



Indiana Academic Standards for Mathematics – Algebra 1 Standards Resource Guide Document



This Teacher Resource Guide, revised in July 2018, provides supporting materials to help educators successfully implement the Indiana Academic Standards for Algebra 1. This resource guide is provided to help ensure all students meet the rigorous learning expectations set by the academic standards. Use of this guide and the resources on the web page is optional – teachers should decide which resources will work best for their students. However, all guidance contained in this document and on the website has been chosen to best support effective teaching practices and promote the Mathematics Process Standards.

With an increased emphasis on content area literacy, academic vocabulary has been noted. Best practices should be utilized when teaching students academic vocabulary. Please see the Literacy Framework and the Science and Technical Subjects Content Area Literacy Standards for examples of best practices.

Examples have been removed from the document as they tend to limit interpretation and classroom application. Rather, success criteria, in the form of “I can” statements, have been included. According to Hattie (2017), success criteria is specific, concrete and measurable, describing what success looks like when a learning goal is reached. Additionally, success criteria contributes to teacher clarity, which has a 0.75 effect size! An effect size of 0.40 reportedly indicates one year of growth. Utilizing success criteria in the classroom allows students to monitor their own learning and increases motivation (Hattie, p. 57). **It is important to note that the success criteria provided here are not intended to be limiting. Teachers may have additional success criteria for their students.**

Guidance around vertical articulation has been provided in the last two columns. Knowing what was expected of students at previous grade levels will help teachers connect new learning to prior knowledge. Additionally, understanding what a student will be expected to learn in the future provides the teacher a context for the current learning. This information is not exhaustive; rather it is provided to give teachers a quick understanding of how the work builds from previous grade levels into subsequent courses. The Indiana Department of Education (IDOE) math team recommends teachers further study this vertical articulation to situate their course objectives in the broader math context.

If you have any questions, please do not hesitate to reach out to the IDOE math team. Contact information for the Elementary and Secondary Math Specialists can be found on the website: <https://www.doe.in.gov/standards/mathematics>. If you have suggested resources for the website, please share those as well.

Hattie, J., Fisher, D., Frey, N., Gojak, L. M., Moore, S. D., & Mellman, W. (2017). *Visible learning for mathematics: What works best to optimize student learning, grades K-12*. Thousand Oaks, CA: Corwin Mathematics.



Real Numbers and Expressions					
Algebra 1 Mathematics Standards		Success Criteria	Academic Vocabulary	Looking Back	Looking Ahead
MA.AI.RNE.1:	Understand the hierarchy and relationships of numbers and sets of numbers within the real number system.	<p>I can classify numbers within the real number system.</p> <p>I can identify numbers as rational or irrational.</p> <p>I can classify rational numbers as integers, whole numbers, and natural numbers.</p> <p>I can create a Venn diagram to show the relationship among the sets of numbers within the real number system.</p>	<p>Real Number System</p> <p>Natural numbers</p> <p>Whole numbers</p> <p>Integers</p> <p>Rational numbers</p> <p>Irrational numbers</p>	<p>Identify rational and irrational numbers (MA.8.NS.1)</p> <p>Convert rational numbers to decimals that repeat and vice versa (MA.8.NS.1)</p> <p>Use rational approximations of irrational numbers (MA.8.NS.2)</p>	<p>Know there is an imaginary number. (MA.AII.CNE.1)</p>
MA.AI.RNE.2:	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	<p>I can show that rational numbers are closed under addition and multiplication.</p> <p>I can show that when adding or multiplying rational numbers the result will also be rational.</p> <p>I can justify that addition with rational and irrational numbers results in an irrational number.</p> <p>I can explain that the product of a non-zero rational number</p>	<p>Rational number</p> <p>Irrational number</p>	<p>Give examples of rational and irrational numbers and explain the difference between them. (MA.8.NS.1)</p>	<p>Understand rational expressions are closed under addition, subtraction, multiplication, and division. (MA.AII.CNE.3)</p>



