervals. Module 04: Lesson 07 Inverse Trigonometric Functions
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. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.1.2	Read, interpret, and use function notation and evaluate a function at a value in its domain. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.1.3	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations. Module 01: Lesson 01 Introduction to Functions Module 10: Lesson 03 Hyperbolas Module 10: Lesson 06 Graphs of Polar Equations Module 12: Lesson 01 Introduction to Limits
EXPECTATION	A2.1.4	Recognize that functions may be defined by different expressions over different intervals of their domains; such functions are piecewise-defined. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A2.1.5	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions. Module 09: Lesson 01 Sequences and Summation Notation
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. Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits
EXPECTATION	A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e). Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 07 Graphs of Rational Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
STRAND /	MI.A.	Algebra and Functions (A)

STANDARD CATEGORY		
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	A2.2.1	Combine functions by addition, subtraction, multiplication, and division. Module 01: Lesson 04 Combinations of Functions
EXPECTATION	A2.2.2	Apply given transformations to basic functions and represent symbolically. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.2.3	Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs. Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.2.4	If a function has an inverse, find the expression(s) for the inverse. (Recommended) Module 01: Lesson 05 Inverse Functions
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) Module 01: Lesson 04 Combinations of Functions Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.2.6	Know and interpret the function notation for inverses and verify that two functions are inverses using composition. (Recommended) Module 01: Lesson 05 Inverse Functions
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	A2.3.1	Identify a function as a member of a family of functions based on its symbolic or graphical representation; recognize that different families of functions have different asymptotic behavior. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions

		Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.3.3	Write the general symbolic forms that characterize each family of functions. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: 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-world situations.
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. Module 01: Lesson 03 Shift, Reflect, Stretch
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-world situations.
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations Module 03: Lesson 05 Exponential and Logarithmic Models
EXPECTATION	A3.2.3	Apply properties of exponential and logarithmic functions. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
EXPECTATION	A.3.2.5	Relate exponential and logarithmic functions to real phenomena, including half-life and doubling time.

		Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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-world situations.
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 01: Lesson 03 Shift, Reflect, Stretch Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: 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-world situations.
GRADE LEVEL EXPECTATION	A3.5	Polynomial Functions
EXPECTATION	A3.5.1	Write the symbolic form and sketch the graph of simple polynomial functions. Module 02: Lesson 01 Quadratic Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2

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-world situations.
GRADE LEVEL EXPECTATION	A3.6	Rational Functions
EXPECTATION	A3.6.1	Write the symbolic form and sketch the graph of simple rational functions. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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-world situations.
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.2	Use the relationship between degree and radian measures to solve problems. Module 04: Lesson 01 Radian and Degree Measure
EXPECTATION	A3.7.3	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of $\pi/6$ and $\pi/4$. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.4	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location of maxima and minima. Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions Module 04: Lesson 07 Inverse Trigonometric Functions
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. Module 04: Lesson 02 Trig Functions: The Unit Circle

		Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
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. Module 04: Lesson 03 Right Triangle Trigonometry
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, and area of all types of triangles. Module 06: Lesson 01 Law of Sines
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. Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models
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 $\text{Area} = (1/2) ab \sin \theta$. Module 06: Lesson 01 Law of Sines Module 06: Lesson 02a Law of Cosines

		Module 06: Lesson 02b Applying the Laws of Sines and Cosines
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
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	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. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas Module 10: Lesson 04a Parametric Equations - Part 1
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) Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas
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. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions
GRADE LEVEL EXPECTATION	P1.2	Perform algebraic operations (including compositions) on functions and apply transformations (translations, reflections, and rescalings). Module 01: Lesson 03 Shift, Reflect, Stretch Module 01: Lesson 04 Combinations of Functions Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 07 Inverse Trigonometric Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 01: Lesson 04 Combinations of Functions Module 04: Lesson 07 Inverse Trigonometric 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 inverses. Module 01: Lesson 05 Inverse Functions
GRADE LEVEL EXPECTATION	P1.5	Determine whether two given functions are inverses, using composition. Module 01: Lesson 05 Inverse Functions
GRADE LEVEL EXPECTATION	P1.6	Identify and describe discontinuities of a function (e.g., greatest integer function, $1/x$) and how these relate to the graph. Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 04 Continuity at a Point
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. Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits
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. Module 03: Lesson 02 Logarithmic Functions and Their Graphs
GRADE LEVEL EXPECTATION	P2.2	Graph logarithmic functions. Graph translations and reflections of these functions. Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 04 Solving Exp. and Log. Equations Module 03: Lesson 05 Exponential and Logarithmic Models
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 Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms
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. Module 03: Lesson 04 Solving Exp. and Log. 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 involving exponential growth and decay. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P3:	Quadratic Functions
GRADE LEVEL EXPECTATION	P3.1	Solve quadratic-type equations (e.g. $e^{(2x)} - 4e^{(x+4)} = 0$) by substitution. Module 02: Lesson 01 Quadratic Functions
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

