

## Algebra I – Curriculum Map 11-12

Marking Period	Content	Skills	Essential Questions	Instruction	Resources	Assessment
<b>(3 – 4 weeks)</b> <b>Linear equations</b>	<p><b>Section Number and name: (Topic)</b></p> <p><b>None</b> Review of fractions</p> <p><b>1-1, 1-2</b> Review of expressions</p> <p><b>2-5.</b> properties (in depth)</p> <p><b>1-6 and add</b> Weighted averages</p> <p><b>2.1,2.2,2.3</b> integer operations</p> <p><b>2.4</b> Distributive property and combining like terms</p> <p><b>1.4, 5.1, 5.2, 5.4</b> basic function notation, domain and range, evaluate given a domain value</p>	<p>What do students have to be able to do connected to the Content?</p> <p>Add, subtract, multiply and divide fractions.</p> <p>Translate between expression and verbal representations</p> <p>Evaluate expressions given variable values</p> <p>Review the integer operations</p> <p>Understand distributive property and all other properties as they apply to combining expressions</p> <p>Write a function rule from a table Understand function notation Evaluate function notation given a domain value</p>	<p>What are fundamental, enduring questions that will guide study and instruction?</p> <p>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.</p> <p>L1.1.1 Know the different properties that hold in different number systems and recognize that the applicable properties change in the transition from the positive integers to all integers, to the rational numbers, and to the real numbers.</p> <p><b>L2.1.1 Explain the meaning and uses of weighted averages</b></p> <p>L1.1.2 Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse has the opposite sign.</p> <p>A2.1.1 Recognize whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range.</p>	<p>What activities are used to develop the skills and knowledge?</p> <p><b>Introduction to year:</b></p>	<p>What materials, texts, videos, internet, software, or human resources support instruction?</p> <p>Function sort Families of functions posters</p>	<p>What evidence (products and/or performances) is collected to establish that the Content and Skills have been learned?</p>

	<p>3.1, 3.2, 3.3 solving linear equations</p> <p>none Algebraic Proof</p> <p>3.6 Problem solving and explaining</p> <p>ch 6 graph <math>x = h</math>, <math>y = k</math></p> <p>ch 6 <math>x</math> and <math>y</math> intercepts of equations</p> <p>6.1 slope of a line</p> <p>6.2 slope intercept form</p> <p>none solution of equation/<math>x</math>-intercept</p> <p>6.3 creating slope intercept equations</p> <p>6.5 point-slope equations</p> <p>6.4 standard form equations</p> <p>ch 6 Translating between forms</p> <p>6.6 Parallel/Perpend. equations</p> <p>none Domain/range of a linear function</p> <p>pg 140-141 Literal equations</p>	<p>write and solve linear equations in one variable</p> <p>justify the steps to solve a linear equation in one variable</p> <p>Solve literal equations for any given variable</p> <p>graph a linear equation using <math>x</math> and <math>y</math> intercepts</p> <p>understand meaning of slope</p> <p>understand slope in a story, table, graph, and equation</p> <p>make quick graphs using slope and <math>y</math>-intercept</p> <p>understand the connection between the <math>x</math>-intercept and the solution of the equation</p> <p>create a slope intercept equation given appropriate information</p> <p>create equations parallel and perpendicular to a given line</p> <p>create point-slope equations given appropriate data</p> <p>create standard form equations given appropriate data</p> <p>translate between standard, point-slope and slope-intercept form of an equation</p> <p>understand linear functions</p> <p>be able to manipulate several variables</p>	<p>A2.1.2 Read, interpret, and use function notation and evaluate a function at a value in its domain.</p> <p>A2.1.3 Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations.</p> <p>A1.2.1 Write and solve equations and inequalities with one or two variables to represent mathematical or applied situations.</p> <p>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 solutions, and apply the quadratic formula appropriately.</p> <p>L1.1.3 Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations.</p> <p>A1.2.8 Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.</p> <p>A2.3.2 Describe the tabular pattern associated with functions having a constant rate of change (linear) or variable rates of change.</p> <p>A2.3.3 Write the general symbolic forms that characterize each family of functions.</p> <p>A2.2.3 Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs (e.g., <math>f(x) = x^3</math> and <math>g(x) = x^{1/3}</math>).</p> <p><b>A3.1.2 Graph lines (including those of the form <math>x = h</math> and <math>y = k</math>) given appropriate information.</b></p> <p><b>A3.1.3 Relate the coefficients in a linear function to the slope and <math>x</math>- and <math>y</math>-intercepts of its graph.</b></p> <p>A2.1.7 Identify and interpret the key features of a function from its graph or its formula(e), (e.g., slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry,</p>	<p><b>Solving and graphing linear equations:</b></p> <p><b>Inverse pairs:</b></p>	<p>Function based scenario</p> <p>Walk-a-thon (research article)</p> <p>Filling a swimming pool</p> <p>Cellular phone plan</p> <p>Miles to destination</p> <p>Going for a walk</p> <p>Candle problem</p> <p>Inverse functions (revamped)</p>	
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			and average rate of change over an interval).			
