2022-2023

Algebra 2
Course Guide

#2221/2222 Algebra 2
#7779/7780 Foundations in Algebra 2

Algebra 2 Pacing

Topic	Days	Topic	Days
1 – Linear Functions & Systems	12	4 – Rational Functions	25
10 - Matrices	12	5 – Rational Exponents & Radical Functions	21
2 – Quadratic Functions & Equations	26	6 – Exponential & Logarithmic Functions	23
3 – Polynomial Functions	23	11 – Statistics (optional)	10
Be here by end of Semester One		Be here by end of Semester Two	

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Linear Functions and Systems – Topic 1			
Lesson	Resource	Reteach & Build Understanding	Days
Key Features: Domain/Range, relative Max/Min and end behavior. Use interval notation and set-builder notation. Transformations of Absolute Value Functions (HSF.BF.B.3, HSF.IF.B.4, HSF.IF.B.5, HSF.IF.B.6, HSF.IF.C.7b)	Supplement 1.1		2
Piecewise-Defined Functions (HSF.IF.B.5, HSF.IF.C.7b, HSF.LE.A.2)	1.3	TE p30B	2
Solving Equations and Inequalities by Graphing (HSA.CED.A.1, HSA.REI.D.11)	1.5	TE p46B	2
Linear Systems – solve by graphing, substitution and elimination no matrices (HSA.CED.A.2, HSA.CED.A.3, HSA.REI.C.6)	1.6	TE p54B	3
Current Events - 3 Acts (HSA.CED.A.2, HSA.CED.A.3, HSA.REI.C.6)	TE p55		1
Review and Test			2
			Total = 12

Create equations that describe numbers or relationships.	
*HSA.CED.A.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
HSA.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
HSA.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.
Solve systems of equations.	
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.
Represent and solve equations and inequalities graphically.	
HSA.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 soutions 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 cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

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Build new functions from existing functions.	
*HSF.BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k, kf(x), f(kx), \text{and } f(x + k)$ 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.
Interpret functions that arise in applications in terms of the context.	
*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, relative maximums and minimums; symmetries; end behavior; and periodicity.
*HSF.IF.B.5	Relate the domain of a function to its graph and the quantitative relationship it describes.
HSF.IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
Analyze functions using different representations.	
*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. *b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
Interpret expression for functions in terms of the situation they model.	
HSF.LE.A.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (including from a table).

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Matrices – Topic 10			
Lesson	Resource	Reteach & Build Understanding	Days
Design Space Cities - STEM Project (HSN.VM.C.6, HSN.VM.C.8, HSN.VM.C.9)	TE p502		1
Operations with Matrices (HSN.VM.C.6, HSN.VM.C.7, HSN.VM.C.8)	10.1	TE p510B	2
Matrix Multiplication (HSN.VM.C.8, HSN.VM.C.9, HSN.VM.C.10)	10.2	TE p517B	2
Quiz			1
Inverses and Determinants (HSN.VM.C.10, HSA.REI.C.9)	10.4 Do Ex. 1-3	TE p536B	1
Inverse Matrices and System of Equations (HSA.CED.A.3, HSA.REI.C.8, HSA.REI.C.9)	10.5	TE p543B	2
The Big Burger - 3 Acts (optional) (HSN.VM.C.6, HSN.VM.C.8)	TE p544		1
Review and Test			2
Calculate using all operations (and determinants) by hand and with technology.			**Total = 12**

Create equations that describe numbers or relationships.	
HSA.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.
Solve systems of equations.	
HSA.REI.C.8	(+) Represent a system of linear equations as a single matrix equation in a vector variable.
HSA.REI.C.9	(+) Find the inverse of a matrix if it exists and use it to solve system of linear equations (use technology for matrices of dimensions 3 x 3 or greater).
Perform operations on matrices and use matrices in applications.	
HSN.VM.C.6	(+) Use matrices to represent and manipulate data.
HSN.VM.C.7	(+) Multiply matrices by scalars to produce new matrices.
HSN.VM.C.8	(+) Add, subtract, and multiply matrices of appropriate dimensions.
HSN.VM.C.9	(+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.
HSN.VM.C.10	(+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.