		and an irrational number is irrational.			
MA.AI.RNE.3:	Rewrite and evaluate numeric expressions with positive rational exponents using the properties of exponents.	<p>I can use the properties of exponents to rewrite numeric expressions with positive rational exponents.</p> <p>I can evaluate numeric expressions with positive rational exponents.</p>	<p>Numeric expression</p> <p>Rational exponent</p> <p>Properties of exponents</p>	Apply properties of exponents with integer exponents (MA.8.NA.3)	<p>Translate expressions between radical and exponential form and simplify them. (MA.AII.CNE.2)</p> <p>Use the properties of exponents to transform expressions for exponential functions. (MA.AII.EL.4)</p> <p>Use the laws of exponents to derive the laws of logarithms. (MA.AII.EL.6)</p>
MA.AI.RNE.4:	Simplify square roots of non-perfect square integers and algebraic monomials.	<p>I can simplify square roots of non-perfect square integers.</p> <p>I can simplify square roots of algebraic monomials.</p>	<p>Integer</p> <p>Monomial</p>	<p>Find the prime factorization of whole numbers. (MA.7.NS.1)</p> <p>Find square roots of perfect square integers. (MA.7.NS.2)</p>	Use special right triangles to solve real-world and other mathematical problems. (MA.G.T.11)
MA.AI.RNE.5:	Simplify algebraic rational expressions, with numerators and	I can simplify rational expressions containing monomial bases with integer	<p>Rational Expression</p> <p>Monomial</p>	Given a numeric expression with common rational	Rewrite rational expression in equivalent forms



	denominators containing monomial bases with integer exponents, to equivalent forms.	exponents in the numerator and/or denominator using the properties of exponents.	Integer	number bases and integer exponents, apply the properties of exponents to generate equivalent expressions. (MA.8.NS.3)	using laws of exponents. (MA.AII.CNE.4)
MA.AI.RNE.6:	Factor common terms from polynomials and factor polynomials completely. Factor the difference of two squares, perfect square trinomials, and other quadratic expressions.	<p>I can find the greatest common factor in polynomials.</p> <p>I can find the greatest common factor in polynomials.</p> <p>I can factor the difference of two squares.</p> <p>I can factor perfect square trinomials.</p> <p>I can factor polynomials completely.</p> <p>I can factor quadratic expressions.</p>	<p>Term</p> <p>Polynomial</p> <p>Factor completely</p> <p>Difference of Two Squares</p> <p>Perfect Square Trinomial</p> <p>Quadratic expression</p>	Find the prime factorization of whole numbers. (MA.7.NS.1)	Rewrite rational expression in equivalent forms using factoring techniques. (MA.AII.CNE.4)
MA.AI.RNE.7:	Understand polynomials are closed under the operations of addition, subtraction, and multiplication with integers; add, subtract, and multiply polynomials and divide polynomials by monomials.	<p>I can explore and justify why polynomials are closed under addition, subtraction and multiplication.</p> <p>I can add and subtract polynomials.</p> <p>I can multiply polynomials.</p>	<p>Polynomial</p> <p>Monomial</p> <p>Like terms</p>	Polynomials can be thought of as an extension of the real number system. You may wish to relate the current standard to MA.AI.RNE.2 in which students explore operations within the rational	<p>Understand rational expressions are closed under addition, subtraction, multiplication, and division. (MA.AII.CNE.3)</p> <p>Add, subtract, multiply, and divide</p>



		<p>I can divide polynomials by monomials.</p> <p>I can simplify the product and quotient of polynomials using the properties of exponents.</p>		<p>and irrational number sets.</p>	<p>rational expressions. (MA.AII.CNE.3)</p> <p>Solve real-world and other mathematical problems involving polynomial equations. (MA.AII.PR.1)</p>
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Functions				
Algebra 1 Mathematics Standards	Success Criteria	Academic Vocabulary	Looking Back	Looking Ahead
MA.AI.F.1:	<p>Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. Understand that if f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. Understand the graph of f is the graph of the equation $y = f(x)$.</p>	<p>I can determine whether a relation is a function given a set of ordered pairs, a table, mapping diagram or a graph.</p> <p>I can represent relations and functions using concrete, verbal, numeric, graphic, and algebraic forms.</p> <p>Given one representation, I can represent a relation or function in another form.</p> <p>I can find $f(x)$ for each x in the domain of f.</p> <p>I can relate (x, y) to $(x, f(x))$.</p>	<p>Relation</p> <p>Function</p> <p>Domain</p> <p>Range</p> <p>Output</p> <p>Input</p> <p>Function notation</p> <p>Mapping diagram</p>	<p>Identify relations and functions (MA.8.AF.3)</p> <p>Determine whether a relation is a function given a table, graph, or equation. (MA.AII.F.1)</p>