			A1.2.2 Associate a given equation with a function whose zeros are the solutions of the equation			
			<b>A3.1.1 Write the symbolic forms of linear functions (standard [i.e., <math>Ax + By = C</math>, where <math>B \neq 0</math>], point-slope, and slope-intercept) given appropriate information and convert between forms.</b>			
		solve one variable inequalities				
	4.4, 4.5 solve inequalities	solve and graph inequalities in two variables	<b>A3.1.4 Find an equation of the line parallel or perpendicular to given line through a given point. Understand and use the facts that nonvertical parallel lines have equal slopes and that nonvertical perpendicular lines have slopes that multiply to give -1.</b>			
	7.5 solve and graph two variable inequalities	graph absolute value equations				
	6.8 graph absolute value equations	solving absolute value equations and relate the solutions to the x-intercepts of the graph	A1.2.1 Write and solve equations and inequalities with one or two variables to represent mathematical or applied situations.			
	4.6 solve absolute value equations	solve absolute value inequalities	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 solutions, and apply the quadratic formula appropriately.			
	4.6 solve absolute value inequalities		A1.2.8 Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.			
			A1.2.4 Solve absolute value equations and inequalities (e.g., solve $ x - 3  \leq 6$ ) and justify.			
			L1.2.2 Interpret representations that reflect absolute value relationships (e.g., $ x - a  < b$ , or $a \pm b$ ) in such contexts as error tolerance.			
		graph systems of equations, including special cases	A1.2.2 Associate a given equation with a function whose zeros are the solutions of the equation			
	7.1 graph systems of equations	solve linear systems of inequalities by graphing	A2.2.2 Apply given transformations (e.g., vertical or horizontal shifts, stretching or shrinking, or reflections about the $x$ - and $y$ -axes) to basic functions and represent symbolically	<b>Applications of systems of linear equations:</b>	Break even analysis	
	7.6 solve linear systems of inequalities by graphing	solve systems of equations by substitution, including special cases			School of rock	
	7.2 solve systems by substitution	solve systems of equations by linear combination			Canoe shop	
	7.3 solve systems by elimination	solve linear systems that involve 3 variables	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		Oil wells	

	<p><b>none</b> solve three variable, three equation systems</p> <p><b>none</b> composition of functions</p>	<p>begin understanding function operations and composition of functions as it relates to substitution and elimination methods</p>	<p>solutions, and apply the quadratic formula appropriately</p> <p>A2.2.1 Combine functions by addition, subtraction, multiplication, and division.</p> <p>A2.1.2 Read, interpret, and use function notation and evaluate a function at a value in its domain.</p>	<p><b>End of unit:</b></p>	<p>Linear or not?</p>	
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Month	Content	Skills	Essential Questions What are fundamental, enduring questions that will guide study and instruction?	Instruction What activities are used to develop the skills and knowledge?	Resources What materials, texts, videos, internet, software, or human resources support instruction?	Assessment What evidence (products and/or performances) is collected to establish that the Content and Skills have been learned?