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Quadratic Functions and Equations – Topic 2			
Lesson	Resource	Reteach & Build Understanding	Days
Hit a Home Run - STEM Project (HSF.BF.B.3, HSF.IF.B.4, HSF.IF.C.7)	TE p73		1
Vertex Form of a Quadratic Function (HSA.CED.A.2, HSF.BF.B.3, HSF.IF.B.4)	2.1	TE p79B	3
Standard Form of a Quadratic Function (HSA.CED.A.2, HSF.IF.B.4)	2.2	TE p87B	3
Quadratic Form of a Quadratic Function (HSA.APR.B.3, HSA.SSE.A.2, HSA.SSE.B.3a-b)	2.3	TE p94B	3
Review and Test			2
Complex Numbers and Operations (HSN.CN.A.1, HSN.CN.A.2, HSN.CN.A.3) - Review simplifying square roots	2.4	TE p101B	3
Swift Kick - 3 Acts (optional) (HSA.CED.A.2, HSF.IF.B.4)	TE p102		1
Completing the Square (HSN.CN.C.7, HSA.REI.B.4, HSA.SSE.B.3b)	2.5	TE p109B	3
The Quadratic Formula (HSN.CN.C.7, HSA.REI.B.4)	2.6	TE p116B	3
Linear-Quadratic Systems (HSN.CN.C.7, HSA.REI.C.7, HSA.REI.D.11)	2.7	TE p123B	2
Review and Test			2
No horizontal stretch or compressions for any families			**Total = 26**

Perform arithmetic operations with complex numbers.	
*HSN.CN.A.1	Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.
HSN.CN.A.2	Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
HSN.CN.A.3	(+) Find the conjugate of a complex number; use conjugates to find moduli ($\lvert a + bi \rvert = \sqrt{a^2 + b^2}$) and quotients of complex numbers.
Use complex numbers and their operations on the complex plane.	
*HSN.CN.C.7	Solve quadratic equations with real coefficients that have complex solutions.
Perform arithmetic operations on polynomials.	
*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.
Create equations that describe numbers or relationships.	
HSA.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

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Solve equations and inequalities in one variable.	
HSA.REI.B.4	Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), 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 $a \pm bi$ for real numbers a and b.
Solve systems of equations	
HSA.REI.C.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.
Represent and solve equations and inequalities graphically.	
HSA.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 soutions of the equation $f(x) = g(x)$;
Interpret the structure of expressions.	
HSA.SSE.A.2	Use the structure of an expression to identify ways to rewrite it.
Write expressions in equivalent forms to solve problems.	
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. a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
Build new functions from existing functions.	
*HSF.BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k, k \cdot f(x), f(kx)$, 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.
Interpret functions that arise in applications in terms of the context.	
*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.
Analyze functions using different representations.	
*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.

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Polynomial Functions – Topic 3			
Lesson	Resource	Reteach & Build Understanding	Days
Design a Stadium - STEM Project (HSA.CED.A.2, HSF.BF.A.1, HSF.IF.A.2, HSF.IF.C.7, HSF.LE.A.3)	TE p130		1
Graphing Polynomial Functions (HSF.IF.B.4, HSF.IF.B.6, HSF.IF.C.7c)	3.1	TE p139B	3
Adding, Subtracting and Multiplying Polynomials (HSA.APR.A.1, HSF.BF.B.1b, HSF.IF.C.9)	3.2	TE p145B	2
Polynomial Identities (HSA.APR.C.4, HSA.SSE.A.2)	3.3	TE p153B	2
Dividing Polynomials (HSA.APR.B.2, HSA.APR.D.6, HSA.SSE.A.2)	3.4	TE p161B	3
Zeros of Polynomial Functions (HSA.APR.B.3, HSA.SSE.A.2, HSF.IF.C.7c)	3.5	TE p169B	3
Polynomial Rollercoasters – 3 Acts	Math Res		2
Theorems About Roots of Polynomial Equations (HSN.CN.C.8, HSN.CN.C.9, HSA.APR.B.2, HSA.APR.B.3)	3.6	TE p178B	2
Transformations of Polynomial Functions (HSF.BF.B.3)	3.7	TE p186B	3
Review and Test			2
Be here by end of Semester One			**Total = 23**

Use complex numbers in polynomial identities and equations.	
HSN.CN.C.8	(+) Extend polynomial identities to the complex numbers. For example, rewrite $x^2 + 4 = (x + 2i)(x - 2i)$
HSN.CN.C.9	(+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
Perform arithmetic operations on polynomials.	
HSA.APR.A.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
Understand the relationship between zeros and factors of polynomials.	
HSA.APR.B.2	Know and apply the Remainder 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 $p(x)$.
*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.
Use polynomial identities to solve problems.	
HSA.APR.C.4	Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.

