Ganado Unified School District #20
Algebra II/ 11-12

PACING Guide SY 2022-2023

Time Line & Resources (Identify textbook, page number or website link & etc.)	Arizona Mathematics Standards	Essential Question (HESS Matrix)	Learning Goal	Vocabulary (Content/Academic)
First Quarter				
Will be applied in all units of study	**Standards for Mathematical Practices:** **MP.1** – Make sense of problems and persevere in solving them. **MP.2** – Reason abstractly and quantitatively. **MP.3** – Construct viable arguments and critique the reasoning of others. **MP.4** – Model with mathematics. **MP.5** – Use appropriate tools strategically. **MP.6** – Attend to precision. **MP.7** – Look for and make use of structure. **MP.8** – Look for and express regularity in repeated reasoning			

REVEAL Algebra 2 Module 1 Relations and Functions	**A2.F-IF.B.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Include problem-solving opportunities utilizing a real-world context. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions. **A2.F-IF.C.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions. **A2.F-IF.C.9** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or	How can analyzing a function help you understand the situation it models? Describe the difference between the codomain and the range. What might cause a codomain to not be all real numbers? Why is the horizontal line test useful to determine whether a function is one-to=one when given a graph? Could a function that is not an onto function be continuous? How do you know if a graph is a linear function? Without graphing, how can you tell whether a function is linear from a table? How many x-intercepts can a linear function have?	Students will be able to: • Determine whether functions are one-to-one and/or onto • Determine the continuity, domain, and range of functions. • Write the domain and range of functions by using set-builder and interval notations. • Identify linear and nonlinear functions • Identify and interpret the intercepts of functions • Identify whether graphs of functions possess line or point symmetry and determine whether functions are even, odd, or neither. • Identify extrema of functions • Identify end behavior of functions • Sketch graphs of functions and compare two functions represented in different ways • Graph linear functions • Graph linear inequalities in two variables • Apply translations to the graphs of functions	- Domain - Codomain - Range - One-to-one function - Onto function - Continuous function - Discrete function - Algebraic notation - Set-Builder notation - Interval notation - Linear function - Linear equation - Nonlinear function - Parabola - Intercept - X-intercept - Y-intercept - Symmetry - Line symmetry - Line of Symmetry - Point symmetry - Point of symmetry - Even functions - Odd functions - Extrema - Maximum - Minimum - Relative maximum

	by verbal descriptions.). Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions. **A2.F-BF.B.3** Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x+k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions. **A1.F-IF.B.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. **A1.A-CED.A.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.	How many x-intercepts can a nonlinear function have? How do you tell if a point is a maximum or relative maximum? Could a graph have a maximum and a different point that is a relative maximum? Why would the maximum or minimum value of a function be important? Why are the key features of a function important when graphing? Why is it important to define some functions over a specific interval?	• Apply dilations to the graphs of functions • Apply compositions of transformations to the graphs of functions and use transformations to write equations from graphs.	- Relative minimum - End behavior - Linear inequality - Boundary - Closed half-plane - Open half-plane - Constraint - Family of graphs - Constant function - Identity function - Transformations - Translation - Dilation - Reflection - Line of reflection -

REVEAL Algebra 2 Module 2 Linear Equations, Inequalities, and Systems	**A2.A-CED.A.1** Create equations and inequalities in one variable and use them to solve problems. Include problem-solving opportunities utilizing real-world context. Focus on equations and inequalities arising from linear, quadratic, rational, and exponential functions. **A1.A-CED.A.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **A1.A-CED.A.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. **A2.F-IF.B.6** Calculate and interpret the average rate of change of a continuous function (presented symbolically or as a table) on a closed interval. Estimate the rate of change from a graph. Include problem-solving opportunities utilizing real-world context. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions.	How are equations, inequalities, and systems of equations or inequalities best used to model to real-world situations? Why are systems of equations useful when solving real-world situations? Why is linear programming important in the real-world? Why is solving a system of equations in three variables similar to solving a system in two variables? What does the solution to a system represent? How do I recognize when there are multiple or no solutions and what does that represent? What strategies can I use to solve systems of equations?	Students will be able to: • Solve linear equations • Solve linear equation by examining graphs of the related functions • Solve linear inequalities • Write and solve absolute value equations, and graph the solutions on a number line • Write and solve absolute value inequalities, and graph the solutions on a number line. • Write linear equations in standard form and identify values of A, B, and C. • Create linear equations in slope-intercept form and by using the coordinates of two points. • Create linear equations in point-slope form by using two points on the line or the slope and a point on the line. • Solve systems of linear equations by graphing • Solve systems of equations by using the substitution method • Solve systems of equations by using the elimination method	- Equation - Solution - Root - Zero - Inequality - Absolute value - Extraneous solution - Empty set - System of equations - Consistent - Inconsistent - Independent - Dependent - Substitution - Elimination - System of inequalities - Feasible region - Bounded - Unbounded - Linear programming - Optimization - Ordered triple