(6 – 8 weeks) Quadratic Functions	<p><b>9.1- 9.4</b> polynomial operations</p> <p><b>9.5 - 9.8</b> factoring</p> <p><b>10.1-10.2</b> quadratic functions and graphing</p> <p><b>none</b> graphing in factored form</p> <p><b>none</b> graphing in vertex form</p> <p><b>none</b> translate between forms</p> <p><b>none</b> create quadratic functions given table, graph, scenario, etc.</p>	<p>Add, subtract, multiply and divide polynomials</p> <p>Understand and use function notation</p> <p>Factor all quadratics including special cases and factor by grouping</p> <p>Graph quadratics in all three forms</p> <p>Translate between forms</p> <p>Understand which form is best for a given situation</p> <p>Identify all key elements of a parabola</p> <p>Be able to state domain and range of any quadratic function</p> <p>Be able to use transformations to write an equation in vertex form</p> <p>Be able to use tabular patterns to write a quadratic function</p> <p>Relate the real solutions of a quadratic to the graph</p> <p>Find inverse pairs using quadratics</p>	<p>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.</p> <p>A2.1.2 Read, interpret, and use function notation and evaluate a function at a value in its domain.</p> <p>A2.2.1 Combine functions by addition, subtraction, multiplication, and division.</p> <p>A1.1.3 Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities (e.g., differences of squares and cubes).</p> <p><b>A3.3.1 Write the symbolic form and sketch the graph of a quadratic function given appropriate information (e.g., vertex, intercepts, etc.).</b></p> <p><b>A3.3.2 Identify the elements of a parabola (vertex, axis of symmetry, and 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.</b></p> <p>A2.2.2 Apply given transformations (e.g., vertical or horizontal shifts, stretching or shrinking, or reflections about the <math>x</math>- and <math>y</math>-axes) to basic functions and represent symbolically</p> <p>A2.3.2 Describe the tabular pattern associated with functions having a constant rate of change (linear) or variable rates of change.</p> <p>A2.3.3 Write the general symbolic forms that characterize each family of functions.</p> <p><b>A3.3.4 Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function</b></p> <p><b>A3.3.5 Express quadratic functions in vertex form to identify their maxima or minima and in factored form to identify their zeros.</b></p>	<p><b>Revamp lessons in book to combine with function notation</b></p> <p><b>Introduction to quadratics:</b></p> <p><b>Factoring:</b></p> <p><b>Quadratics and graphing:</b></p>	<p>Modeling curves Theatre problem</p> <p>Finding the lines</p> <p>Quadratics exploration posters (me) Investigating vertex form Stopping distance Ball bounce activity Inverse wkst revamped again</p>	

	<p><b>10.3 – 10.4</b> solving quadratics</p> <p><b>10.5</b> solve by completing the square</p> <p><b>none</b> use completing the square to create vertex form</p> <p><b>10.6</b> quadratic formula</p> <p><b>none</b> use quadratic formula to get x-intercepts from standard form</p> <p><b>none</b> understand the imaginary number <math>i</math></p> <p><b>none</b> use <math>i</math> when solving quadratics</p> <p><b>applications – some in book – but will need to add more</b></p>	<p>Solve any quadratic equation:</p> <ul style="list-style-type: none"> <li>- by square roots</li> <li>- by quadratic formula</li> <li>- by completing the square</li> </ul> <p>associate these solutions with the x-intercepts of the graph</p> <p>use completing the square to translate between standard and vertex form</p> <p>Understand the square root of <math>-1</math> is <math>i</math></p> <p>Use <math>i</math> to simplify the square root of any negative number</p> <p>Use <math>i</math> to simplify quadratic formula and completing the square that involve negative square roots</p> <p>Be able to use quadratics to model situations</p> <p>Know when a situation can be modeled by a quadratic</p>	<p>A1.2.2 Associate a given equation with a function whose zeros are the solutions of the equation</p> <p>A2.1.1 Recognize whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range.</p> <p>A1.2.1 Write and solve equations and inequalities with one or two variables to represent mathematical or applied situations.</p> <p>A1.2.3 Solve linear and quadratic equations and inequalities, including systems of up to three linear equations with three unknowns. <b>Justify steps in the solutions, and apply the quadratic formula appropriately</b></p> <p><b>A3.3.3 Convert quadratic functions from standard to vertex form by completing the square.