



# Alignment Document

## State of Virginia And Aventa Learning Algebra 1

### Algebra 1 2005-2007 Benchmark Blueprint

State Standard Number	State Standard Area / Description	Unit Name	Course Topic Description
0	Algebra I		
0	Expressions and Operations		
A.2	The student will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variables. Students will choose an appropriate computational technique, such as mental mathematics, calculator, or paper and pencil.		
A.2.1	Translate verbal expressions into algebraic expressions with three or fewer terms.	Equations	Equations
		Variables and Expressions	Algebraic Expressions
		Variables and Expressions	Expressions with Powers
A.2.2	Relate a polynomial expression with three or fewer terms to a verbal expression.	Polynomials	Polynomials
		Polynomials	Addition and Subtraction of Polynomials
		Variables and Expressions	Expressions with Powers
		Variables and Expressions	Multiplying Monomials
		Equations	Equations



A.2.3	Evaluate algebraic expressions for a given replacement set to include integers and rational numbers.	Real Numbers	Subtracting Fractions with Real Numbers
		Real Numbers	Decimals
		Real Numbers	Fractions
		Variables and Expressions	Multiplying and Dividing Integers
		Variables and Expressions	Exponents and Roots
		Functions and Linear Equations	Replacement Sets and Variables
A.2.4	Apply appropriate computational techniques to evaluate an algebraic expression.	Real Numbers	Decimals
		Real Numbers	Evaluating Division Expressions
A.10	ALGEBRA I The student will apply the laws of exponents to perform operations on expressions with integral exponents, using scientific notation when appropriate.		
A.10.1	Identify the base, exponent, and coefficient in a monomial expression.	Polynomials	Addition and Subtraction of Polynomials
		Polynomials	Multiplying Monomials Review
		Polynomials	Polynomials
		Variables and Expressions	Multiplying Monomials
		Variables and Expressions	Dividing Monomials
A.10.2	Simplify monomial expressions and ratios of monomial expressions in which the exponents are integers, using the laws of exponents.	Variables and Expressions	Multiplying Monomials
		Variables and Expressions	Problem Solving using Exponents and Roots
		Variables and Expressions	Dividing Monomials
		Polynomials	Multiplying Monomials Review



A.10.3	Express numbers, using scientific notation, and perform operations, using the laws of exponents.	Variables and Expressions	Order of Operations
		Variables and Expressions	Fractional Exponents
		Variables and Expressions	Dividing Monomials
		Variables and Expressions	Multiplying Monomials
		Exponentials	Exponential Equations
		Polynomials	Scientific Notation
		Polynomials	From Scientific Notation to Standard Notation
		Polynomials	Computing with Scientific Notation
A.11	The student will add, subtract, and multiply polynomials and divide polynomials with monomial divisors, using concrete objects, pictorial and area representations, and algebraic manipulations.		
A.11.1	Model sums, differences, products, and quotients of polynomials with concrete objects and their related pictorial representations.		
A.11.2	Relate concrete and pictorial representations for polynomial operations to their corresponding algebraic manipulations.	Variables and Expressions	Multiplying Monomials
		Polynomials	Special Products
		Polynomials	Addition and Subtraction of Polynomials
		Polynomials	Solving Equations Using Factoring
		Polynomials	Multiplying Polynomials by a Monomial
		Polynomials	Multiplying Using FOIL
A.11.3	Find sums and differences of polynomials.	Polynomials	Addition and Subtraction of Polynomials
A.11.4	Multiply polynomials by monomials and binomials by binomials symbolically.	Polynomials	Multiplying Polynomials
		Polynomials	Multiplying Using FOIL
		Polynomials	Multiplying Monomials Review
		Polynomials	Special Products