	A2.A-REI.D.11 Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) =g(x); find the solutions approximately (e.g., using technology to graph the functions, make tables of values, or find successive approximations). Include problems in real-world context. Extend from linear, quadratic, and exponential functions to cases where f(x) and/or g(x) are polynomial, rational, exponential, and logarithmic functions.		• Solve systems of linear inequalities in two variables • Find maximum and minimum values of a function over a region • Solve real-world optimization problems by graphing systems of inequalities maximizing or minimizing constraints • Solve systems of linear equations in three variables • Solve absolute value equations • Solve absolute value inequalities	
REVEAL Algebra 2 Module 3 Quadratic Functions	**A2.F-IF.B.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Include problem-solving opportunities utilizing a real-world context. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine,	Why are important characteristics of a quadratic function? What real-world situations can be modeled by quadratic functions and equations? How can the graph of a quadratic function help you solve the corresponding quadratic equation? How do complex numbers relate to	Students will be able to: • Graph quadratic functions • Find the interpret the average rate of change of quadratic functions given symbolically, in tables, and in graphs • Solve quadratic equations by graphing • Perform operations with pure imaginary numbers • Perform operations with complex numbers • Solve quadratic equations by factoring	- Quadratic function - Axis of symmetry - Vertex - Maximum - Minimum - Rate of change - Average rate of change - Quadratic equation - Standard form of a quadratic equation - Imaginary unit i - Pure imaginary number

	tangent, square root, cube root and piecewise-defined functions. **A2.F-IF.B.6** Calculate and interpret the average rate of change of a continuous function (presented symbolically or as a table) on a closed interval. Estimate the rate of change from a graph. Include problem-solving opportunities utilizing real-world context. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions. **A1.A-CED.A.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **A2.N-CN.A.1** Apply the relation i 2 = –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. Write complex numbers in the form (a+bi) with a and b real. **A2.N-CN.C.7** Solve quadratic equations with real coefficients that have complex solutions.	solving quadratic equations? How do you know what method to use when solving a quadratic equation? How do you know what method to use when solving a quadratic equation? How do I find the zeros of a function? How do I create and use a mathematical model to analyze a real-world situation? How do I find the vertex and what does it represent in the context of the problem?	• Solve quadratic equations by factoring special products • Solve quadratic equations by using the Square Root Property. • Complete the square in quadratic expressions to solve quadratic equations • Complete the square in a quadratic function to interpret key features of its graph • Solve equations by using the Quadratic Formula • Determine the number and type of roots of a quadratic equation • Graph quadratic inequalities in two variables • Solve quadratic inequalities in two variables by graphing • Solve systems of linear and quadratic equations • Solve systems of two quadratic equations	- Complex number - Complex conjugates - Rationalizing the denominator - Factored form - Difference of squares - Perfect square trinomials - Completing the Square - Vertex form - Projectile motion problems - Discriminant - Quadratic Inequality - Quadratic relations

	A1.F-IF.C.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. **a.** Use the process of factoring and completing the square of a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. **A1.A-SSE.A.1** Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret expressions by viewing one or more of their parts as a single entity. **A2.A-REI.D.11** Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) =g(x); find the solutions approximately (e.g., using technology to graph the functions, make tables of values, or find successive approximations). Include problems in real-world context. Extend from linear, quadratic, and exponential functions to cases where f(x) and/or g(x) are polynomial, rational, exponential, and logarithmic functions.			