		<p>multiplicities, testing the sign on intervals and analyzing the function's large-scale behavior.</p> <p>Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 05a Fundamental Theorem of Algebra Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2</p>
GRADE LEVEL EXPECTATION	P4.3	<p>Know and apply fundamental facts about polynomials: the Remainder Theorem, the Factor Theorem, and the Fundamental Theorem of Algebra.</p> <p>Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials</p>
STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P5:	Rational Functions and Difference Quotients
GRADE LEVEL EXPECTATION	P5.1	<p>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.</p> <p>Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits</p>
STRAND / STANDARD CATEGORY	MI.P.	Precalculus
STANDARD	P6:	Trigonometric Functions
GRADE LEVEL EXPECTATION	P6.1	<p>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.</p> <p>Module 04: Lesson 01 Radian and Degree Measure Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions Module 04: Lesson 07 Inverse Trigonometric Functions</p>
GRADE LEVEL EXPECTATION	P6.2	<p>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.</p> <p>Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions</p>
GRADE LEVEL EXPECTATION	P6.3	<p>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.</p> <p>Module 04: Lesson 07 Inverse Trigonometric Functions</p>
GRADE LEVEL EXPECTATION	P6.4	<p>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).</p> <p>Module 04: Lesson 03 Right Triangle Trigonometry Module 05: Lesson 01 Using Fundamental Identities Module 05: Lesson 02 Verifying Trigonometric Identities Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas</p>
GRADE LEVEL EXPECTATION	P6.5	<p>Solve trigonometric equations using basic identities and inverse trigonometric functions.</p> <p>Module 05: Lesson 03a Solving Linear Trigonometric Equations Module 05: Lesson 03b Solving Trigonometric Equations Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas Module 06: Lesson 01 Law of Sines Module 06: Lesson 02a Law of Cosines</p>

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.). Module 04: Lesson 03 Right Triangle Trigonometry Module 05: Lesson 01 Using Fundamental Identities Module 05: Lesson 02 Verifying Trigonometric Identities Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas
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 relate to the data set or situation. Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions
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 problems using vectors. Module 06: Lesson 03 Vectors in the Plane Module 06: Lesson 04c Cross Products of Two Vectors
GRADE LEVEL EXPECTATION	P7.2	Know and apply the algebraic and geometric definitions of the dot product of vectors. Module 06: Lesson 04a Vectors and Dot Products Module 06: Lesson 04b Vectors in 3 Dimensions
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. Module 09: Lesson 01 Sequences and Summation Notation Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences Module 09: Lesson 04 Mathematical Induction
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. Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences Module 09: Lesson 04 Mathematical Induction
GRADE LEVEL EXPECTATION	P8.3	Understand, explain, and use the formulas for the sums of finite arithmetic and geometric sequences. Module 09: Lesson 03 Geometric Sequences
GRADE LEVEL EXPECTATION	P8.4	Compute the sums of infinite geometric series. Understand and apply the convergence criterion for geometric series. Module 09: Lesson 03 Geometric Sequences
GRADE LEVEL EXPECTATION	P8.5	Understand and explain the principle of mathematical induction and prove statements using mathematical induction. Module 09: Lesson 04 Mathematical Induction
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. Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots

		Module 10: Lesson 05 Polar Coordinates
GRADE LEVEL EXPECTATION	P9.2	Write complex numbers in polar form. Know and use De Moivre's Theorem. Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots Module 10: Lesson 05 Polar Coordinates
GRADE LEVEL EXPECTATION	P9.3	Evaluate parametric equations for given values of the parameter. Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.4	Convert between parametric and rectangular forms of equations. Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.5	Graph curves described by parametric equations and find parametric equations for a given graph. Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.6	Use parametric equations in applied contexts (e.g., orbits and projectiles) to model situations and solve problems. Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.7	Know, explain, and apply the locus definitions of parabolas, ellipses, and hyperbolas and recognize these conic sections in applied situations. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas
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. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas
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. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas
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 $x^2 = -1$. Module 02: Lesson 04 Complex Numbers Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots
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. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A1.1.2.	Know the properties of exponents and roots and apply them in algebraic expressions.

		Module 03: Lesson 01 Exponential Functions and Their Graphs
EXPECTATION	A1.1.3.	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities. Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials
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. Module 02: Lesson 01 Quadratic Functions
STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1.	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation and evaluate a function at a value in its domain. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations. Module 10: Lesson 03 Hyperbolas
EXPECTATION	A2.1.4.	Recognize that functions may be defined by different expressions over different intervals of their domains; such functions are piecewise-defined. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A2.1.5.	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions. Module 09: Lesson 01 Sequences and Summation Notation
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. Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra

		Module 02: Lesson 05b Writing about Polynomials Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits
EXPECTATION	A2.1.7.	Identify and interpret the key features of a function from its graph or its formula(s). Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 07 Graphs of Rational Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.1.	Combine functions by addition, subtraction, multiplication, and division. Module 01: Lesson 04 Combinations of Functions
EXPECTATION	A2.2.2.	Apply given transformations to parent functions and represent symbolically. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.2.3.	Determine whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs. Module 01: Lesson 05 Inverse Functions
STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.3.	Representations of Functions
EXPECTATION	A2.3.1.	Identify a function as a member of a family of functions based on its symbolic or graphical representation; recognize that different families of functions have different asymptotic behavior. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.3.3.	Write the general symbolic forms that characterize each family of functions. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 01: Lesson 03 Shift, Reflect, Stretch
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
EXPECTATION	A3.2.5.	Relate exponential functions to real phenomena, including half-life and doubling time. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 01: Lesson 03 Shift, Reflect, Stretch Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: 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. Module 02: Lesson 01 Quadratic Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions

		Module 02: Lesson 05a Fundamental Theorem of Algebra Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 10: Lesson 03 Hyperbolas
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. Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations
EXPECTATION	L2.1.5.	Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers. Module 02: Lesson 04 Complex Numbers Module 02: Lesson 05a Fundamental Theorem of Algebra Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots
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.

		Module 09: Lesson 01 Sequences and Summation Notation Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences
EXPECTATION	L2.2.2.	Compute sums of finite arithmetic and geometric sequences. Module 09: Lesson 03 Geometric Sequences
EXPECTATION	L2.2.3.	Use iterative processes in such examples as computing compound interest or applying approximation procedures. Module 03: Lesson 01 Exponential Functions and Their Graphs
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 measurements; solve applied problems. Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations
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. Module 01: Lesson 01 Introduction to Functions
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. Module 03: Lesson 02 Logarithmic Functions and Their Graphs
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. Module 03: Lesson 04 Solving Exp. and Log. Equations
EXPECTATION	A1.2.10.	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific intervals. Module 04: Lesson 07 Inverse Trigonometric Functions
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 identify its domain and range. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation, and evaluate a function at a value in its domain. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words, and translate among representations. Module 10: Lesson 03 Hyperbolas
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. Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits
EXPECTATION	A2.1.7.	Identify and interpret the key features of a function from its graph or its formula(s). Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 07 Graphs of Rational Functions
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.1.	Combine functions by addition, subtraction, multiplication, and division. Module 01: Lesson 04 Combinations of Functions
EXPECTATION	A2.2.2.	Apply given transformations to parent functions, and represent symbolically. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.2.3.	Recognize whether a function (given in tabular or graphical form) has an inverse, and recognize simple inverse pairs. Module 01: Lesson 05 Inverse Functions
STRAND / STANDARD	MI.AII.	Algebra II

