

Standard 1: Algebraic Reasoning: Patterns and Relationships

7 th Grade	8 th Grade	Algebra 1	Algebra 2
The student will use number properties and algebraic reasoning to identify, simplify, and solve simple linear equations and inequalities.	The student will graph and solve linear equations and inequalities in problem solving situations.	The student will use expressions and equations to model number relationships.	
1. Identify, describe, and analyze functional relationships (linear and nonlinear) between two variables (e.g., as the value of x increases on a table, do the values of y increase or decrease, identify a positive rate of change on a graph and compare it to a negative rate of change).		1.a Equations and Formulas – Translate word phrases and sentences into expressions and equations and vice versa.	
2. Write and solve two-step equations with one variable using number sense, the properties of operations, and the properties of equality (e.g., $-2x + 4 = -2$).	1. Equations a. Model, write, and solve multi-step linear equations with one variable using a variety of methods to solve application problems.	1.b Equations and Formulas – Solve literal equations involving several variables for one variable in terms of the others.	
	b. Graph and interpret the solution to one- and two-step linear equations on a number line with one variable and on a coordinate plane with two variables.		
	c. Predict the effect on the graph of a linear equation when the slope or y-intercept changes (e.g., make predictions from graphs, identify the slope or y-intercept in the equation $y = mx + b$ and relate to a graph).		
	d. Apply appropriate formulas to solve problems (e.g., $d=rt$, $I=prt$).	1.c Equations and Formulas – Use the formulas from measurable attributes of geometric models (perimeter, circumference, area and volume), science, and statistics to solve problems within an algebraic context.	

3. Inequalities: Model, write, solve, and graph one-step linear inequalities with one variable.	2. Inequalities: Model, write, solve, and graph one-step linear inequalities with one variable.		
		1.d Equations and Formulas – Solve two-step and three-step problems using concepts such as rules of exponents, rate, distance, ratio and proportion, and percent.	1.a Rational Exponents – Convert expressions from radical notations to rational exponents and vice versa.
		3.a Expressions – Simplify and evaluate linear, absolute value, rational and radical expressions.	1.b Add, subtract, multiply, divide, and simplify radical expressions and expressions containing rational exponents.
			2.b Polynomial and Rational Expressions – Add, subtract, multiply, divide, and simplify rational expressions, including complex fractions.
		3.b Expressions – Simplify polynomials by adding, subtracting or multiplying.	2.a Polynomial and Rational Expressions – Divide polynomial expressions by lower degree polynomials.
		3.c Expressions – Factor polynomial expressions.	
			3.a Complex Numbers – Recognize that to solve certain problems and equations, number systems need to be extended from real numbers to complex numbers.
			3.b Complex Numbers – Add, subtract, multiply, divide, and simplify expressions involving complex numbers.

Standard 2: Relationships and Functions

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		1.a Relations and Functions – Distinguish between linear and nonlinear data.	
		1.b Relations and Functions - Distinguish between relations and functions.	
		1.c Relations and Functions - Identify dependent and independent variables, domain and range.	1.d Functions and Function Notation - Use algebraic, interval, and set notations to specify the domain and range of functions of various types.
		1.d Relations and Functions - Evaluate a function using tables, equations or graphs.	
		2.a Linear Equations and Graphs – Solve linear equations by graphing or using properties of equality.	
		2.b Linear Equations and Graphs – Recognize the parent graph of the functions $y = k$, $y = x$, $y = x $, and predict the effects of transformations on the parent graph.	1.a Functions and Function Notation – Recognize the parent graphs of polynomial, exponential, radical, quadratic, and logarithmic functions and predict the effects of transformations on the parent graphs, using various methods and tools which may include graphing calculators.
			1.b Functions and Function Notation – Add, subtract, multiply, and divide functions using function notation.
			1.c Functions and Function Notation – Combine functions by composition.
			1.e Functions and Function Notation - Find and graph the inverse of a function, if it exists.
		2.c.i Linear Equations and Graphs – Slope – Calculate the slope of a line using a graph, an equation, two points or a set of data	

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		points.	
		2.c.ii Linear Equations and Graphs – Slope – Use the slope to differentiate between lines that are parallel, perpendicular, horizontal, or vertical.	
		2.c.iii Linear Equations and Graphs – Slope – Interpret the slope and intercepts within the context of everyday life (e.g., telephone charges based on base rate [y-intercept] plus rate per minute [slope]).	
		2.d Linear Equations and Graphs – Develop the equation of a line and graph linear relationships given the following: slope and y-intercept, slope and one point on the line, two points on the line, x-intercept and y-intercept, a set of data points.	
		2.e Linear Equations and Graphs – Match equations to a graph, table, or situation and vice versa.	
		3.a Linear Inequalities and Graphs – Solve linear inequalities by graphing or using properties of inequalities.	
		3.b Linear Inequalities and Graphs – Match inequalities (with 1 or 2 variables) to a graph, table, or situation and vice versa.	
		4. Solve a system of linear equations by graphing, substitution or elimination.	2.a Systems of Equations - Model a situation that can be described by a system of equations or inequalities and use the model to answer questions about the situation.
			2.b Systems of Equations - Model a situation that can be described by a system of equations or inequalities and use the model to answer questions about the situation.