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HSA.APR.D.6	Rewrite simple 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 computer algebra system.
Create equations that describe numbers or relationships.	
HSA.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
Interpret the structure of expressions.	
HSA.SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing the difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
Build a function that models a relationship between two quantities.	
HSF.BF.A.1	Write a function that describes a relationship between two quantities. b. Combine standard function types using arithmetic operations.
Build new functions from existing functions.	
*HSF.BF.A.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k, k \cdot f(x), f(kx),$ 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.
Understand the concept of a function and use function notation.	
*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.
Interpret functions that arise in applications in terms of the context.	
*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; intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
HSF.IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
Analyze functions using different representations.	
*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. *c. Graph polynomial functions identifying zeros when suitable factorizations are available, and showing end behavior.
HSF.IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically and in table or a verbal description.
Construct and compare linear, quadratic and exponential models and solve problems.	
HSF.LE.A.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

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Rational Functions – Topic 4			
Lesson	Resource	Reteach & Build Understanding	Days
Review Fractions and Factoring Quadratics	Supplement		1
Manufacturing Costs - STEM Project (HSA.CED.A.1, HSA.CED.A.2, HSA.REI.D.11, HSF.IF.C.7d)	TE p192		1
Inverse Variation and the Reciprocal Function (HSA.CED.A.2, HSF.BF.B.3, HSF.IF.C.7d)	4.1	TE p200B	3
Graphing Rational Functions (transformation of rational functions) (HSA.APR.D.6, HSA.REI.D.11, HSF.BF.B.3, HSF.IF.C.7d)	4.2	TE p209B	4
Multiplying and Dividing Rational Expressions (HSA.APR.D.6, HSA.APR.D.7, HSA.SSE.A.2)	4.3	TE p216B	3
Adding and Subtracting Rational Expressions (HSA.APR.D.7, HSA.SSE.A.2)	4.4	TE p223B	5
Solving Rational Equations (HSA.CED.A.1, HSA.REI.A.1, HSA.REI.A.2)	4.5	TE p231B	5
Real Cool Waters - 3 Acts	TE p232		1
Review and Test			2
			Total = 25

Rewrite rational expressions.	
HSA.APR.D.6	Rewrite simple 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 computer algebra system.
*HSA.APR.D.7	Rewrite rational expressions. 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.
Create equations that describe numbers or relationships.	
*HSA.CED.A.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
HSA.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
Understand solving equations as a process of reasoning and explain the reasoning.	
HSA.REI.A.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

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*HSA.REI.A.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
Represent and solve equations and inequalities graphically.	
HSA.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 soutions 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 cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
Interpret the structure of expressions.	
HSA.SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
Build new functions from existing functions.	
*HSF.BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k, k \cdot f(x), f(kx), \text{and } f(x + k)$ 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.
Analyze functions using different representations.	
*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. *d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

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Rational Exponents and Radical Functions – Topic 5			
Lesson	Resource	Reteach & Build Understanding	Days
Tune a Piano - STEM Project (HSN.RN.A.2, HSA.CED.A.1, HSA.REI.A.1, HSA.SSE.A.1)	TE p239		1
nth Roots, Radicals, Rational Exponents (HSN.RN.A.1, HSN.RN.A.2, HSA.REI.A.1) Use of absolute value and $\pm$ are both used in this text. However, in this class and on assessments the absolute value will be used when simplifying expressions. $\sqrt[4]{625x^{24}y^{28}} = \|5x^6y^7\|$ Use $\pm$ if $x^2 = 36$, then $x = \pm 6$.	5.1	TE p246B	4
Properties of Exponents and Radicals (HSA.SSE.A.1, HSA.SSE.A.2)	5.2	TE p254B	4
Graphing Radical Functions (HSF.BF.B.3, HSF.IF.B.4, HSF.IF.C.7d)	5.3	TE p262B	3
Solving Radical Equations (HSA.CED.A.4, HSA.REI.A.1, HSA.REI.A.2)	5.4	TE p271B	2
The Snack Shack - 3 Acts (HSA.CED.A.1, HSA.CED.A.4, HSA.REI.A.2)	TE p272		1
Function Operations (HSF.BF.A.1b, HSF.BF.A.1c)	5.5	TE p280B	2
Inverse Relations and Functions (HSF.BF.B.4a-d)	5.6	TE p289B	2
Review and Test			2
			Total = 21

Extend the properties of exponents to rational exponents.	
HSN.RN.A.1	Explain how the definitions 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.
*HSN.RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
Create equations that describe numbers or relationships.	
*HSA.CED.A.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
HSA.CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
Understand solving equations as a process of reasoning and explain the reasoning.	
HSA.REI.A.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution..

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*HSA.REI.A.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
Interpret the structure of expressions.	
HSA.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 complicated expressions by viewing one or more of the parts as a single entity. For example, interpret $P(1+r)^t$ as the product of P and a factor not depending on P.
HSA.SSE.A.2	Use the structure of an expression to identify ways to rewrite it.
Build a function that models a relationship between two quantities.	
HSF.BF.A.1	Write a function that describes a relationship between two quantities. b. Combine standard function types using arithmetic operations. c. (+) Compose functions.
Build new functions from existing functions.	
*HSF.BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x)+k, k\cdot f(x), f(kx), \text{and } f(x+k)$ 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.
*HSF.BF.B.4	Find inverse functions. *a. Solve an equation of the form $f(x)=c$ for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x)=2x^3$ or $f(x)=\frac{(x+1)}{(x-1)}$ for $x\neq 1$. b. (+) Verify by composition that one function is the inverse of another. c. (+) Read values of an inverse function from a graph or a table, given the function has an inverse. d. (+) Produce an invertible function from a non-invertible function by restricting the domain.
Interpret functions that arise in applications in terms of the context.	
*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.
Analyze functions using different representations.	
*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. *b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