</b></p> <p>A1.2.8 Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.</p> <p><b>L2.1.4 Know that the complex number <math>i</math> is one of two solutions to <math>x^2 = -1</math>.</b></p> <p>A2.2.3 Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs (e.g., <math>f(x) = x^3</math> and <math>g(x) = x^{1/3}</math>).</p> <p>A2.4.1 Identify the family of functions best suited for modeling a given real-world situation [e.g., quadratic functions for motion of an object under the force of gravity or exponential functions for compound interest. <i>In the example above, recognize that the appropriate general function is exponential (<math>P = P_0a^t</math>)</i>].</p> <p>A2.4.2 Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. <i>In the example above, substitute the given values <math>P_0 = 300</math> and <math>a = 1.02</math> to obtain <math>P = 300(1.02)^t</math>.</i></p> <p>A2.4.3 Using the adapted general symbolic form, draw reasonable</p>	<p><b>End of unit:</b></p>	<p>What do you know about quadratics? Linear or quadratic?</p>	
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			conclusions about the situation being modeled. <i>In the example above, the exact solution is 365.698, but for this problem, an appropriate approximation is 365.</i>			
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Month	Content	Skills	Essential Questions	Instruction	Resources	Assessment
(4 – 5 WEEKS) Polynomial Functions	9.1- 9.4 polynomial operations  None of the graphing is in the book	<p>Add, subtract, multiply and divide polynomials</p> <p>Understand and use function notation</p> <p>Write a polynomial function given appropriate information</p> <p>Sketch the graph of a polynomial</p> <p>Given a polynomial function:</p> <ul style="list-style-type: none"> <li>- find x-intercepts</li> <li>- find y-intercept</li> <li>- find positive intervals</li> <li>- find negative intervals</li> <li>- find domain</li> <li>- find range</li> <li>- find maximum zeros</li> </ul> <p>understand the effects of:</p> <ul style="list-style-type: none"> <li>- leading coefficient</li> <li>- degree</li> <li>- end behavior</li> </ul> <p>factor a polynomial</p> <ul style="list-style-type: none"> <li>- difference of cubes</li> <li>- sum of cubes</li> <li>- factor by grouping</li> </ul> <p>decide if a polynomial function is right for a given situation and write a model for the situation</p> <p>find inverses of simple polynomials</p> <p>use transformations on polynomial graphs</p> <p>understand the symmetry of a polynomial graph (even vs odd)</p>	<p>A2.2.1 Combine functions by addition, subtraction, multiplication, and division.</p> <p>A2.1.2 Read, interpret, and use function notation and evaluate a function at a value in its domain.</p> <p><b>A3.5.1 Write the symbolic form and sketch the graph of simple polynomial functions.</b></p> <p><b>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.</b></p> <p><b>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.</b></p> <p>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.</p> <p>A1.1.3 Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities (e.g., differences of squares and cubes).</p> <p>A1.2.1 Write and solve equations and inequalities with one or two variables to represent mathematical or applied situations.</p> <p>A1.2.2 Associate a given equation with a function whose zeros are the solutions of the equation</p> <p>A1.2.8 Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.</p> <p>A2.1.1 Recognize whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range.</p> <p>A2.1.3 Represent functions in symbols, graphs, tables, diagrams,</p>	<p><b>Introduction:</b></p> <p><b>Graphing:</b></p>	<p>Tray problem</p> <p>Polynomials worksheet Investigating polynomials Kix cereal activity Symmetry/transformations Graphing polynomials Factoring End behavior, positive and negative intervals Inverses revamped again</p>	<p>What evidence (products and/or performances) is collected to establish that the Content and Skills have been learned?</p>