<p>MA.AI.F.2:</p>	<p>Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear, has a maximum or minimum value). Sketch a graph that exhibits the qualitative features of a function that has been verbally described. Identify independent and dependent variables and make predictions about the relationship.</p>	<p>I can identify intervals of increase and decrease given a graph.</p> <p>I can describe a function as linear or nonlinear given a graph.</p> <p>I can identify and classify maximum or minimum values of the graph of a function.</p> <p>I can sketch a graph when given qualitative features verbally.</p> <p>Given the graph of a function, I can decide which variable is the independent variable and dependent variable and make predictions about their relationship.</p> <p>Given a verbal description of a function, I can decide which variable is the independent variable and dependent variable and make predictions about their relationship.</p>	<p>Qualitative</p> <p>Linear</p> <p>Nonlinear</p> <p>Maximum value</p> <p>Minimum value</p> <p>Independent variable</p> <p>Dependent variable</p>	<p>Describe qualitatively the functional relationship between two quantities. (MA.8.AF.4)</p> <p>Sketch a graph that exhibits the features that has been verbally described (MA.8.AF.4)</p> <p>Identification of independent and dependent variables (MA.8.AF.3)</p>	<p>Describe the effect on the graph of $f(x)$ under a variety of transformations. (MA.AII.F.5)</p> <p>Graph piecewise-defined functions; identify and describe features. (MA.AII.PR.2)</p>
<p>MA.AI.F.3:</p>	<p>Identify the domain and range of relations represented in tables, graphs, verbal descriptions, and equations.</p>	<p>I can describe the domain and range of relations given a variety of representations.</p> <p>I can discuss an appropriate domain and range given</p>	<p>Domain</p> <p>Range</p> <p>Relation</p>	<p>Understand that a function assigns to each x-value exactly one y-value and that the graph of a function is a set of</p>	<p>Identify domain and range of quadratic functions. (MA.AII.Q.2)</p>



		various representations of relations.		ordered pairs. (MA.8.AF.3)	Identify the domain and range of exponential functions. (MA.AII.EL.2) Identify domain and range of polynomial, square root, and piecewise-defined functions. (MA.AII.PR.2)
MA.AI.F.4:	Understand and interpret statements that use function notation in terms of a context; relate the domain of the function to its graph and to the quantitative relationship it describes.	I can write equations of functions using function notation. I can interpret the meaning of values of functions written in function notation. I can describe an appropriate domain in a given context. I can connect the domain of a function written in function notation to its graph.	Function notation Domain Quantitative	Describe qualitatively the functional relationship between two quantities by analyzing a graph. (MA.8.AF.4)	Understand composition of functions. (MA.AII.F.2)

Linear Equations, Inequalities, and Functions

Algebra 1 Mathematics Standards	Success Criteria	Academic Vocabulary	Looking Back	Looking Ahead
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<p>MA.AI.L.1:</p>	<p>Understand that the steps taken when solving linear equations create new equations that have the same solution as the original. Solve fluently linear equations and inequalities in one variable with integers, fractions, and decimals as coefficients. Explain and justify each step in solving an equation, starting from the assumption that the original equation has a solution. Justify the choice of a solution method.</p>	<p>I can manipulate linear equations to create equivalent equations.</p> <p>I can understand that simplifying equations does not change the solution.</p> <p>I can solve a variety of linear equations in one variable fluently.</p> <p>I can solve a variety of linear inequalities in one variable fluently.</p> <p>I can justify each step I take in solving a linear equation or inequality.</p>	<p>Linear equation</p> <p>Linear inequality</p> <p>Integer</p> <p>Coefficient</p>	<p>Solve linear equations with rational number coefficients fluently (MA.8.AF.1)</p>	<p>Solve quadratic equations in one variable. (MA.AI.QE.4)</p> <p>Solve absolute value equations in one variable. (MA.AI.L.9)</p> <p>Solve exponential equations in one variable. (MA.AII.EL.7)</p> <p>Solve polynomial equations. (MA.AII.PR.1)</p> <p>Solve rational and radical functions. (MA.AII.PR.3)</p>
<p>MA.AI.L.2:</p>	<p>Represent real-world problems using linear equations and inequalities in one variable and solve such problems. Interpret the solution and determine whether it is reasonable.</p>	<p>I can create equations and inequalities in one variable and use them to solve problems.</p> <p>I can create equations and inequalities in one variable to model real-world situations.</p> <p>I can assess the reasonableness of my solution to linear</p>	<p>Linear equation</p> <p>Linear inequality</p>	<p>Represent and solve real-world problems using linear equations and inequalities in one variable (MA.8.AF.1)</p>	<p>Represent real-world problems using quadratic equations in one variable. (MA.AI.QE.5)</p> <p>Represent real-world problems with quadratic functions and solve. (MA.AII.Q.1)</p>