Second Quarter				
REVEAL Algebra 2 Module 4 Polynomials and Polynomial Functions	**A2.F-IF.B.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Include problem-solving opportunities utilizing a real-world context. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions. **A2.F-IF.C.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions. **A1.A-APR.A.1** Understand that polynomials form a system	How does an understanding of polynomials and polynomial functions help us understand and interpret real-world events? How does a power function's graph change as the degree of the function increases? Are polynomials closed under addition, subtraction, and multiplication? How do you know you have your remainder and that you are done dividing? How do I determine the zeros of a function and what do they represent? How do I compare and contrast polynomial functions? How do I create and use a mathematical model to	Students will be able to: • Graph and analyze power functions • Graph and analyze polynomial functions • Approximate zeros by graphing polynomial functions • Find extrema of polynomial functions • Add and subtract polynomials • Multiply polynomials • Divide polynomials by using long division • Divide polynomials by using synthetic division • Expand powers of binomials by using Pascal's Triangle and the Binomial Theorem	- Power function - Leading coefficient - Degree - Monomial function - Polynomial in one variable - Standard form of a polynomial - Degree of a polynomial - Polynomial function - Quartic function - Quantic function - Binomial - Trinomial - Closed - FOIL Method - Synthetic division - Pascal's Triangle -

	analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **A2.A-APR.D.6** Rewrite rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or for the more complicated examples, a computer algebra system.	analyze a real-world situation? How do I determine the function's end behavior?		
REVEAL Algebra 2 Module 5 Polynomial Equations	**A2.A-CED.A.1** Create equations and inequalities in one variable and use them to solve problems. Include problem-solving opportunities utilizing real-world context. Focus on equations and inequalities arising from linear, quadratic, rational, and exponential functions. **A2.A-REI.D.11** Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) =g(x); find the solutions approximately (e.g., using technology to graph the functions, make tables of values, or find successive approximations). Include problems in real-world context. Extend from linear, quadratic, and exponential functions to cases where	What methods are useful for solving polynomial equations and finding zeros of polynomial functions? Why are the Remainder and Factor Theorems important when solving polynomial equations? Why is the Fundamental Theorem of Algebra important as we use polynomial equations to model and solve real-world situations?	Students will be able to: • Solve polynomial equations by graphing • Solve polynomial equations by factoring • Solve polynomial equations by writing them in quadratic form and factoring • Prove polynomial identities and use them to describe numerical relationships • Evaluate functions by using synthetic substitution • Use the Factor Theorem to determine factors of polynomials	- Prime polynomial - Quadratic form - Identity - Polynomial identity - Synthetic substitution - Depressed polynomial - Multiplicity

	f(x) and/or g(x) are polynomial, rational, exponential, and logarithmic functions. **A2.A-APR.C.4** Prove polynomial identities and use them to describe numerical relationships. **A2.A-APR.B.2** Know and apply the Remainder and Factor Theorem: For a polynomial p(x) and a number a, the remainder on division by (x – a) is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x). **P.N-CN.C.9** Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials. **A2.A-APR.B.3** Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. Focus on quadratic, cubic, and quartic polynomials including polynomials for which factors are not provided. **A2.F-IF.C.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Functions include linear, quadratic, exponential, polynomial,		• Use the Fundamental Theorem of Algebra to determine the numbers and types of roots of polynomial equations • Determine the numbers and types of roots of polynomial equations, find zeros, and use zeros to graph polynomial functions	

	logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions.			
REVEAL Algebra 2 Module 6 Inverse and Radical Functions	**A2.F-BF.A.1** Write a function that describes a relationship between two quantities. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions. Include problem-solving opportunities utilizing real-world context. b. Combine function types using arithmetic operations and function composition. **A1.F-IF.B.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. **A2.F-BF.B.4** Find inverse functions. a. Understand that an inverse function can be obtained by expressing the dependent variable of one function as the independent variable of another, recognizing that functions f and g are inverse functions if and only if $f(x) = y$ and $g(y) = x$ for all values of x in the domain of f and all values of y in the domain of g. **A2.A-SSE.A.2** Use structure to identify ways to rewrite numerical and polynomial expressions. Focus	How can the inverse of a function be used to help interpret a real-world event or solve a problem? Why would you use the inverse of a function to model a real-world situation? Why would you choose a square root function to model a set of data instead of a polynomial function? How do I determine the zeros of a function? How do I determine a function's asymptotes and relate them to the function's behavior? How do I determine the essential details of the function and use them to graph?	Students will be able to: • Find sums, differences, products, and quotients of functions • Find compositions of functions • Find inverses of relations • Verify that two relations are inverses by using compositions • Simplify expressions involving radicals and rational exponents. • Simplify expressions in exponential or radial form • Graph and analyze square root functions • Graph and analyze cube root functions • Simplify radical expressions • Add, subtract, and multiply radicals • Divide and simplify radical expressions by rationalizing the denominator • Solve radical equations in one variable and identify extraneous solutions	- Composition of functions - Inverse relations - Inverse functions - Nth root - Index - Radicand - Principal root - Rational exponent - Radical function - Square root function - Cube root function - Like radical expressions - Conjugates - Radical equation