		Polynomials	Multiplying Polynomials by a Monomial
		Variables and Expressions	Multiplying Monomials
A.11.5	Find the quotient of polynomials, using a monomial divisor.	Variables and Expressions	Dividing Monomials
		Variables and Expressions	Multiplying Monomials
		Polynomials	Multiplying Monomials Review
A.12	The student will factor completely first- and second-degree binomials and trinomials in one or two variables. The graphing calculator will be used as a tool for factoring and for confirming algebraic factorizations.		
A.12.1	Use the distributive property to "factor out" all common monomial factors.	Polynomials	Factoring with the GCF
A.12.2	Factor second-degree polynomials and binomials with integral coefficients and a positive leading coefficient less than four.	Polynomials	Factoring Other Trinomials
		Polynomials	Difference of Two Squares
		Polynomials	Factoring with the GCF
		Polynomials	Factoring Perfect Square Trinomials
		Polynomials	Factoring Simple Trinomials
A.12.3	Identify polynomials that cannot be factored over the set of real numbers.	Polynomials	Difference of Two Squares
		Polynomials	Factoring with the GCF
		Polynomials	Factoring Perfect Square Trinomials
		Polynomials	Factoring Simple Trinomials
		Polynomials	Factoring Other Trinomials
A.12.4	Use the x-intercepts from the graphical representation of the polynomial to determine and confirm its factors.	Quadratics	Solving by Graphing and Factoring
A.13	The student will express the square root of a whole number in simplest radical form and approximate square roots to the nearest tenth.		
A.13.1	Estimate the square root of a non-perfect square to the nearest tenth by		
A.13.1.a	identifying the two perfect squares it lies between;	Real Numbers	Estimation with Real Numbers



A.13.1.b	finding the square root of those two perfect squares; and	Real Numbers	Estimation with Real Numbers
A.13.1.c	using those values to estimate the square root of the nonperfect square.	Real Numbers	Estimation with Real Numbers
A.13.2	Find the square root of a number, and make a reasonable interpretation of the displayed value for a given situation, using a calculator.	Variables and Expressions	Roots
A.13.3	Express the square root of a whole number less than 1,000 in simplest radical form.	Variables and Expressions	Roots
		Quadratics and Radicals	Adding and Subtracting Radical
		Quadratics and Radicals	Simplifying Radicals
		Quadratics and Radicals	Multiplying Radical Expressions
		Quadratics and Radicals	Simplifying Radicals with Variables
0	Relations and Functions		
A.5	The student will create and use tabular, symbolic, graphical, verbal, and physical representations to analyze a given set of data for the existence of a pattern, determine the domain and range of relations, and identify the relations that are functions.		
A.5.1	Analyze a table of ordered pairs for the existence of a pattern that defines the change relating input and output values.	Functions and Linear Equations	Linear Patterns
A.5.2	Write a linear equation to represent a pattern in which there is a constant rate of change between variables.	Functions and Linear Equations	Scatter Plots and Correlation
		Functions and Linear Equations	Line of Fit
		Functions and Linear Equations	Linear Patterns
		Functions and Linear Equations	Writing Linear Equations
		Functions and Linear Equations	Slope-Intercept Form
A.5.3	Determine from a set of ordered pairs, a table, or a graph whether a relation is a function.	Functions and Linear Equations	Relations
		Functions and Linear Equations	Functions



A.5.4	Identify the domain and range for a relation, given a set of ordered pairs, a table, or a graph.	Functions and Linear Equations	Graphs of Inverses
		Functions and Linear Equations	Relations
A.5.5	Use physical representations, such as algebra manipulatives, to represent quantitative data.		
A.15	The student will, given a rule, find the values of a function for elements in its domain and locate the zeros of the function both algebraically and with a graphing calculator. The value of $f(x)$ will be related to the ordinate on the graph.		
A.15.1	For each $x$ in the domain of $f$ , find $f(x)$ .	Functions and Linear Equations	Replacement Sets and Variables
		Functions and Linear Equations	Functions
		Functions and Linear Equations	Relations
A.15.2	Identify the zeros of the function algebraically and confirm them, using the graphing calculator.	Quadratics	Solving by Graphing
		Quadratics	Solving by Factoring
		Quadratics	Quadratic Formula (excludes graphing calculator)
A.18	The student will analyze a relation to determine whether a direct variation exists and represent it algebraically and graphically, if possible.		
A.18.1	Given a table of values, determine whether a direct variation exists.	Functions and Linear Equations	Direct Variation
A.18.2	Write an equation for a direct variation, given a set of data.	Functions and Linear Equations	Direct Variation
A.18.3	Graph a direct variation from a table of values or a practical situation.	Functions and Linear Equations	Direct Variation
0	Equations and Inequalities		
A.1	The student will solve multistep linear equations and inequalities in one variable, solve literal equations (formulas) for a given variable, and apply these skills to solve practical problems. Graphing calculators will be used to confirm algebraic solutions.		