		equations and inequalities.			
MA.AI.L.3:	Represent real-world and other mathematical problems using an algebraic proportion that leads to a linear equation and solve such problems.	<p>I can set up a proportion to solve real-world problems.</p> <p>I can create a linear equation from a proportion.</p>	<p>Algebraic Proportion</p> <p>Linear equation</p>	<p>Identify real-world and other mathematical situations that involve proportional relationships. Write equations and draw graphs to represent proportional relationships and recognize that these situations are described by a linear function. (MA.7.AF.9)</p>	
MA.AI.L.4:	Represent linear functions as graphs from equations (with and without technology), equations from graphs, and equations from tables and other given information (e.g., from a given point on a line and the slope of the line).	<p>I can write a linear equation given a graph.</p> <p>I can graph a linear equation given its equation.</p> <p>I can identify the slope and y-intercept given a graph, equation, or table.</p> <p>I can write a linear equation given a table of values.</p> <p>I can write a linear equation given the slope and a point on the line.</p>	<p>Linear function</p> <p>Slope</p> <p>y-intercept</p> <p>Point-slope form</p>	<p>Construct a function to model a linear relationship between two quantities given a verbal description, table, or graph. (MA.8.AF.6)</p> <p>Compare the properties of two linear functions in different forms. (MA.8.AF.7)</p>	<p>Find the equation of a line, passing through a given point that is parallel or perpendicular to a given line. (MA.G.PL.4)</p> <p>Represent quadratic functions using tables, graphs, and equations; translate fluently among these representations. (MA.AII.Q.1)</p>



		I can write a linear equation given two points on the line.			
MA.AI.L.5:	Represent real-world problems that can be modeled with a linear function using equations, graphs, and tables; translate fluently among these representations, and interpret the slope and intercepts.	<p>I can write the equation of a linear function to model a real-world situation.</p> <p>I can translate among linear representations.</p> <p>I can identify the slope and y-intercept of a real-world situation.</p> <p>I can interpret the slope and y-intercept of a linear function that represents a real-world situation.</p>	<p>Linear function</p> <p>Slope</p> <p>x-intercept</p> <p>y-intercept</p>	<p>Construct a function to model a linear relationship between two quantities given a verbal description, table of values, or graph (MA.8.AF.6)</p> <p>Describe the meaning of slope and y-intercept in the context of a problem (MA.8.AF.6)</p>	<p>Represent real-world problems that can be modeled with quadratic functions using tables, graphs, and equations; translate fluently among these representations; interpret the solutions. (MA.AII.Q.1)</p>
MA.AI.L.6:	Translate among equivalent forms of equations for linear functions, including slope-intercept, point-slope, and standard. Recognize that different forms reveal more or less information about a given situation.	<p>I can identify a linear function as being written in either slope-intercept form, point-slope form, or standard form.</p> <p>I can manipulate a linear function written in any form to another form.</p>	<p>Linear functions</p> <p>Slope-Intercept Form</p> <p>Point-Slope Form</p> <p>Standard Form</p>	<p>Write equations in the form $y = mx$. (MA.7.AF.9)</p> <p>Construct a function to model a linear function in the form $y = mx + b$. (MA.8.AF.6)</p>	<p>Determine if lines are parallel, perpendicular, or neither by comparing slopes in graphs and equations. (MA.G.PL.4)</p>