CATEGORY		
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.3.	Representations of Functions
EXPECTATION	A2.3.1.	Identify a function as a member of a family of functions based on its symbolic or graphical representation; recognize that different families of functions have different asymptotic behavior. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.3.3.	Write the general symbolic forms that characterize each family of functions. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations Module 03: Lesson 05 Exponential and Logarithmic Models
EXPECTATION	A3.2.3.	Apply properties of exponential and logarithmic functions. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms
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. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
STRAND /	MI.AII.	Algebra II

STANDARD CATEGORY		
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.2.	Use the relationship between degree and radian measures to solve problems. Module 04: Lesson 01 Radian and Degree Measure
EXPECTATION	A3.7.3.	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of $\pi/6$ and $\pi/4$. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.4.	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location of maxima and minima. Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions Module 04: Lesson 07 Inverse Trigonometric Functions
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.7.	Conic Sections and Their Properties
EXPECTATION	G1.7.2.	Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas Module 10: Lesson 04a Parametric Equations - Part 1
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 and square root of 3 in basic right triangle trigonometry, and the

		importance of pi because of its role in circle relationships. Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models
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. Module 06: Lesson 03 Vectors in the Plane Module 06: Lesson 04a Vectors and Dot Products Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 04c Cross Products of Two Vectors
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. Module 04: Lesson 03 Right Triangle Trigonometry
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, and area of all types of triangles. Module 06: Lesson 01 Law of Sines
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. Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models
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 $\text{Area} = (1/2) ab \sin \theta$. Module 06: Lesson 01 Law of Sines Module 06: Lesson 02a Law of Cosines Module 06: Lesson 02b Applying the Laws of Sines and Cosines

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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
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**Michigan Curriculum Standards
Mathematics
Grade 12 - Adopted 2007**

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	L1.1.6	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. Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models
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. Module 10: Lesson 03 Hyperbolas
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. Module 06: Lesson 03 Vectors in the Plane Module 06: Lesson 04a Vectors and Dot Products Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 04c Cross Products of Two Vectors
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	L2.1.3	Explain the exponential relationship between a number and its base 10

		<p>logarithm and use it to relate rules of logarithms to those of exponents in expressions involving numbers.</p> <p>Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations</p>
EXPECTATION	L2.1.4	<p>Know that the complex number i is one of two solutions to $x^2 = -1$.</p> <p>Module 02: Lesson 04 Complex Numbers Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots</p>
EXPECTATION	L2.1.5	<p>Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers.</p> <p>Module 02: Lesson 04 Complex Numbers Module 02: Lesson 05a Fundamental Theorem of Algebra Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots</p>
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	<p>Find the nth term in arithmetic, geometric, or other simple sequences.</p> <p>Module 09: Lesson 01 Sequences and Summation Notation Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences</p>
EXPECTATION	L2.2.2	<p>Compute sums of finite arithmetic and geometric sequences.</p> <p>Module 09: Lesson 03 Geometric Sequences</p>
EXPECTATION	L2.2.3	<p>Use iterative processes in such examples as computing compound interest or applying approximation procedures.</p> <p>Module 03: Lesson 01 Exponential Functions and Their Graphs</p>
EXPECTATION	L2.2.4	<p>Compute sums of infinite geometric sequences. (Recommended)</p> <p>Module 09: Lesson 03 Geometric Sequences</p>
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	L2.3.2	<p>Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel measurements; solve applied problems.</p> <p>Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations</p>
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. Module 09: Lesson 04 Mathematical Induction
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. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A1.1.2	Know the definitions and properties of exponents and roots transition fluently between them, and apply them in algebraic expressions. Module 03: Lesson 01 Exponential Functions and Their Graphs
EXPECTATION	A1.1.3	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities. Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials
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. Module 03: Lesson 02 Logarithmic Functions and Their Graphs
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) Module 04: Lesson 03 Right Triangle Trigonometry Module 05: Lesson 01 Using Fundamental Identities Module 05: Lesson 02 Verifying Trigonometric Identities Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas
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. Module 02: Lesson 01 Quadratic Functions
EXPECTATION	A1.2.7	Solve exponential and logarithmic equations, and justify steps in the solution. Module 03: Lesson 04 Solving Exp. and Log. Equations
EXPECTATION	A1.2.10	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific intervals. Module 04: Lesson 07 Inverse Trigonometric Functions
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. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.1.2	Read, interpret, and use function notation and evaluate a function at a value in its domain. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.1.3	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations. Module 01: Lesson 01 Introduction to Functions Module 10: Lesson 03 Hyperbolas Module 10: Lesson 06 Graphs of Polar Equations Module 12: Lesson 01 Introduction to Limits
EXPECTATION	A2.1.4	Recognize that functions may be defined by different expressions over different intervals of their domains; such functions are piecewise-defined. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A2.1.5	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions. Module 09: Lesson 01 Sequences and Summation Notation