A.1.1	Translate verbal sentences to algebraic equations and inequalities in one variable.	Equations	Equations and Problem Solving
		Equations	Parentheses in Equations
		Equations	Mixture Problems
		Equations	Multiplication and Division in Equations
		Equations	Equations with Variables on Each Side
		Equations	Solving Problems
		Equations	Distance Formula
		Equations	Equations
		Equations	Solving Multi-Step Equations
		Equations	Rate Problems
		Inequalities	Compound Inequalities
		Inequalities	Solving Inequalities by Addition and Subtraction
		Inequalities	Absolute Value Inequalities
		Inequalities	Solving Inequalities Using Multiplication and Division
		Inequalities	Multi-Step Inequalities
A.1.2	Solve multistep linear equations and noncompound inequalities in one variable with the variable in both sides of the equation or inequality.	Equations	Mixture Problems
		Equations	Parentheses in Equations
		Equations	Equations with Variables on Each Side
		Equations	Formulas as Equations
		Inequalities	Multi-Step Inequalities
A.1.3	Solve multistep linear equations and inequalities in one variable with grouping symbols in one or both sides of the equation or inequality.	Equations	Equations with Variables on Each Side
		Equations	Formulas as Equations
		Equations	Mixture Problems
		Equations	Parentheses in Equations
		Inequalities	Multi-Step Inequalities
A.1.4	Solve multistep equations and inequalities in one variable with rational coefficients and constants.	Equations	Rate Problems
		Equations	Mixture Problems
		Inequalities	Compound Inequalities



A.1.5	Solve a literal equation (formula) for a specified variable.	Equations	Formulas as Equations
		Equations	Distance Formula
A.1.6	Apply skills for solving linear equations to practical situations.	Functions and Linear Equations	Linear Patterns
		Functions and Linear Equations	Slope-Intercept Form
		Functions and Linear Equations	Writing Linear Equations
		Polynomials	Solving Equations Using Factoring
A.1.7	Confirm algebraic solutions to linear equations and inequalities, using a graphing calculator.		
A.3	The student will justify steps used in simplifying expressions and solving equations and inequalities. Justifications will include the use of concrete objects; pictorial representations; and the properties of real numbers, equality, and inequality.		
A.3.1	Simplify expressions and solve equations and inequalities, using the commutative, associative, and distributive properties.	Real Numbers	Evaluating Division Expressions
		Real Numbers	Writing and Justifying Steps Using Properties
		Real Numbers	Solving Multi-Step Equations
		Real Numbers	Inequalities in Two Variables
		Real Numbers	The Associative Property
		Real Numbers	Decimals
		Real Numbers	Multi-Step Inequalities
		Equations	Solving Problems
		Equations	Mixture Problems
		Equations	Equations with Variables on Each Side
		Inequalities	Compound Inequalities
		Variables and Expressions	The Commutative Property
		Variables and Expressions	The Distributive Property



A.3.2	Simplify expressions and solve equations and inequalities, using the order of operations.	Real Numbers	Multiplying and Dividing Integers
		Real Numbers	Division of Rational Numbers
		Real Numbers	Evaluating Division Expressions
		Real Numbers	Solving Multi-Step Equations
		Real Numbers	Exponential Equations
		Real Numbers	Evaluating Expressions
		Real Numbers	Multi-Step Inequalities
		Equations	Mixture Problems
		Inequalities	Compound Inequalities
		Variables and Expressions	Order of Operations
A.3.3	Solve equations, using the addition, multiplication, closure, identity, and inverse properties.	Real Numbers	Properties of Closure and Equality
		Real Numbers	Multiplication and Division in Equations
		Real Numbers	Using the Properties
		Real Numbers	Mixture Problems
		Real Numbers	Writing and Justifying Steps Using Properties
		Real Numbers	Solving Multi-Step Equations
		Equations	Formulas as Equations
		Equations	Addition and Subtraction in Equations
		Equations	Equations with Variables on Each Side
A.3.4	Solve equations, using the reflexive, symmetric, transitive, and substitution properties of equality.	Real Numbers	Using the Properties
		Real Numbers	Writing and Justifying Steps Using Properties
		Real Numbers	Solving Multi-Step Equations
		Real Numbers	Replacement Sets and Variables
A.3.5	Create and interpret pictorial representations for simplifying expressions and solving equations and inequalities.		