		I can identify the benefits of writing a linear function in various forms.			
MA.AI.L.7:	Represent real-world problems using linear inequalities in two variables and solve such problems; interpret the solution set and determine whether it is reasonable. Solve other linear inequalities in two variables by graphing.	<p>I can write a linear inequality in two variables to represent real-world problems.</p> <p>I can graph a linear inequality in two variables and identify the solution set.</p> <p>Given a graph of a linear inequality, I can identify the solution set.</p> <p>I can assess the reasonableness of the solution set of a linear inequality.</p>	<p>Linear inequality</p> <p>Solution Set</p>	Construct a function to model a linear relationship between two quantities given a verbal description, table of values, or graph. (MA.8.AF.6)	Represent real-world problems using a system of two linear inequalities in two variables. (MA.AI.SEI.4)
MA.AI.L.8:	Solve compound linear inequalities in one variable, and represent and interpret the solution on a number line. Write a compound linear inequality given its number line representation.	<p>Given a number line graph, I can write a compound inequality.</p> <p>I can solve a compound inequality in one variable.</p> <p>I can graph a given compound inequality.</p> <p>I can discuss the meaning of the solution set of a compound inequality.</p>	Compound Linear Inequality	Solve inequalities and graph the solution set. (MA.7.AF.3)	



MA.AI.L.9:	Solve absolute value linear equations in one variable.	<p>I can apply the concept of absolute value to solve absolute value linear equations in one variable.</p> <p>I can discuss the reason for two solutions to absolute value equations.</p>	Absolute value linear equation	<p>Understand that the absolute value of a number is the distance from zero on a number line. (MA.7.NS.4)</p>	<p>Solve exponential equations in one variable. (MA.AII.EL.7)</p> <p>Solve polynomial equations. (MA.AII.PR.1)</p> <p>Solve rational and radical functions. (MA.AII.PR.3)</p>
MA.AI.L.10:	Graph absolute value linear equations in two variables.	<p>I can graph absolute value linear equations.</p> <p>I can discuss important features of absolute value linear equations.</p> <p>I can create a table of values to graph a linear absolute value equation.</p> <p>I can graph various transformations of the parent absolute value linear equation.</p>	Absolute value linear equation	<p>Understand that the absolute value of a number is the distance from zero on a number line. (MA.7.NS.4)</p> <p>Graph a line given a point and its slope. (MA.7.AF.5)</p>	<p>Graph exponential and quadratic equations in two variables. (MA.AI.QE.3)</p> <p>Graph exponential functions. (MA.AII.EL.2)</p> <p>Graph polynomial, square root, and piecewise-defined functions. (MA.AII.PR.2)</p>
MA.AI.L.11:	Solve equations and formulas for a specified variable, including equations with coefficients represented by variables.	<p>I can isolate a specific variable given a literal equation or formula.</p> <p>I can identify which variable would be beneficial to isolate in a</p>	<p>Literal equation</p> <p>Coefficient</p>	<p>Translate among equivalent forms of equations for linear functions. (MA.AI.L.6)</p>	<p>Use completing the square to rewrite quadratic functions. (MA.AII.Q.2)</p> <p>Find the inverse of a function. (MA.AII.F.3)</p>



		literal equation or formula.			
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Systems of Equations and Inequalities					
Algebra 1 Mathematics Standards		Success Criteria	Academic Vocabulary	Looking Back	Looking Ahead
MA.AI.SEI.1:	Understand the relationship between a solution of a pair of linear equations in two variables and the graphs of the corresponding lines. Solve pairs of linear equations in two variables by graphing; approximate solutions when the coordinates of the solution are non-integer numbers.	<p>I can identify the solution to a pair of linear equations given the graph as the point of intersection.</p> <p>I can substitute the point of intersection of a pair of linear equations in to each equation to verify the point of intersection is the solution to the pair of linear equations.</p> <p>I can approximate the solution to a system linear equations graphically and assess the reasonableness of my estimation.</p>	System of linear equations	Approximate the solution of a system of equations by graphing (MA.8.AF.8)	Solve a system of equations consisting of a linear equation and a quadratic equation graphically. (MA.AII.SE.1)
MA.AI.SEI.2:	Understand that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a	I can use the elimination method for solving a system of two linear equations.	<p>System of linear equations</p> <p>Elimination method</p>	Understand that solutions to a system of two linear equations corresponds to the	Solve a system of equations consisting of a linear equation and a quadratic equation