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. Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits
EXPECTATION	A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e). Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 07 Graphs of Rational Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
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	A2.2.1	Combine functions by addition, subtraction, multiplication, and division. Module 01: Lesson 04 Combinations of Functions
EXPECTATION	A2.2.2	Apply given transformations to basic functions and represent symbolically. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.2.3	Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs. Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.2.4	If a function has an inverse, find the expression(s) for the inverse. (Recommended) Module 01: Lesson 05 Inverse Functions
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) Module 01: Lesson 04 Combinations of Functions Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.2.6	Know and interpret the function notation for inverses and verify that two functions are inverses using composition. (Recommended)

		Module 01: Lesson 05 Inverse Functions
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	A2.3.1	Identify a function as a member of a family of functions based on its symbolic or graphical representation; recognize that different families of functions have different asymptotic behavior. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.3.3	Write the general symbolic forms that characterize each family of functions. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: 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-world situations.
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. Module 01: Lesson 03 Shift, Reflect, Stretch
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-world situations.
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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.

		<p>Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations Module 03: Lesson 05 Exponential and Logarithmic Models</p>
EXPECTATION	A3.2.3	<p>Apply properties of exponential and logarithmic functions.</p> <p>Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms</p>
EXPECTATION	A3.2.4	<p>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.</p> <p>Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models</p>
EXPECTATION	A.3.2.5	<p>Relate exponential and logarithmic functions to real phenomena, including half-life and doubling time.</p> <p>Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models</p>
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-world situations.
GRADE LEVEL EXPECTATION	A3.3	Quadratic Functions
EXPECTATION	A3.3.1	<p>Write the symbolic form and sketch the graph of a quadratic function given appropriate information.</p> <p>Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: Parabolas</p>
EXPECTATION	A3.3.2	<p>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.</p> <p>Module 01: Lesson 03 Shift, Reflect, Stretch Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: Parabolas</p>
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-world situations.
GRADE LEVEL EXPECTATION	A3.5	Polynomial Functions
EXPECTATION	A3.5.1	<p>Write the symbolic form and sketch the graph of simple polynomial functions.</p> <p>Module 02: Lesson 01 Quadratic Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 10: Lesson 04a Parametric Equations - Part 1</p>

		Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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-world situations.
GRADE LEVEL EXPECTATION	A3.6	Rational Functions
EXPECTATION	A3.6.1	Write the symbolic form and sketch the graph of simple rational functions. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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-world situations.
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.2	Use the relationship between degree and radian measures to solve problems.

		Module 04: Lesson 01 Radian and Degree Measure
EXPECTATION	A3.7.3	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of $\pi/6$ and $\pi/4$. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.4	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location of maxima and minima. Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions Module 04: Lesson 07 Inverse Trigonometric Functions
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
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. Module 04: Lesson 03 Right Triangle Trigonometry
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, and area of all types of triangles. Module 06: Lesson 01 Law of Sines
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. Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models
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 θ using the formula $\text{Area} = (1/2) ab \sin \theta$. Module 06: Lesson 01 Law of Sines Module 06: Lesson 02a Law of Cosines Module 06: Lesson 02b Applying the Laws of Sines and Cosines
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
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	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. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas Module 10: Lesson 04a Parametric Equations - Part 1
EXPECTATION	G1.7.4	Know and use the relationship between the vertices and foci in an ellipse, the vertices and foci in a hyperbola, and the directrix and focus in a parabola, interpret these relationships in applied contexts. (Recommended) Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas
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. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions
GRADE LEVEL EXPECTATION	P1.2	Perform algebraic operations (including compositions) on functions and apply transformations (translations, reflections, and rescalings). Module 01: Lesson 03 Shift, Reflect, Stretch Module 01: Lesson 04 Combinations of Functions Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 07 Inverse Trigonometric Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 01: Lesson 04 Combinations of Functions Module 04: Lesson 07 Inverse Trigonometric 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 inverses. Module 01: Lesson 05 Inverse Functions
GRADE LEVEL EXPECTATION	P1.5	Determine whether two given functions are inverses, using composition. Module 01: Lesson 05 Inverse Functions
GRADE LEVEL EXPECTATION	P1.6	Identify and describe discontinuities of a function (e.g., greatest integer function, $1/x$) and how these relate to the graph. Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 04 Continuity at a Point
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. Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits
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. Module 03: Lesson 02 Logarithmic Functions and Their Graphs
GRADE LEVEL EXPECTATION	P2.2	Graph logarithmic functions. Graph translations and reflections of these functions. Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 04 Solving Exp. and Log. Equations Module 03: Lesson 05 Exponential and Logarithmic Models
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 Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms
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.

