Algebra 2 Scope & Sequence

Days May Vary	Unit	Standard(s)/Outcome(s)	Essential/Guiding Questions
14-16	Unit 1: Solving Equations	• CCSS.MATH.CONTENT.6.EE.A.2.A Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract from " as*. • CCSS.MATH.CONTENT.6.EE.A.2.B Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression as a product of two factors; view as both a single entity and a sum of two terms*. • CCSS.MATH.CONTENT.6.EE.A.2.C Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems.	• How is solving simple equations in one variable similar to solving equations that require new strategies and additional steps? • How does solving a quadratic equation with no real solutions connect to the existence of complex numbers? • What are different methods of solving a quadratic equation? • How will analyzing the discriminant reveal the nature of the solutions which would include complex solutions? • How can a negative number be thought of as the square of an imaginary number? • How are you able to identify extraneous

		Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas and to find the volume and surface area of a cube with sides of length s = .* ● CCSS.MATH.CONTENT.HSA.REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. ● CCSS.MATH.CONTENT.HSA.REI.D.11 Explain why the *x*-coordinates of the points where the graphs of the equations and intersect are the solutions of the equation ; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where and/or are linear, polynomial, rational, absolute	solutions?

		value, exponential, and logarithmic functions.* • CCSS.MATH.CONTENT.HSA.REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. • CCSS.MATH.CONTENT.HSA.REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables • CCSS.MATH.CONTENT.HSA.REI.B.4 Solve quadratic equations in one variable. • CCSS.MATH.CONTENT.HSA.REI.B.4.A Use the method of completing the square to transform any quadratic equation in into an equation of the form that has the same solutions. Derive the quadratic formula from this form. • CCSS.MATH.CONTENT.HSA.REI.B.4.B Solve quadratic equations by inspection (e.g., for), taking square roots,	

		completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as for real numbers and . • CCSS.MATH.CONTENT.HSA.REI.A.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	
14-16	Unit 2: Functions	• CCSS.MATH.CONTENT.HSF.IF.A.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. • CCSS.MATH.CONTENT.HSF.IF.A.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. • CCSS.MATH.CONTENT.HSF.BF.B.4 Find inverse functions.	• How do you distinguish between linear, exponential, root and simple relationships given the verbal, numeric and/or graphic representations? • How do you determine unknown parameters needed to create an equation that accurately models a given situation? • How do you produce a graph of a function with the appropriate scales and

		• CCSS.MATH.CONTENT.HSF.BF.B.4.A Solve an equation of the form for a simple function f that has an inverse and write an expression for the inverse. *For example, or f* • CCSS.MATH.CONTENT.HSF.BF.B.4.B (+) Verify by composition that one function is the inverse of another. • CCSS.MATH.CONTENT.HSF.BF.B.4.C (+) Read values of an inverse function from a graph or a table, given that the function has an inverse. • CCSS.MATH.CONTENT.HSF.BF.B.4.D (+) Produce an invertible function from a non-invertible function by restricting the domain. • CCSS.MATH.CONTENT.HSF.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.* • CCSS.MATH.CONTENT.HSF.IF.C.7.A Graph linear and quadratic functions and show intercepts, maxima, and minima.	labels used to display all aspects of a relation? • How do you describe the restrictions on the domain of all functions based on real world context? • How do you recognize functions in various forms? • How do you recognize common attributes of functions from various representations?

		• CCSS.MATH.CONTENT.HSA.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. • CCSS.MATH.CONTENT.HSF.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.* • CCSS.MATH.CONTENT.HSF.IF.C.7.B Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. • CCSS.MATH.CONTENT.HSF.IF.B.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an*	

		*appropriate domain for the function.** • CCSS.MATH.CONTENT.HSA.REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	
14-16	Unit 3: Polynomials	• CCSS.MATH.CONTENT.HSF.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.* • CCSS.MATH.CONTENT.HSF.IF.C.7.A Graph linear and quadratic functions and show intercepts, maxima, and minima. • CCSS.Math.Content.HSF.IF.C.7.c Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. • CCSS.Math.Content.HSF.IF.C.8 Write a function defined by an expression in different but	• How will you determine the vertex form of a quadratic function given its standard form? • How will you determine a quadratic function's vertex, and maximum or minimum both symbolically and graphically? • How will you use function transformations to graph polynomial functions of a higher degree? • How do you use the Leading Coefficient Test to determine end behavior of polynomial functions? • How do you determine

		equivalent forms to reveal and explain different properties of the function. ● CCSS.Math.Content.HSF.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. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.** ● CCSS.MATH.CONTENT.HSA.APR.B.2 Know and apply the Remainder Theorem: For a polynomial and a number , the remainder on division by is , so if and only if is a factor of . ● CCSS.MATH.CONTENT.HSA.APR.B.3 Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function	possible rational zeros of polynomial functions using the Rational Zero Test? ● How do you use synthetic division and the factor theorem to find real zeros of a function? ● How do you add, subtract, multiply, divide and graph complex numbers? ● How do you find the zeros of polynomials to help graph polynomial functions? ● How do you determine the polynomial function with the given zeros to graph a polynomial function using a graphing calculator?