	on polynomial multiplication and factoring patterns. **A2.F-IF.C.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions. **A2.F-BF.B.3** Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x+k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions. **A2.A-REI.A.2** Solve rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.		• Solve radical equations by graphing systems of equations	

Third Quarter				
REVEAL Algebra 2 Module 7 Exponential Functions	**A2.F-IF.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Include problem-solving opportunities utilizing real- world context. Key features include: intercepts, intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root, and piecewise-defined functions. **A2.F-IF.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root, and piecewise-defined functions.	How are real-world situations involving quantities that grow or decline rapidly modeled mathematically? How do I determine a function's asymptotes and relate them to the function's behavior? How do I use exponential functions to model real-world situations? How do I create and use a mathematical model to analyze a real-world situation? How can being financially literate help you make good decisions? What type of patterns can be modeled mathematically?	Students will be able to: • Graph exponential growth functions • Graph exponential decay functions • Solve exponential equations in one variable • Solve exponential inequalities in one variable • Analyze expressions and functions involving the natural base e • Generate geometric sequences • Find sums of geometric series • Choose the best function type to model sets of data	- Exponential function - Exponential growth - Asymptote - Growth factor - Exponential decay - Decay factor - Exponential equation - Compound interest - Exponential inequality - e - Sequence - Term of a sequence - Finite sequence - Infinite sequence - Geometric sequence - Common ratio - Explicit formula - Recursive formula - Geometric means - Series - Geometric series - Sigma notation - Regression function

	A2.A-REI.11 Explain why the x – coordinate of the points where g(x) and f(x) intersect are the solutions to the equation g(x) = f(x). Find the solutions algebraically and graphically. Include problems utilizing real-world context. Extend from linear, quadratic, and exponential functions to cases where f(x) and/or g(x) are polynomial, rational, exponential, and logarithmic. **A2.A-CED.A.1** Create equations and inequalities in one variable and use them to solve problems. Include problem-solving opportunities utilizing real-world context. Focus on equations and inequalities arising from linear, quadratic, rational, and exponential functions. **A1.A-CED.A.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **A2.F-IF.B.6** Calculate and interpret the average rate of change of a continuous function (presented symbolically or as a table) on a closed interval. Estimate the rate of change from a graph. Include problem-solving opportunities utilizing real-world context.			- Coefficient of determination

	Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions. **A2.A-SSE.B.4** Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments			
REVEAL Algebra 2 Module 8 Logarithmic Functions	**A2.A-SSE.A.2** Use structure to identify ways to rewrite numerical and polynomial expressions. Focus on polynomial multiplication and factoring patterns. **A2.F-IF.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root, and piecewise-defined functions. **A2.A-CED.A.1** Create equations and inequalities in one variable and use them to solve problems. Include problem-solving opportunities utilizing real-world context. Focus on equations and inequalities arising	How are logarithms defined and used to model situations in the real world? How do I determine a function's asymptotes and relate them to the function's behavior? How do I use logarithmic functions to model? What is a logarithmic function and how is it related to an exponential function? How are the graphs of exponential functions and logarithm functions related?	Students will be able to: • Write logarithmic expressions in exponential form • Write exponential expressions in logarithmic form • Graph and analyze logarithmic functions • Solve logarithmic equations using properties of equality • Simplify and evaluate expressions by using the properties of logarithms • Solve exponential equations by using common logarithms • Evaluate logarithmic expressions by using the Change of Base Formula • Simplify expressions with natural logarithms	- Logarithm - Logarithm function - Logarithmic equation - Common logarithms - Natural base - Exponential function - Natural logarithm -