		Module 03: Lesson 04 Solving Exp. and Log. 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 involving exponential growth and decay. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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. Module 02: Lesson 01 Quadratic Functions
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's large-scale behavior. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 05a Fundamental Theorem of Algebra Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P4.3	Know and apply fundamental facts about polynomials: the Remainder Theorem, the Factor Theorem, and the Fundamental Theorem of Algebra. Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials
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. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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. Module 04: Lesson 01 Radian and Degree Measure Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions Module 04: Lesson 07 Inverse Trigonometric Functions
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions

		Module 04: Lesson 06 Graphs of Other Trig Functions
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. Module 04: Lesson 07 Inverse Trigonometric Functions
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). Module 04: Lesson 03 Right Triangle Trigonometry Module 05: Lesson 01 Using Fundamental Identities Module 05: Lesson 02 Verifying Trigonometric Identities Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas
GRADE LEVEL EXPECTATION	P6.5	Solve trigonometric equations using basic identities and inverse trigonometric functions. Module 05: Lesson 03a Solving Linear Trigonometric Equations Module 05: Lesson 03b Solving Trigonometric Equations Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas Module 06: Lesson 01 Law of Sines Module 06: Lesson 02a Law of Cosines
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.). Module 04: Lesson 03 Right Triangle Trigonometry Module 05: Lesson 01 Using Fundamental Identities Module 05: Lesson 02 Verifying Trigonometric Identities Module 05: Lesson 04 Sum and Difference Formulas Module 05: Lesson 05 Multiple-Angle and Product-Sum Formulas
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 relate to the data set or situation. Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions
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 problems using vectors. Module 06: Lesson 03 Vectors in the Plane Module 06: Lesson 04c Cross Products of Two Vectors
GRADE LEVEL EXPECTATION	P7.2	Know and apply the algebraic and geometric definitions of the dot product of vectors. Module 06: Lesson 04a Vectors and Dot Products Module 06: Lesson 04b Vectors in 3 Dimensions
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. Module 09: Lesson 01 Sequences and Summation Notation Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences Module 09: Lesson 04 Mathematical Induction
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. Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences Module 09: Lesson 04 Mathematical Induction

GRADE LEVEL EXPECTATION	P8.3	Understand, explain, and use the formulas for the sums of finite arithmetic and geometric sequences. Module 09: Lesson 03 Geometric Sequences
GRADE LEVEL EXPECTATION	P8.4	Compute the sums of infinite geometric series. Understand and apply the convergence criterion for geometric series. Module 09: Lesson 03 Geometric Sequences
GRADE LEVEL EXPECTATION	P8.5	Understand and explain the principle of mathematical induction and prove statements using mathematical induction. Module 09: Lesson 04 Mathematical Induction
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. Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots Module 10: Lesson 05 Polar Coordinates
GRADE LEVEL EXPECTATION	P9.2	Write complex numbers in polar form. Know and use De Moivre's Theorem. Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots Module 10: Lesson 05 Polar Coordinates
GRADE LEVEL EXPECTATION	P9.3	Evaluate parametric equations for given values of the parameter. Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.4	Convert between parametric and rectangular forms of equations. Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.5	Graph curves described by parametric equations and find parametric equations for a given graph. Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.6	Use parametric equations in applied contexts (e.g., orbits and projectiles) to model situations and solve problems. Module 10: Lesson 04b Parametric Equations - Part 2
GRADE LEVEL EXPECTATION	P9.7	Know, explain, and apply the locus definitions of parabolas, ellipses, and hyperbolas and recognize these conic sections in applied situations. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas
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. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas
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. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas
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 $x^2 = -1$. Module 02: Lesson 04 Complex Numbers Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots
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. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A1.1.2.	Know the properties of exponents and roots and apply them in algebraic expressions. Module 03: Lesson 01 Exponential Functions and Their Graphs
EXPECTATION	A1.1.3.	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities. Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials
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. Module 02: Lesson 01 Quadratic Functions
STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.1.	Definitions, Representations, and Attributes of Functions
EXPECTATION	A2.1.1.	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation and evaluate a function at a value in its domain. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words and