	<p>multiple of the other produces a system with the same solutions. Solve pairs of linear equations in two variables using substitution and elimination.</p>	<p>I can determine the factor by which one equation should be multiplied to create an equivalent system of linear equations.</p> <p>I can use the substitution method for solving a system of two linear equations.</p>	<p>Substitution method</p>	<p>point of intersection of their graphs. (MA.8.AF.8)</p>	<p>algebraically. (MA.AII.SE.1)</p> <p>Solve a system of two or three linear equations in two or three variables algebraically. (MA.AII.SE.2)</p>
MA.AI.SEI.3:	<p>Write a system of two linear equations in two variables that represents a real-world problem and solve the problem with and without technology. Interpret the solution and determine whether the solution is reasonable.</p>	<p>I can write a system of linear equations to represent a real-world problem.</p> <p>I can solve a system of linear equations representing a real-world problem using any method (graphing, elimination, substitution).</p> <p>I can interpret and assess the solution to a system of linear equations representing a real-world problem.</p>	<p>System of linear equations</p> <p>Elimination method</p> <p>Substitution method</p>	<p>Construct a function to model a linear relationship between two quantities. (MA.8.AF.6)</p> <p>Represent real-world problems that can be modeled with a linear function. (MA.AI.L.5)</p>	<p>Represent real-world problems using a system of linear equations in three variables and solve such problems. (MA.AII.SE.3)</p>



MA.AI.SEI.4:	Represent real-world problems using a system of two linear inequalities in two variables and solve such problems; interpret the solution set and determine whether it is reasonable. Solve other pairs of linear inequalities by graphing with and without technology.	<p>I can write a system of linear inequalities in two variables to represent a real-world problem.</p> <p>I can solve a system of linear inequalities representing a real-world problem.</p> <p>I can graph a system of linear inequalities in two variables and identify the solution set of the system.</p> <p>I can decide if the solution set of a system of linear inequalities is reasonable in context.</p>	<p>System of linear inequalities</p> <p>Solution set</p>	Represent real-world problems using linear inequalities in two variables. (MA.AI.L.7)	
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Quadratic and Exponential Equations and Functions					
Algebra 1 Mathematics Standards	Success Criteria	Academic Vocabulary	Looking Back	Looking Ahead	
MA.AI.QE.1:	Distinguish between situations that can be modeled with linear functions and with exponential functions. Understand that linear	I can give examples of situations that would be modeled with a linear function and those that would be modeled with an exponential function.	<p>Linear function</p> <p>Exponential function</p> <p>Interval</p>	Describe similarities between linear and nonlinear functions from tables, graphs, verbal descriptions, and equations. (MA.8.AF.5)	Identify the percent rate of change in exponential functions written as equations and classify them as representing growth



	<p>functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. Compare linear functions and exponential functions that model real-world situations using tables, graphs, and equations.</p>	<p>I can identify an exponential function graphically, numerically, and algebraically.</p> <p>I can identify a linear function graphically, numerically, and algebraically.</p> <p>I can find the constant rate of change or the constant ratio of change given a table, graph, or equation.</p> <p>I can model real-world situations both exponentially and linearly using tables, graphs, or equations.</p>	Factor	<p>Compare the properties of two linear functions in different forms. (MA.8.AF.7)</p>	<p>or decay. (MA.AII.EL.3)</p>
MA.AI.QE.2:	<p>Represent real-world and other mathematical problems that can be modeled with exponential functions using tables, graphs, and equations of the form $y = ab^x$ (for integer values of $x > 1$, rational values of $b > 0$ and $b \neq 1$); translate fluently among these representations and</p>	<p>I can model an exponential function graphically, numerically, and algebraically.</p> <p>I can extend my understanding of exponential functions to real-world situations.</p> <p>I can describe the important values of an exponential function and how they present in an</p>		<p>Construct a function to model a linear relationship between two quantities given a verbal description, table of values or graph. (MA.8.AF.6)</p>	<p>Represent real-world problems using exponential equations in one or two variables and solve. (MA.AII.EL.7)</p>



	interpret the values of a and b.	equation, table, or graph.			
MA.A1.QE.3:	Graph exponential and quadratic equations in two variables with and without technology.	<p>I can graph an exponential equation in the coordinate plane.</p> <p>I can graph a quadratic equation in the coordinate plane.</p> <p>I can graph various transformations of the parent exponential function.</p> <p>I can graph various transformations of the parent quadratic function.</p>	<p>Exponential equation</p> <p>Quadratic equation</p>	<p>Graph a line given its slope and a point. (MA.7.AF.5)</p> <p>Graph absolute value linear equations in two variables. (MA.A1.L.10)</p>	<p>Graph exponential functions. (MA.AII.EL.2)</p> <p>Graph polynomial, square root, and piecewise-defined functions. (MA.AII.PR.2)</p>