			<p>or words and translate among representations.</p> <p><b>A2.1.6</b> Identify the zeros of a function and the intervals where the values of a function are positive or negative. Describe the behavior of a function as <math>x</math> approaches positive or negative infinity, given the symbolic and graphical representations</p> <p><b>A2.1.7</b> Identify and interpret the key features of a function from its graph or its formula(e), (e.g., slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, and average rate of change over an interval).</p> <p><b>A2.2.2</b> Apply given transformations (e.g., vertical or horizontal shifts, stretching or shrinking, or reflections about the <math>x</math>- and <math>y</math>-axes) to basic functions and represent symbolically</p> <p><b>A2.2.3</b> Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs (e.g., <math>f(x) = x^3</math> and <math>g(x) = x^{1/3}</math>).</p> <p><b>A2.3.2</b> Describe the tabular pattern associated with functions having a constant rate of change (linear) or variable rates of change.</p> <p><b>A2.3.3</b> Write the general symbolic forms that characterize each family of functions.</p> <p><b>A2.4.1</b> Identify the family of functions best suited for modeling a given real-world situation [e.g., quadratic functions for motion of an object under the force of gravity or exponential functions for compound interest. <i>In the example above, recognize that the appropriate general function is exponential (<math>P = P_0a^t</math>)].</i></p> <p><b>A2.4.2</b> Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. <i>In the example above, substitute the given values <math>P_0 = 300</math> and <math>a = 1.02</math> to obtain</i> <math>P = 300(1.02)^t</math>.</p> <p><b>A2.4.3</b> Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. <i>In the example above, the exact solution is 365.698, but for this problem, an appropriate approximation is 365.</i></p>	<p><b>End of unit:</b></p>	<p>Identify the function</p>	
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Month	Content	Skills	Essential Questions	Instruction	Resources	Assessment
(8 – 9 WEEKS) Exponential Functions	<p>What topic(s) is being covered and what is the important vocabulary? What do students need to know</p> <p><b>Power functions are not in book</b></p> <p>8.1 zero/negative exponents</p> <p>8.3-8.5 properties of exponents</p> <p>none rational exponents</p> <p>11.1 simplifying radicals</p> <p>11.2 operations with radicals</p>	<p>What do students have to be able to do connected to the Content?</p> <p>Analyze power function graphs for symmetry</p> <p>Write a power function for a situation</p> <p>Sketch a graph of a power function</p> <p>Find inverse pairs of power functions</p> <p>Find domain and range of power functions</p> <p>Use exponent rules to simplify expressions</p> <p>Evaluate expressions with:</p> <ul style="list-style-type: none"> <li>- negative exponents</li> <li>- zero exponents</li> <li>- rational exponents</li> <li>- roots</li> </ul> <p>Transition between roots and exponents</p>	<p>What are fundamental, enduring questions that will guide study and instruction?</p> <p><b>A3.4.3 Analyze the graphs of power functions, noting reflectional or rotational symmetry.</b></p> <p><b>A3.4.1 Write the symbolic form and sketch the graph of power functions.</b></p> <p><b>A3.4.2 Express direct and inverse relationships as functions (e.g., <math>y = kx^n</math> and <math>y = kx^{-n}</math>, <math>n &gt; 0</math>) and recognize their characteristics (e.g., in <math>y = x^3</math>, note that doubling <math>x</math> results in multiplying <math>y</math> by a factor of 8).</b></p> <p>A1.2.2 Associate a given equation with a function whose zeros are the solutions of the equation</p> <p><b>L1.1.4 Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number less than 0, a number between 0 and 1, and a number greater than 1.</b></p> <p><b>L2.1.2 Calculate fluently with numerical expressions involving exponents. Use the rules of exponents, and evaluate numerical expressions involving rational and negative exponents, and transition easily between roots and exponents.</b></p> <p><b>A1.1.2 Know the definitions and properties of exponents and roots and apply them in algebraic expressions.</b></p> <p>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.</p> <p>A1.2.1 Write and solve equations and inequalities with one or two variables to represent mathematical or applied situations.</p> <p>A1.2.8 Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.</p> <p>A2.1.2 Read, interpret, and use function notation and evaluate a function at a value in its domain.</p>	<p>What activities are used to develop the skills and knowledge?</p> <p><b>Introduction:</b></p> <p><b>Exponent rules:</b></p>	<p>What materials, texts, videos, internet, software, or human resources support instruction?</p> <p>Inverse worksheet revamped again!!</p> <p>Folding paper activity</p> <p>Exploring exponential rules</p>	<p>What evidence (products and/or performances) is collected to establish that the Content and Skills have been learned?</p>