	from linear, quadratic, rational, and exponential functions. **A2.A-REI.11** Explain why the x – coordinate of the points where g(x) and f(x) intersect are the solutions to the equation g(x) = f(x). Find the solutions algebraically and graphically. Include problems utilizing real-world context. Extend from linear, quadratic, and exponential functions to cases where f(x) and/or g(x) are polynomial, rational, exponential, and logarithmic. **A2.F-LE.A.4** For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where *a*, *c*, and *d* are numbers and the base *b* is 2, 10, or *e*; evaluate the logarithms that are not readily found by hand or observation using technology	Why are common logarithms useful in the real world? Why are exponential growth and decay functions useful in the real world?	• Solve exponential equations by using natural logarithms • Write and solve exponential growth equations and inequalities • Write and solve exponential decay equations	
REVEAL Algebra 2 Module 9 Rational Functions	**P.A-APR.D.7** Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions. **A2.F-IF.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the	How are the rules for operations with rational numbers applied to operations with rational expressions and equations? How do I determine the zeros of a function? How do I determine a function's asymptotes	Students will be able to: • Simplify rational expressions • Simplify rational expressions by multiplying and dividing • Simplifying rational expressions by adding and subtracting • Simplify complex fractions	- Rational expression - Complex fraction - Reciprocal function - Vertical asymptote - Horizontal asymptote - Hyperbola - Excluded values - Rational function - Oblique asymptote - Point discontinuity

	quantities, and sketch graphs showing key features given a verbal description of the relationship. Include problem-solving opportunities utilizing real- world context. Key features include: intercepts, intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root, and piecewise-defined functions. **A1.F-IF.B.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. **A2.F-BF.3** Identify the effect on the graph of replacing f(x) by f(x) + k, k*f(x), f(kx), and f(x + k) for specified values of k (both positive and negative); find the values of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graphs using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. Functions include linear, quadratic, exponential, polynomial,	and relate them to the function's behavior? How do I determine the essential details of the function and use them to graph? Why are graphs useful? How are the properties of a rational function reflected in its graph? Why can analyzing a rational function algebraically and graphically help you to see the "whole picture"?	• Graph reciprocal functions by making tables of values • Graph and write reciprocal functions by using transformations • Graph and analyze rational functions with vertical and horizontal asymptotes • Graph and analyze rational functions with oblique asymptotes • Recognize and solve direct and joint variation equations • Recognize and solve inverse and combined variation equations • Solve rational equations in one variable • Solve rational inequalities in one variable	- Direct variation - Constant of variation - Joint variation - Inverse variation - Combined variation - Rational equation - Rational inequality

	logarithmic, rational, sine, cosine, tangent, square root, cube root, and piecewise-defined functions. **A2.A-CED.A.1** Create equations and inequalities in one variable and use them to solve problems. Include problem-solving opportunities utilizing real-world context. Focus on equations and inequalities arising from linear, quadratic, rational, and exponential functions. **A1.A-CED.A.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **A2.A-REI.A.2** Solve rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. **A2.A-REI.11** Explain why the x – coordinate of the points where g(x) and f(x) intersect are the solutions to the equation g(x) = f(x). Find the solutions algebraically and graphically. Include problems utilizing real-world context. Extend from linear, quadratic, and exponential functions to cases where f(x) and/or g(x) are polynomial, rational, exponential, and logarithmic.			

Fourth Quarter				
REVEAL Algebra 2 **Module 10** **Inferential Statistics**	**A2.S-IC.A.1** Understand statistics as a process for making inferences about population parameters based on a random sample from that population. **A2.S-IC.A.2** Explain whether a specified model is consistent with results from a given data-generating process. **A2.S-IC.B.3** Recognize the purposes of and differences between designed experiments, sample surveys and observational studies. **A2.S-IC.B.4** Use data from a sample survey to estimate a population mean or proportion; recognize that estimates are unlikely to be correct and the estimates will be more precise with larger sample sizes. **P.S-IC.B.5** Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. **P.S-IC.B.6** Evaluate reports based on data.	How can data be collected and interpreted so that it is useful to a specific audience? How can you use information to make decision? How can probability be used in decision making? Can statistics lie?	Students will be able to: • Classify sampling methods and identify bias in samples and survey questions • Distinguish among sample surveys, experiments, and observational studies • Compare theoretical and experimental probabilities • Determine whether models are consistent with results from simulations of real-life situations • Describe distributions by finding their mean and standard deviation • Classify variables and analyze probability distributions to determine expected outcomes • Analyze normally distributed variables by using the Empirical Rule • Analyze standardized data and distributions by using z-values • Use sample data to infer a population mean by using confidence intervals	- Parameter - Statistic - Population - Bias - Survey - Experiment - Observational study - Theoretical probability - Experimental probability - Probability model - Simulation - Descriptive statistics - Distribution - Symmetric distribution - Outlier - Variance - Standard deviation - Probability distribution - Discrete random variable - Continuous random variable - Outcome - Sample space normal distribution - Z-value