A.6	The student will select, justify, and apply an appropriate technique to graph linear functions and linear inequalities in two variables. Techniques will include slope-intercept, x- and y-intercepts, graphing by transformation, and the use of the graphing calculator.		
A.6.1	Graph linear equations and inequalities in two variables that arise from a variety of practical situations.	Functions and Linear Equations	Graphing an Equation Using Points
		Functions and Linear Equations	Slope-Intercept Form
		Functions and Linear Equations	Graphing an Equation Using Intercepts
		Functions and Linear Equations	Graphing an Equation Using Slope and Y-Intercept
		Functions and Linear Equations	Line of Fit
		Solving Systems	Solving by Graphing
		Solving Systems	Problem Solving
		Solving Systems	Solving Systems of Inequalities
		Inequalities	Graphing Inequalities in Two Variables
A.6.2	Use the line $y = x$ as a reference, and apply transformations defined by changes in the slope or y-intercept.		
A.6.3	Express linear functions or inequalities in slope-intercept form, and use the graphing calculator to display the relationship.	Solving Systems	Review of Graphing Linear Equations (excludes calculator)
		Solving Systems	Review of Graphing Inequalities (excludes calculator)
		Functions and Linear Equations	More about Slope (excludes calculator)
		Functions and Linear Equations	Slope-Intercept Form (excludes calculator)
		Inequalities	Inequalities in Two Variables (excludes calculator)
		Inequalities	Graphing Inequalities in Two Variables (excludes calculator)



A.6.4	Explain why a given technique is appropriate for graphing a linear function.	Functions and Linear Equations	Graphing an Equation Using Points
		Functions and Linear Equations	Graphing an Equation Using Intercepts
		Solving Systems	Review of Graphing Linear Equations
A.7	The student will determine the slope of a line when given an equation of the line, the graph of the line, or two points on the line. Slope will be described as rate of change and will be positive, negative, zero, or undefined. The graphing calculator will be used to investigate the effect of changes in the slope on the graph of the line.		
A.7.1	Recognize that $m$ represents the slope in the equation of the form $y = mx + b$ .	Functions and Linear Equations	More about Slope
		Functions and Linear Equations	Slope-Intercept Form
		Functions and Linear Equations	Forms of Non-Vertical Linear Equations
A.7.2	Find the slope of the line, given the equation of a linear function.	Functions and Linear Equations	More about Slope
		Functions and Linear Equations	Slope-Intercept Form
		Functions and Linear Equations	Graphing an Equation Using Slope and Y-Intercept
A.7.3	Calculate the slope of a line, given the coordinates of two points on the line.	Functions and Linear Equations	More about Slope
		Functions and Linear Equations	Point-Slope Form
		Functions and Linear Equations	Forms of Non-Vertical Linear Equations
A.7.4	Find the slope of a line, given the graph of a line.	Functions and Linear Equations	More about Slope
A.7.5	Recognize and describe a line with a slope that is positive, negative, zero, or undefined.	Functions and Linear Equations	More about Slope
		Functions and Linear Equations	Point-Slope Form
		Solving Systems	Review of Graphing Linear Equations
A.7.6	Describe slope as a constant rate of change between two variables.	Functions and Linear Equations	Writing Linear Equations
		Functions and Linear Equations	Slope-Intercept Form



A.7.7	Compare the slopes of graphs of linear functions, using the graphing calculator.		
A.8	The student will write an equation of a line when given the graph of the line, two points on the line, or the slope and a point on the line.		
A.8.1	Recognize that equations of the form $y = mx + b$ and $Ax + By = C$ are equations of lines.	Functions and Linear Equations	Point-Slope Form
		Functions and Linear Equations	Forms of Non-Vertical Linear Equations
		Functions and Linear Equations	More about Slope
A.8.2	Write an equation of a line when given the graph of a line.	Functions and Linear Equations	Line of Fit
A.8.3	Write an equation of a line when given two points on the line whose coordinates are integers.	Functions and Linear Equations	More about Slope
		Functions and Linear Equations	Point-Slope Form
A.8.4	Write an equation of a line when given the slope and a point on the line whose coordinates are integers.	Functions and Linear Equations	Point-Slope Form
		Functions and Linear Equations	Slope-Intercept Form
		Functions and Linear Equations	Forms of Non-Vertical Linear Equations
A.8.5	Write an equation of a vertical line as $x = c$ .	Functions and Linear Equations	Point-Slope Form
A.8.6	Write an equation of a horizontal line as $y = c$ .	Functions and Linear Equations	Forms of Non-Vertical Linear Equations
		Functions and Linear Equations	Point-Slope Form
A.9	The student will solve systems of two linear equations in two variables both algebraically and graphically and apply these techniques to solve practical problems. Graphing calculators will be used both as a primary tool for solution and to confirm an algebraic solution.		
A.9.1	Given a system of two linear equations in two variables that has a unique solution, solve the system by substitution or elimination to find the ordered pair which satisfies both equations.	Solving Systems	Elimination and Multiplication
		Solving Systems	Solving by Substitution