		translate among representations. Module 10: Lesson 03 Hyperbolas
EXPECTATION	A2.1.4.	Recognize that functions may be defined by different expressions over different intervals of their domains; such functions are piecewise-defined. Module 01: Lesson 01 Introduction to Functions
EXPECTATION	A2.1.5.	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions. Module 09: Lesson 01 Sequences and Summation Notation
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. Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits
EXPECTATION	A2.1.7.	Identify and interpret the key features of a function from its graph or its formula(s). Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 07 Graphs of Rational Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.1.	Combine functions by addition, subtraction, multiplication, and division. Module 01: Lesson 04 Combinations of Functions
EXPECTATION	A2.2.2.	Apply given transformations to parent functions and represent symbolically. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.2.3.	Determine whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs. Module 01: Lesson 05 Inverse Functions
STRAND / STANDARD CATEGORY	MI.AI.	Algebra I
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.3.	Representations of Functions

EXPECTATION	A2.3.1.	Identify a function as a member of a family of functions based on its symbolic or graphical representation; recognize that different families of functions have different asymptotic behavior. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.3.3.	Write the general symbolic forms that characterize each family of functions. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 01: Lesson 03 Shift, Reflect, Stretch
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
EXPECTATION	A3.2.5.	Relate exponential functions to real phenomena, including half-life and doubling time. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 05 Exponential and Logarithmic Models
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.

		Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 01: Lesson 03 Shift, Reflect, Stretch Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 10: Lesson 01 Introduction to Conics: 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. Module 02: Lesson 01 Quadratic Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 10: Lesson 04a Parametric Equations - Part 1 Module 10: Lesson 04b Parametric Equations - Part 2
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. Module 10: Lesson 03 Hyperbolas
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. Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations
EXPECTATION	L2.1.5.	Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers. Module 02: Lesson 04 Complex Numbers Module 02: Lesson 05a Fundamental Theorem of Algebra Module 06: Lesson 05 Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots
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. Module 09: Lesson 01 Sequences and Summation Notation Module 09: Lesson 02 Arithmetic Sequences Module 09: Lesson 03 Geometric Sequences
EXPECTATION	L2.2.2.	Compute sums of finite arithmetic and geometric sequences. Module 09: Lesson 03 Geometric Sequences
EXPECTATION	L2.2.3.	Use iterative processes in such examples as computing compound interest or applying approximation procedures. Module 03: Lesson 01 Exponential Functions and Their Graphs
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 measurements; solve applied problems. Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations
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. Module 01: Lesson 01 Introduction to Functions
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. Module 03: Lesson 02 Logarithmic Functions and Their Graphs