			• Use sample data to infer a population proportion by using confidence intervals	- Standard normal distribution - Inferential statistics - Sampling error - Standard error of the mean - Confidence interval - Maximum error of the estimate - Population proportion -
REVEAL Algebra 2 Module 11 Trigonometric Functions	**A2.F-TF.A.1** Understand radian measure of an angle as the length of the arc on any circle subtended by the angle, measured in units of the circle's radius. **A2.F-TF.A.2** Explain how the unit circle in the coordinate plane enables the extension of sine and cosine functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. **P.F-TF.A.3** Use special triangles to determine geometrically the values of sine, cosine, tangent for π /3, π/4 and π/6, and use the unit circle to express the values of sine, cosine, and tangent for π-x, π+x, and 2π-x in terms of their values for x, where x is any real number.	What are the key features of the graph of a trigonometric function and how do they represent real-world situations? Why are trigonometric functions in right triangles useful in the real world? Why are the graphs of sine and cosine useful in a real world setting? How do I graph trigonometric functions?	Students will be able to: • Draw angles in standard position and identify coterminal angles • Convert between degree and radian measures and find arc lengths by using central angles • Find values of trigonometric functions for acute triangles • Find values of trigonometric functions of general angles • Find values of trigonometric functions by using reference angles • Find values of trigonometric functions given a point on a unit circle or the measure of a special angle	- Standard position - Initial side - Terminal side - Coterminal angles - Radian - Central angle of a circle - Trigonometry - Trigonometric ratio - Trigonometric function - Sine - Cosine - Tangent - Cosecant - Secant - Cotangent - Quadrantal angle - Reference angle - Unit circle

	A2.F-TF.B.5 Create and interpret sine, cosine and tangent functions that model periodic phenomena with specified amplitude, frequency, and midline. **A2.F-IF.B.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Include problem-solving opportunities utilizing a real-world context. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions. **A2.F-IF.C.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine,		• Find values of trigonometric functions that model periodic events • Graph and analyze sine and cosine functions • Model periodic real-world situations with sine and cosine functions • Graph and analyze tangent functions • Graph and analyze reciprocal trigonometric functions • Graph horizontal translations of trigonometric functions • Graph vertical translations of trigonometric functions • Find values of angle measure by using inverse trigonometric functions	- Circular function - Periodic function - Cycle - Period - Oscillation - Midline - Amplitude - Sinusoidal function - Frequency - Reciprocal trigonometric functions - Phase shift - Vertical shift - Inverse trigonometric functions - Principal values

	tangent, square root, cube root and piecewise-defined functions. **A2.F-BF.B.3** Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x+k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions. **P.F-TF.B.7** Use inverse functions to solve trigonometric equations utilizing real world context; evaluate the solution and interpret them in terms of context.			
REVEAL Algebra 2 Module 12 Trigonometric Identities and Equations	**A2.F-TF.C.8** Use the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and the quadrant of the angle θ to find sin(θ), cos(θ), or tan(θ) given sin(θ) or cos(θ). **P.F-TF.C.9** Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.	How are trigonometric identities similar to and different from other equations? How do you simplify a trigonometric expression? Why are trigonometric identities useful?	Students will be able to: • Find trigonometric values by using trigonometric identities • Simplifying trigonometric expressions by using trigonometric identities • Verifying trigonometric identities	- Trigonometric identity - Pythagorean identities - Cofunction identities - Trigonometric equation

		How do you decide what techniques to use when verifying a trigonometric identity? How do I solve a problem involving right or oblique (law of sines & law of cosines) triangles? How do I apply identities to solve trigonometric equations?	• Find values of sine and cosine by using sum and difference identities • Verify trigonometric identities by using sum and difference identities • Find values of sine and cosine by using double-angle identities • Find values of sine and cosine by using half-angle identities • Solve trigonometric equations	