<p><b>11.3</b> solving radical equations</p> <p><b>8.7</b> exponential functions</p> <p><b>8.8</b> exponential growth and decay</p> <p><b>10.8</b> linear, quadratic, or exponential</p>	<p>Solve power functions using inverse operations</p> <p>Check for extraneous solutions</p> <p>Write a model for an exponential function</p> <p>Understand exponential growth and decay</p> <p>Understand half-life and doubling time</p> <p>Graph an exponential function</p> <p>Determine domain and range of an exponential function</p> <p>Apply transformations to exponential function graphs</p> <p>Understand the common ratio pattern in a table that produces an exponential function</p> <p>Identify which family of functions best represents the data and write a model for the data</p>	<p><b>A1.2.6</b> Solve power equations (e.g., <math>(x + 1)^3 = 8</math>) and equations including radical expressions (e.g., <math>\sqrt{3x - 7} = 7</math>), justify steps in the solution, and explain how extraneous solutions may arise.</p> <p><b>A3.2.1</b> Write the symbolic form and sketch the graph of an exponential function given appropriate information (e.g., given an initial value of 4 and a rate of growth of 1.5, write <math>f(x) = 4(1.5)^x</math>).</p> <p><b>A3.2.4</b> 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.</p> <p><b>A3.2.5</b> Relate exponential functions to real phenomena, including half-life and doubling time</p> <p><b>A2.1.1</b> Recognize whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range.</p> <p><b>A2.1.3</b> Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations.</p> <p><b>A2.1.6</b> Identify the zeros of a function and the intervals where the values of a function are positive or negative. Describe the behavior of a function as <math>x</math> approaches positive or negative infinity, given the symbolic and graphical representations</p> <p><b>A2.1.7</b> Identify and interpret the key features of a function from its graph or its formula(e), (e.g., slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, and average rate of change over an interval).</p> <p><b>A2.2.2</b> Apply given transformations (e.g., vertical or horizontal shifts, stretching or shrinking, or reflections about the <math>x</math>- and <math>y</math>-axes) to basic functions and represent symbolically</p> <p><b>A2.2.3</b> Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs (e.g., <math>f(x) = x^3</math> and <math>g(x) = x^{1/3}</math>).</p> <p><b>A2.3.2</b> Describe the tabular pattern associated with functions having a constant rate of change (linear) or variable rates of change.</p> <p><b>A2.3.3</b> Write the general symbolic forms that characterize each family of functions.</p> <p><b>A2.4.1</b> Identify the family of functions best suited for modeling a given real-world situation [e.g., quadratic functions for motion of an object under the force of gravity or exponential functions for compound interest. <i>In the example above, recognize that the</i></p>	<p><b>Exponential graphs:</b></p>	<p>Let's make a deal          Finding exponential models          M&amp;M data collection          Exponential situations          Light intensity          Exponential functions          "Numbers" activity          Murder mystery</p>		
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			<p><i>appropriate general function is exponential (<math>P = P_0a^t</math>).</i></p> <p><b>A2.4.2</b> Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. <i>In the example above, substitute the given values <math>P_0 = 300</math> and <math>a = 1.02</math> to obtain</i> <math>P = 300(1.02)^t</math>.</p> <p><b>A2.4.3</b> Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. <i>In the example above, the exact solution is 365.698, but for this problem, an appropriate approximation is 365.</i></p>			
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Month	Content	Skills	Essential Questions	Instruction	Resources	Assessment
<b>(4 – 6 weeks) Mathematical Modeling</b>	<p>What topic(s) is being covered and what is the important vocabulary? What do students need to know</p> <p><b>1.5</b> scatter plots</p> <p><b>6.7</b> scatter plots</p> <p><b>4.6</b> absolute value and error tolerance</p> <p><b>the rest is not in the book</b></p>	<p>What do students have to be able to do connected to the Content?</p> <p>Make a scatter plot</p> <p>Fit a line to the data</p> <p>Use least squares regression lines</p> <p>Evaluate patterns in scatterplots</p> <p>Make predictions from your best fit line</p> <p>Evaluate error</p> <p>Understand correlation vs causation</p> <p>Use Pearson's Correlation Coefficient</p> <p>Relate absolute value to error tolerance</p> <p>Understand error tolerance and it's uses</p> <p>Recognize and use piece wise functions</p> <p>Understand their domain and range</p>	<p>What are fundamental, enduring questions that will guide study and instruction?