<p>MA.AI.QE.4:</p>	<p>Solve quadratic equations in one variable by inspection (e.g., for $x^2 = 49$), finding square roots, using the quadratic formula, and factoring, as appropriate to the initial form of the equation.</p>	<p>I can solve quadratic equations by using square roots.</p> <p>I can solve a quadratic equation by using the quadratic formula.</p> <p>I can write a quadratic equation in standard form in order to identify the correct values to be used in the quadratic formula.</p> <p>I can solve a quadratic equation by using a variety of factoring techniques.</p> <p>I can explain the zero-product property and how it relates to solving a quadratic equation by factoring.</p> <p>I can determine which strategy for solving quadratic equations is most appropriate given an initial equation.</p>	<p>Quadratic equation</p> <p>Quadratic formula</p> <p>Factoring</p> <p>Zero-product property</p> <p>Square root</p>	<p>Use square roots to solve equations of the form $x^2 = p$, where p is a positive rational number (MA.8.NS.4)</p>	<p>Use the discriminant to determine the number and type of solutions to a quadratic equation in one variable. (MA.AII.Q.3)</p>
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<p>MA.AI.QE.5:</p>	<p>Represent real-world problems using quadratic equations in one or two variables and solve such problems with and without technology. Interpret the solution and determine whether it is reasonable.</p>	<p>I can translate a real-world problem given verbally, graphically, or numerically into a quadratic equation in one or two variables.</p> <p>I can solve a quadratic equation using the most appropriate technique given the initial problem (i.e., by graphing, factoring, by using square roots).</p> <p>I can evaluate the reasonableness of my solution.</p>	<p>Quadratic equation</p>	<p>Represent real-world problems using linear equations in one variable and solve. (MA.8.AF.2)</p> <p>Construct a function to model a linear relationship between two quantities given a verbal description, table of values or graph. (MA.8.AF.6)</p>	<p>Represent real-world problems that can be modeled with quadratic functions using tables, graphs, and equations and solve. (MA.AII.Q.1)</p>
<p>MA.AI.QE.6:</p>	<p>Use the process of factoring to determine zeros, lines of symmetry, and extreme values in real-world and other mathematical problems involving quadratic functions; interpret the results in the real-world contexts.</p>	<p>I can use a variety of factoring techniques to find the zeros of a quadratic function.</p> <p>I can locate the line of symmetry of a parabola as the vertical line that goes through the point directly in the middle of the zeros.</p> <p>I can determine the maximum/minimum value of a quadratic function using the line of</p>	<p>Factoring</p> <p>Zeros of a function</p> <p>Line of symmetry</p> <p>Extreme value</p> <p>Quadratic function</p> <p>Parabola</p>	<p>Sketch a graph that exhibits the qualitative features of a function that have been verbally described. (MA.8.AF.4)</p> <p>Factor common terms from polynomials and factor polynomials completely. (MA.AI.RNE.6)</p>	<p>Use completing the square to rewrite quadratic functions and graph these. Identify intercepts, zeros, domain and range and lines of symmetry. (MA.AII.Q.2)</p>



		<p>symmetry and the equation.</p> <p>I can analyze important aspects of a parabola and discuss their relevance in context.</p>			
MA.AI.QE.7:	Describe the relationships among the solutions of a quadratic equation, the zeros of the function, the x-intercepts of the graph, and the factors of the expression.	<p>I can discuss the connection between the solutions, the zeros, and the x-intercepts of a quadratic function.</p> <p>I can compare the factors of a quadratic expression to the solutions of a quadratic function.</p>	<p>Quadratic equation</p> <p>Zeros of a function</p> <p>x-intercept</p>		Use the discriminant to determine the number and type of solutions to a quadratic equation in one variable. (MA.AII.Q.3)

Data Analysis, Statistics, and Probability				
Algebra 1 Mathematics Standards	Success Criteria	Academic Vocabulary	Looking Back	Looking Ahead