A.9.2	Given a system of two linear equations in two variables that has a unique solution, solve the system graphically to find the point of intersection.	Solving Systems	Solving by Graphing
A.9.3	Determine whether a system of two linear equations has one solution, no solution, or infinite solutions.	Solving Systems	Systems of equations
		Solving Systems	Problem Solving with Systems
A.9.4	Write a system of two linear equations that describes a practical situation.	Solving Systems	Problem Solving with Systems
A.9.5	Interpret and determine the reasonableness of the algebraic or graphical solution of a system of two linear equations that describes a practical situation.	Solving Systems	Systems of equations
		Solving Systems	Problem Solving with Systems
A.14	The student will solve quadratic equations in one variable both algebraically and graphically. Graphing calculators will be used both as a primary tool in solving problems and to verify algebraic solutions.		
A.14.1	Solve quadratic equations algebraically or by using the graphing calculator. When solutions are represented in radical form, the decimal approximation will also be given.	Quadratics and Radicals	The Quadratic Formula
		Quadratics and Radicals	Solving Quadratic Equations with Graphs (excludes calculator)
		Quadratics and Radicals	Solving by Using Square Roots
		Polynomials	Solving Equations by Factoring Trinomials
		Polynomials	Factoring Other Trinomials
		Polynomials	Solving Equations Using Factoring
A.14.2	Verify algebraic solutions, using the graphing calculator.		

A.14.3	Identify the x-intercepts of the quadratic function as the solution(s) to the quadratic equation that is formed by setting the given quadratic expression equal to zero.	Quadratics and Radicals	The Quadratic Formula
		Quadratics and Radicals	Solving Quadratic Equations with Graphs
		Quadratics and Radicals	Graphing Quadratic Functions
0	Statistics		
A.4	The student will use matrices to organize and manipulate data, including matrix addition, subtraction, and scalar multiplication. Data will arise from business, industrial, and consumer situations.		
A.4.1	Represent data from practical problems in matrix form.	Solving Systems	The Matrix
A.4.2	Calculate the sum or difference of two given matrices that are no larger than $4 \times 4$ .	Solving Systems	Addition of Matrices
A.4.3	Calculate the product of a scalar and a matrix that is no larger than $4 \times 4$ .	Solving Systems	Scalar Multiplication of Matrices
A.4.4	Solve practical problems involving matrix addition, subtraction, and scalar multiplication, using matrices that are no larger than $4 \times 4$ .	Solving Systems	Addition of Matrices
		Solving Systems	Scalar Multiplication of Matrices
A.4.5	Read and interpret the data in a matrix representing the solution to a practical problem.	Solving Systems	The Matrix
A.16	The student will, given a set of data points, write an equation for a line of best fit and use the equation to make predictions.		
A.16.1	Write an equation for the line of a best fit, given a set of six to ten data points in a table, on a graph, or from a practical situation.	Functions and Linear Equations	Line of Fit
A.16.2	Make predictions about unknown outcomes, using the equation of a line of best fit.	Functions and Linear Equations	Line of Fit
A.17	The student will compare and contrast multiple one-variable data sets, using statistical techniques that include measures of central tendency, range, and box-and-whisker graphs.		



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A.17.1	Calculate the measures of central tendency and range of a set of data with no more than 20 data points.	Solving Systems	Statistics
		Solving Systems	Histograms
		Solving Systems	Analyzing Statistical Data
		Variables and Expressions	Mean, Median and Mode
		Variables and Expressions	Stem and Leaf Plots
A.17.2	Compare measures of central tendency using numerical data from a table with no more than 20 data points.	Solving Systems	Histograms
		Solving Systems	Analyzing Statistical Data
		Solving Systems	Statistics
		Variables and Expressions	Stem and Leaf Plots
		Variables and Expressions	Mean, Median and Mode
A.17.3	Compare and contrast two sets of data, each set having no more than 20 data points, using measures of central tendency and the range.	Solving Systems	Histograms
		Solving Systems	Analyzing Statistical Data
		Variables and Expressions	Stem and Leaf Plots
A.17.4	Compare and analyze two sets of data, each set having no more than 20 data points, using box-and-whisker plots.	Solving Systems	Analyzing Statistical Data
		Solving Systems	Box Plots