</p> <p><b>L1.2.4 Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media.</b></p> <p><b>S2.1.1 Construct a scatterplot for a bivariate data set with appropriate labels and scales.</b></p> <p><b>S2.1.2 Given a scatterplot, identify patterns, clusters, and outliers. Recognize no correlation, weak correlation, and strong correlation.</b></p> <p><b>S2.1.3 Estimate and interpret Pearson's correlation coefficient for a scatterplot of a bivariate data set. Recognize that correlation measures the strength of linear association.</b></p> <p><b>S2.1.4 Differentiate between correlation and causation. Know that a strong correlation does not imply a cause-and-effect relationship. Recognize the role of lurking variables in correlation.</b></p> <p><b>S2.2.1 For bivariate data that appear to form a linear pattern, find the least squares regression line by estimating visually and by calculating the equation of the regression line. Interpret the slope of the equation for a regression line.</b></p> <p><b>S2.2.2 Use the equation of the least squares regression line to make appropriate predictions.</b></p> <p><b>L1.2.2 Interpret representations that reflect absolute value relationships (e.g., <math> x-a  &lt; b</math>, or <math>a \pm b</math>) in such contexts as error tolerance.</b></p> <p><b>A2.1.4 Recognize that functions may be defined by different expressions over different intervals of their</b></p>	<p>What activities are used to develop the skills and knowledge?</p> <p><b>Correlation coefficient:</b></p> <p><b>Error:</b></p>	<p>What materials, texts, videos, internet, software, or human resources support instruction?</p> <p>Use websites to investigate</p> <p>Looking at error</p>	<p>What evidence (products and/or performances) is collected to establish that the Content and Skills have been learned?</p>

		<p>Understand recursive functions</p> <p>Graph recursive functions</p> <p>Compute values of a recursive function</p> <p>Justify numerical relationships</p> <p>The rest of the unit is introducing different tables, graphs, situations, etc. and deciding which model fits the situation and then writing a model for the situation. It is a comparison of all function families.</p>	<p><b>domains. Such functions are piecewise-defined (e.g., absolute value and greatest integer functions).</b></p> <p><b>A2.1.5 Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions (e.g., <math>f(0) = 5</math>, and <math>f(n) = f(n-1) + 2</math>).</b></p> <p><b>L1.1.5 Justify numerical relationships (e.g., show that the sum of even integers is even; that every integer can be written as <math>3m + k</math>, where <math>k</math> is 0, 1, or 2, and <math>m</math> is an integer; or that the sum of the first <math>n</math> positive integers is <math>n(n+1)/2</math>).</b></p> <p>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.</p> <p>A1.1.3 Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities (e.g., differences of squares and cubes).</p> <p>A1.2.1 Write and solve equations and inequalities with one or two variables to represent mathematical or applied situations.</p> <p>A1.2.2 Associate a given equation with a function whose zeros are the solutions of the equation</p> <p>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 solutions, and apply the quadratic formula appropriately.</p> <p>A1.2.8 Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.</p> <p>A2.1.1 Recognize whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range.</p>	<p><b>Recursive functions:</b></p> <p><b>Mathematical modeling, this is a review of all families of functions:</b></p>	<p>Maintaining medicine levels and excel</p> <p>Earthquake Handshake problem Hooke's Law Ball roll data collection and modeling Ball drop data collection and modeling Tower of Hanoi Cricket Chirps Linear, Quadratic, Polynomial, Exponential, or Power</p>	
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			<p><i>function is exponential (<math>P = P_0a^t</math>).</i></p> <p><b>A2.4.2</b> Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. <i>In the example above, substitute the given values <math>P_0 = 300</math> and <math>a = 1.02</math> to obtain</i> <math>P = 300(1.02)^t</math>.</p> <p><b>A2.4.3</b> Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. <i>In the example above, the exact solution is 365.698, but for this problem, an appropriate approximation is 365.</i></p>			
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