		defined by the polynomial. ● CCSS.MATH.CONTENT.HSN.CN.B.4 (+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number. ● CCSS.MATH.CONTENT.HSF.BF.B.3 Identify the effect on the graph of replacing by , , , and for specific values of k (both positive and negative); find the value of 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.	
14-16	Unit 4: Rational Equations	● CCSS.MATH.CONTENT.HSA.APR.D.6 Rewrite simple rational expressions in different forms; write in the form , where , , , and are polynomials with the	● How do you determine the vertical, horizontal and slant asymptotes, and holes of a rational function?

		degree of less than the degree of, using inspection, long division, or, for the more complicated examples, a computer algebra system. ● CCSS.MATH.CONTENT.HSA.REI.D.11 Explain why the *x*-coordinates of the points where the graphs of the equations and intersect are the solutions of the equation ; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where and/or are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.* ● CCSS.MATH.CONTENT.HSF.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.* ● CCSS.MATH.CONTENT.HSF.IF.C.7.D (+) Graph rational functions, identifying zeros and asymptotes when suitable	● How do you find the domain of a rational function? How do you sketch the graph of a rational function? ● What connections can you make to vocabulary, such as coefficients, terms, degree, powers, leading coefficients, monomial, to more complex expressions such as polynomial and rational expressions? ● How do you use appropriate mathematical vocabulary to categorize polynomials and rational expressions? ● What connections can you make between the algorithms for operations on rational numbers and operation on rational numbers?

		factorizations are available, and showing end behavior.	
15-17	Unit 5: Exponentials and Logarithms	• CCSS.MATH.CONTENT.HSN.RN.A.1 Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define to be the cube root of 5 because we* we want = to hold, so must equal 5. • CCSS.MATH.CONTENT.HSN.RN.A.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents. • CCSS.MATH.CONTENT.HSA.REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. • CCSS.MATH.CONTENT.HSF.LE.A.1 Distinguish between	• How do you distinguish between linear, quadratic, exponential, root and simple rational relationship given the verbal, numeric, and/or graphic representations? • How do you connect appropriate function to context knowledge of the key features of exponential and logarithmic functions? • How do you relate the concept of domain to each function studied? • How do you describe the restrictions on the domain of all functions studied based on real world context? • When producing a rough graph of the parent function for each type of function, how do you apply knowledge of how parameters are introduce

		situations that can be modeled with linear functions and with exponential functions. ● CCSS.MATH.CONTENT.HSF.LE.A.1.C Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. ● CCSS.Math.Content.HSA.SSE.B.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. ● CCSS.Math.Content.HSA.SSE.B.3.c Use the properties of exponents to transform expressions for exponential functions. *For example the expression 1.15t can be rewritten as (1.151/12)12t ≈ 1.01212t to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.* ● CCSS.MATH.CONTENT.HSA.REI.D.11 Explain why the *x*-	into a function and alter the shape of the graph of the parent function? ● What connections can you make between adding, subtracting, multiplying of exponential functions from Algebra1 to adding, subtracting, multiplying and dividing any function? ● What connection can you make to finding the inverse of a linear function from Algebra 1 to finding the inverse of a simple exponential function and finding the domain and range of a function to its inverse?

		coordinates of the points where the graphs of the equations and intersect are the solutions of the equation ; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where and/or are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.* • CCSS.MATH.CONTENT.HSF.BF.B.5 (+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.	

15-17	Unit 6: Trigonometry	• CCSS.Math.Content.HSG.SRT.C.6Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. • CCSS.Math.Content.HSG.SRT.C.8Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.* • CCSS.Math.Content.HSF.TF.A.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. • CCSS.Math.Content.HSF.TF.A.2 Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. • CCSS.Math.Content.HSF.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	• How can angle measures in radians be used to determine the ratio of intercepted arc to radius? • How do you convert degree to radian measure and radian measure to degree? • What connections can you make between special right triangles and evaluating trigonometric functions at any domain value? • How do you extend angles beyond sing counterclockwise as the positive direction of rotation? • How do you connect contextual situations to appropriate trigonometric functions?

		the unit circle to express the values of sine, cosine, and tangent for x, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number • CCSS.Math.Content.HSF.TF.A.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. • CCSS.Math.Content.HSF.TF.B.7 (+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.* • CCSS.Math.Content.HSF.TF.C.8 Prove the Pythagorean identity and use it to find , , or given ,), or and the quadrant of the angle. • CCSS.Math.Content.HSF.TF.C.9 (+) Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems. • CCSS.Math.Content.HSF.TF.A.4 (+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric	

		functions. • CCSS.Math.Content.HSF.TF.B.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.* • CCSS.Math.Content.HSF.TF.B.6 (+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.	