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			2.c *Systems of Equations - Use either one quadratic equation and one linear equation or two quadratic equations to solve problems.
		5.a Nonlinear Functions – Match exponential and quadratic functions to a table, graph or situation and vice versa.	
		5.b Nonlinear Functions – Solve quadratic equations by graphing, factoring, or using the quadratic formula.	3.a Quadratic Equations and Functions - Solve quadratic equations by graphing, factoring, completing the square and quadratic formula.
			3.b Quadratic Equations and Functions - Graph a quadratic function and identify the x- and y-intercepts and maximum or minimum value, using various methods and tools which may include a graphing calculator.
			3.c Quadratic Equations and Functions - Model a situation that can be described by a quadratic function and use the model to answer questions about the situation.
			4. Identify, graph, and write the equations of the conic sections (circle, ellipse, parabola, and hyperbola).
			5.a Exponential and Logarithmic Functions - Graph exponential and logarithmic functions.
			5.b Exponential and Logarithmic Functions - Apply the inverse relationship between exponential and logarithmic functions to convert from one form to another.
			5.c Exponential and Logarithmic Functions - Model a situation that can be described by an exponential or logarithmic function and

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			use the model to answer questions about the situation.
			6.a Polynomial Equations and Functions - Solve polynomial equations using various methods and tools which may include factoring and synthetic division.
			6.b Polynomial Equations and Functions - Sketch the graph of a polynomial function.
			6.c Polynomial Equations and Functions - Given the graph of a polynomial function, identify the x- and y-intercepts, relative maximums and relative minimums, using various methods and tools which may include a graphing calculator.
			6.d Polynomial Equations and Functions - Model a situation that can be described by a polynomial function and use the model to answer questions about the situation.
			7.a Rational Equations and Functions - Solve rational equations.
			7.b Rational Equations and Functions - Sketch the graph of a rational function.
			7.c Rational Equations and Functions - Given the graph of a rational function, identify the x- and y-intercepts, vertical asymptotes, using various methods and tools which may include a graphing calculator.
			7.d Rational Equations and Functions - Model a situation that can be described by a rational function and use the model to answer questions about the situation.

Standard 3: Data Analysis, Probability and Statistics

7 th Grade	8 th Grade	Algebra 1	Algebra 2
The student will use data analysis, probability, and statistics to interpret data in a variety of contexts.	The student will use data analysis, probability, and statistics to interpret data in a variety of contexts.		
1. Data Analysis - Compare, translate, and interpret between displays of data (e.g., multiple sets of data on the same graph, data from subsets of the same population, combinations of diagrams, tables, charts, and graphs).	1. Data Analysis - Select, analyze and apply data displays in appropriate formats to draw conclusions and solve problems.	1.a Data Analysis – Translate from one representation of data to another and understand that the data can be represented using a variety of tables, graphs, or symbols and that different modes of representation often convey different messages.	
		1.b Data Analysis – Make valid inferences, predictions, and/or arguments based on data from graphs, tables, and charts.	
2. Probability - Determine the probability of an event involving “or”, “and”, or “not” (e.g., on a spinner with one blue, two red and two yellow sections, what is the probability of getting a red or a yellow?).	2. *Probability - Determine how samples are chosen (random, limited, biased) to draw and support conclusions about generalizing a sample to a population (e.g., is the average height of a men’s college basketball team a good representative sample for height predictions?).		
3. Central Tendency - Compute the mean, median, mode, and range for data sets and understand how additional data or outliers in a set may affect the measures of central tendency.	3. Central Tendency - Find the measures of central tendency (mean, median, mode, and range) of a set of data and understand why a specific measure provides the most useful information in a given context.	1.c Data Analysis – Solve two-step and three-step problems using concepts such as probability and measures of central tendency.	
		2. Collect data involving two variables and	1.a Analysis of Collected Data Involving Two

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		display on a scatter plot; interpret results using a linear model/equation and identify whether the model/equation is a line best fit for the data.	Variables - Interpret data on a scatter plot using a linear, exponential, or quadratic model/equation.
			1.b Analysis of Collected Data Involving Two Variables - Identify whether the model/equation is a curve of best fit for the data, using various methods and tools which may include a graphing calculator.
			2.a *Measures of Central Tendency and Variability - Analyze and synthesize data from a sample using appropriate measures of central tendency (mean, median, mode, weighted average).
			2.b *Measures of Central Tendency and Variability - Analyze and synthesize data from a sample using appropriate measures of variability (range, variance, standard deviation).
			2.c *Measures of Central Tendency and Variability - Use the characteristics of the Gaussian normal distribution (bell-shaped curve) to solve problems.
			2.d *Measures of Central Tendency and Variability - Identify how given outliers affect representations of data.
			3. Identify and use arithmetic and geometric sequences and series to solve problems.