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Exponential and Logarithmic Functions – Topic 6			
Lesson	Resource	Reteach & Build Understanding	Days
Analyze Elections - STEM Project (HSA.CED.A.1, HSF.BF.B.5, HSF.IF.C.8, HSF.LE.A.4)	TE p297		1
Key Features of Exponential Functions (supplement transformations (h,k) and a, $f(x) = a(b)^{(x-h)} + k$) (HSF.BF.B.3, HSF.IF.B.4, HSF.IF.B.6, HSF.IF.C.7e, HSF.IF.C.9, HSF.LE.A.2, HSF.LE.B.5)	6.1	TE p304B	4
Exponential Models (HSA.SSE.B.3c, HSF.IF.C.8b, HSF.LE.B.5)	6.2	TE p312B	3
Buying a Car – 3 Acts	Math Res		2
Logarithms (HSF.BF.B.4a, HSF.BF.B.5, HSF.LE.A.4)	6.3	TE p320B	3
Logarithmic Functions (HSF.BF.B.3, HSF.BF.B.5, HSF.IF.B.5, HSF.IF.B.6, HSF.IF.C.7e, HSF.IF.C.9)	6.4	TE p326B	3
Properties of Logarithms (HSF.LE.A.4)	6.5	TE p332B	3
Exponential and Logarithmic Equations (HSA.CED.A.1, HSA.REI.A.1, HSA.REI.D.11, HSA.SSE.A.2, HSF.LE.A.4)	6.6	TE p339B	2
Review and Test			2
			Total = 23

Create equations that describe numbers or relationships.	
*HSA.CED.A.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
Understand solving equations as a process of reasoning and explain the reasoning.	
HSA.REI.A.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
Represent and solve equations and inequalities graphically.	
HSA.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 soutions 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 cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
Interpret the structure of expressions.	
HSA.SSE.A.2	Use the structure of an expression to identify ways to rewrite it.
Write expression in equivalent forms to solve problems.	
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. c. Use the properties of exponents to transform expressions for exponential functions. For example, the expression 1.15^t can be rewritten as $\left(1.15^{1/12}\right)^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.

Algebra 2

Build new functions from existing functions.	
*HSF.BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k, k \cdot f(x), f(kx)$, 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.
*HSF.BF.B.4	Find inverse functions. *a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. b. (+) Verify by composition that one function is the inverse of another. c. (+) Read values of an inverse function from a graph or table, given that the function has an inverse. d. (+) Produce an invertible function from a non-invertible function by restricting the domain.
HSF.BF.B.5	(+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.
Interpret functions that arise in applications in terms of context.	
*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.
*HSF.IF.B.5	Relate the domain of a function to its graph and, to the quantitative relationship it describes.
HSF.IF.B.6	Calculate and interpret the average rate of change of a function over a specified interval. Estimate rate of change from a graph.
Analyze functions using different representations.	
*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. *e. Graph exponential and logarithmic functions, showing intercepts and end behavior.
*HSF.IF.C.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. *b. Use properties of exponents to interpret expressions for exponential functions.
HSF.IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one rational function and an algebraic expression for another compare features.
Interpret expression for functions in terms of the situation they model.	
HSF.LE.A.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (including reading these from a table).
*HSF.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 logarithm using technology.
Interpret expression for functions in terms of the situation they model.	
HSF.LE.B.5	Interpret the parameters in a linear or exponential function in terms of a context.

Algebra 2

Statistics – Topic 11 (optional)			
Lesson	Resource	Reteach & Build Understanding	Days
Statistical Questions and Variables (HSS.IC.A.1)	11.1	p557B	2
Statistical Studies and Sampling Methods (HSS.IC.A.1, HSS.IC.B.3, HSS.IC.B.6)	11.2	p564B	2
Data Distributions (HSS.IC.A.2, HSS.ID.A.1, HSS.ID.A.2)	11.3	p572B	2
Normal Distributions (HSS.IC.B.6, HSS.ID.A.4)	11.4	p580B	2
Review and Test			2
Be here by end of Semester Two			**Total = 10**

Understand and evaluate random processes underlying statistical experiments.	
HSS.IC.A.1	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
HSS.IC.A.2	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?
Make inferences and justify conclusions from sample surveys, experiments, and observational studies.	
HSS.IC.B.3	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
HSS.IC.B.6	Evaluate reports based on data.
Summarize, represent, and interpret data on a single count or measurement variable.	
HSS.ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
HSS.ID.A.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
HSS.ID.A.4	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.