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. Module 03: Lesson 04 Solving Exp. and Log. Equations
EXPECTATION	A1.2.10.	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific intervals. Module 04: Lesson 07 Inverse Trigonometric Functions
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 identify its domain and range. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 02 Graphs of Functions Module 01: Lesson 04 Combinations of Functions Module 01: Lesson 05 Inverse Functions Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 07 Inverse Trigonometric Functions
EXPECTATION	A2.1.2.	Read, interpret, and use function notation, and evaluate a function at a value in its domain. Module 01: Lesson 01 Introduction to Functions Module 01: Lesson 05 Inverse Functions
EXPECTATION	A2.1.3.	Represent functions in symbols, graphs, tables, diagrams, or words, and translate among representations. Module 10: Lesson 03 Hyperbolas
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. Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 02 Polynomial Functions of Higher Degree Module 02: Lesson 03 Real Zeros of Polynomial Functions Module 02: Lesson 05a Fundamental Theorem of Algebra Module 02: Lesson 05b Writing about Polynomials Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits Module 12: Lesson 02 Techniques for Evaluating Limits Module 12: Lesson 03 Evaluating One-Sided Limits
EXPECTATION	A2.1.7.	Identify and interpret the key features of a function from its graph or its formula(s). Module 01: Lesson 02 Graphs of Functions Module 02: Lesson 07 Graphs of Rational Functions
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II

STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.2.	Operations and Transformations with Functions
EXPECTATION	A2.2.1.	Combine functions by addition, subtraction, multiplication, and division. Module 01: Lesson 04 Combinations of Functions
EXPECTATION	A2.2.2.	Apply given transformations to parent functions, and represent symbolically. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.2.3.	Recognize whether a function (given in tabular or graphical form) has an inverse, and recognize simple inverse pairs. Module 01: Lesson 05 Inverse Functions
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II
STANDARD	A2:	Functions
GRADE LEVEL EXPECTATION	A2.3.	Representations of Functions
EXPECTATION	A2.3.1.	Identify a function as a member of a family of functions based on its symbolic or graphical representation; recognize that different families of functions have different asymptotic behavior. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
EXPECTATION	A2.3.3.	Write the general symbolic forms that characterize each family of functions. Module 01: Lesson 03 Shift, Reflect, Stretch Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 10: Lesson 01 Introduction to Conics: Parabolas
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. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms Module 03: Lesson 04 Solving Exp. and Log. Equations Module 03: Lesson 05 Exponential and Logarithmic Models
EXPECTATION	A3.2.3.	Apply properties of exponential and logarithmic functions. Module 03: Lesson 01 Exponential Functions and Their Graphs Module 03: Lesson 02 Logarithmic Functions and Their Graphs Module 03: Lesson 03 Properties of Logarithms

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. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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. Module 02: Lesson 06 Rational Functions and Asymptotes Module 02: Lesson 07 Graphs of Rational Functions Module 12: Lesson 01 Introduction to Limits
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.2.	Use the relationship between degree and radian measures to solve problems. Module 04: Lesson 01 Radian and Degree Measure
EXPECTATION	A3.7.3.	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of $\pi/6$ and $\pi/4$. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
EXPECTATION	A3.7.4.	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location of maxima and minima. Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions Module 04: Lesson 07 Inverse Trigonometric Functions
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 05b Analyzing the Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions
STRAND / STANDARD CATEGORY	MI.AII.	Algebra II

STANDARD	G1:	Figures and Their Properties
GRADE LEVEL EXPECTATION	G1.7.	Conic Sections and Their Properties
EXPECTATION	G1.7.2.	Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones. Module 10: Lesson 01 Introduction to Conics: Parabolas Module 10: Lesson 02 Ellipses Module 10: Lesson 03 Hyperbolas Module 10: Lesson 04a Parametric Equations - Part 1
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 and square root of 3 in basic right triangle trigonometry, and the importance of pi because of its role in circle relationships. Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models
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. Module 06: Lesson 03 Vectors in the Plane Module 06: Lesson 04a Vectors and Dot Products Module 06: Lesson 04b Vectors in 3 Dimensions Module 06: Lesson 04c Cross Products of Two Vectors
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. Module 04: Lesson 03 Right Triangle Trigonometry
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, and area of all types of triangles. Module 06: Lesson 01 Law of Sines

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. Module 04: Lesson 03 Right Triangle Trigonometry Module 04: Lesson 08 Applications and Models
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 $\text{Area} = (1/2) ab \sin \theta$. Module 06: Lesson 01 Law of Sines Module 06: Lesson 02a Law of Cosines Module 06: Lesson 02b Applying the Laws of Sines and Cosines
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. Module 04: Lesson 02 Trig Functions: The Unit Circle Module 04: Lesson 05a Graphs of Sine and Cosine Functions Module 04: Lesson 06 Graphs of Other Trig Functions

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