<p>MA.AI.DS.1:</p>	<p>Distinguish between random and non-random sampling methods, identify possible sources of bias in sampling, describe how such bias can be controlled and reduced, evaluate the characteristics of a good survey and well-designed experiment, design simple experiments or investigations to collect data to answer questions of interest, and make inferences from sample results.</p>	<p>I can determine whether a sampling method was random or non-random.</p> <p>I can identify various sampling methods, including, but not limited to, simple random sampling, stratified random sampling, stratified and convenience sampling.</p> <p>I can determine if there is bias present in a sampling method.</p> <p>I can suggest ways to control and prevent bias in sampling.</p> <p>I can give qualities of a good survey or experiment.</p> <p>I can use the results from a sample to make inferences about a population.</p> <p>I can design simple experiments to collect data to answer questions.</p>	<p>Random sampling</p> <p>Nonrandom sampling</p> <p>Bias</p> <p>Survey</p> <p>Experiment</p> <p>Inference</p>	<p>Understand that random sampling tends to produce representative samples and support valid inferences. (MA.8.DSP.1)</p> <p>Use data from a random sample to draw inferences about a population. (MA.8.DSP.2)</p>	<p>Make inferences and justify conclusions from sample surveys, experiments, and observational studies. (MA.AII.DSP.1)</p>
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<p>MA.AI.DS.2:</p>	<p>Graph bivariate data on a scatter plot and describe the relationship between the variables.</p>	<p>I can graph points on the coordinate plane.</p> <p>I can analyze a scatterplot to determine if a pattern or relationship exists between the two variables.</p> <p>I can classify bivariate data as having a positive association, negative association, or no association.</p>	<p>Bivariate Data</p> <p>Scatter plot</p> <p>Positive association</p> <p>Negative association</p> <p>Nonlinear association</p>	<p>Construct and interpret scatterplots for bivariate data (MA.8.DSP.1)</p>	
<p>MA.AI.DS.3:</p>	<p>Use technology to find a linear function that models a relationship for a bivariate data set to make predictions; interpret the slope and y-intercept, and compute (using technology) and interpret the correlation coefficient.</p>	<p>I can use technology to find a linear function that models a relationship in a scatter plot.</p> <p>I can use the linear model to make predictions beyond and within the data set.</p> <p>I can interpret the slope and y-intercept found in the context of the data graphed.</p> <p>I can use technology to find the correlation coefficient of a linear model for a scatter plot.</p>	<p>Linear function</p> <p>Bivariate data</p> <p>Slope</p> <p>Y-intercept</p> <p>Correlation Coefficient</p>	<p>Informally fit a straight line to a scatterplot and describe the model fit (MA.8.DSP.2)</p>	<p>Use technology to find a linear, quadratic, or exponential function that models a relationship for bivariate data. (MA.AII.DSP.2)</p>



		Given the correlation coefficient, I can assess the accuracy of my predictions beyond and within the data set.			
MA.AI.DS.4:	Distinguish between correlation and causation.	<p>I can differentiate between the definitions of correlation and causation.</p> <p>I can identify causal fallacies such as common underlying cause or coincidence and apply this knowledge to real-world situations.</p> <p>I can determine if the relationship between bivariate data is correlated or causal.</p>	<p>Correlation</p> <p>Causation</p>		<p>Compute and interpret the correlation coefficient. (MA.AII.DSP.2)</p>
MA.AI.DS.5:	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative	<p>I can use given information to construct a two-way table.</p> <p>I can identify frequencies and compute relative frequencies to complete a two-way table.</p> <p>I can identify and explain the meaning of marginal, conditional and joint frequencies.</p>	<p>Bivariate data</p> <p>Frequency</p> <p>Relative frequency</p> <p>Two-way table</p> <p>Joint relative frequency</p> <p>Marginal relative frequency</p>	<p>Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantitative variables. Describe patterns such as clustering, outliers, positive or negative association, linear association, and</p>	



	frequencies calculated for rows or columns (including joint, marginal, and conditional relative frequencies) to describe possible associations and trends in the data.	I can draw conclusions and state trends that are indicated in the data.	Conditional relative frequency	nonlinear association. (MA.8.DSP.1)	
MA.AI.DS.6:	Understand that statistics and data are non-neutral and designed to serve a particular interest. Analyze the possibilities for whose interest might be served and how the representations might be misleading.	<p>I can understand that numbers are neutral but data is non-neutral.</p> <p>I can argue the idea that data is gathered to serve interests.</p> <p>I can identify sources of bias in data reporting or misleading representation of data.</p>	Statistics	Understand that statistics can be used to gain information about a population. (MA.7.DSP.1)	Make inferences and justify conclusions from sample surveys, experiments, and observational studies. (All.DSP.1)