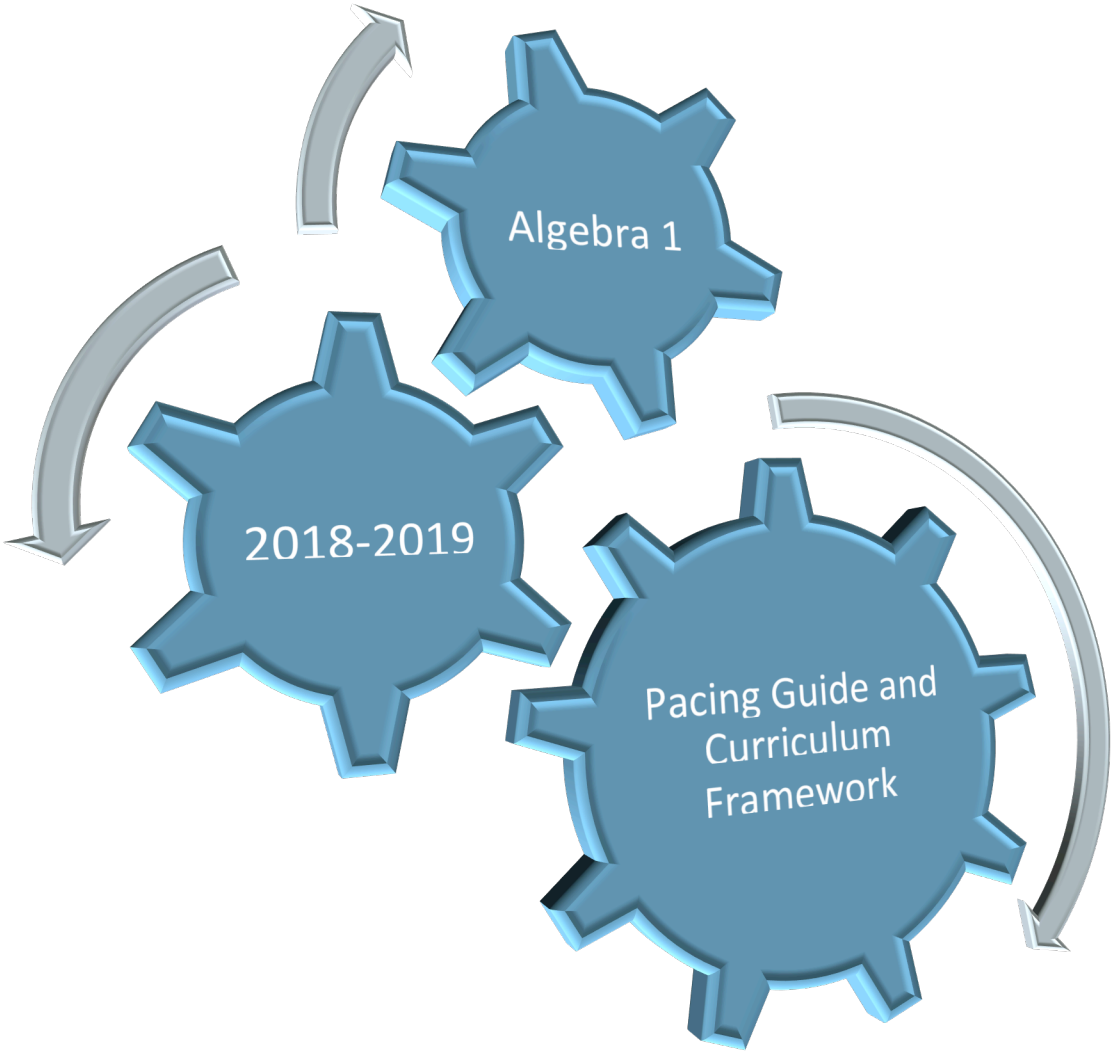
Algebra 1
2018-2019
Pacing Guide and Curriculum Framework

Comparison of Mathematics Standards of Learning – 2009 to 2016

2009 SOL	2016 SOL
Expressions and Operations	
A.1 The student will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variables.	A.1 The student will a) represent verbal quantitative situations algebraically; and b) evaluate algebraic expressions for given replacement values of the variables.
A.2 The student will perform operations on polynomials, including a) applying the laws of exponents to perform operations on expressions; b) adding, subtracting, multiplying, and dividing polynomials; and c) factoring completely first- and second-degree binomials and trinomials in one or two variables. Graphing calculators will be used as a tool for factoring and for confirming algebraic factorizations. [Moved to EKS]	A.2 The student will perform operations on polynomials, including a) applying the laws of exponents to perform operations on expressions; b) adding, subtracting, multiplying, and dividing polynomials; and c) factoring completely first- and second-degree binomials and trinomials in one variable.
A.3 The student will express the square roots and cube roots of whole numbers and the square root of a monomial algebraic expression in simplest radical form.	A.3 The student will simplify a) square roots of whole numbers and monomial algebraic expressions; b) cube roots of integers; and c) numerical expressions containing square or cube roots.
Equations and Inequalities	
A.4 The student will solve multistep linear and quadratic equations in two variables, including a) solving literal equations (formulas) for a given variable; b) justifying steps used in simplifying expressions and solving equations, using field properties and axioms of equality that are valid for the set of real numbers and its subsets; c) solving quadratic equations algebraically and graphically; d) solving multistep linear equations algebraically and graphically; e) solving systems of two linear equations in two variables algebraically and graphically; and f) solving real-world problems involving equations and systems of equations. Graphing calculators will be used both as a primary tool in solving problems and to verify algebraic solutions. [Moved to EKS]	A.4 The student will solve a) multistep linear equations in one variable algebraically; b) quadratic equations in one variable algebraically; c) literal equations for a specified variable; d) systems of two linear equations in two variables algebraically and graphically; and e) practical problems involving equations and systems of equations.
A.5 The student will solve multistep linear inequalities in two variables, including a) solving multistep linear inequalities algebraically and graphically; b) justifying steps used in solving inequalities, using axioms of inequality and properties of order that are valid for the set of real numbers and its subsets; [Moved to EKS] c) solving real-world problems involving inequalities; and d) solving systems of inequalities.	A.5 The student will a) solve multistep linear inequalities in one variable algebraically and represent the solution graphically; b) represent the solution of linear inequalities in two variables graphically; c) solve practical problems involving inequalities; and d) represent the solution to a system of inequalities graphically.

2009 SOL	2016 SOL
A.6 The student will graph linear equations and linear inequalities in two variables, including a) determining 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; and b) writing the 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.6 The student will a) determine the slope of a line when given an equation of the line, the graph of the line, or two points on the line; b) write the 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; and c) graph linear equations in two variables.
Functions	
A.7 The student will investigate and analyze function (linear and quadratic) families and their characteristics both algebraically and graphically, including a) determining whether a relation is a function; b) domain and range; c) zeros of a function; d) *x*- and *y*-intercepts; e) finding the values of a function for elements in its domain; and f) making connections between and among multiple representations of functions including concrete, verbal, numeric, graphic, and algebraic.	A.7 The student will investigate and analyze linear and quadratic function families and their characteristics both algebraically and graphically, including a) determining whether a relation is a function; b) domain and range; c) zeros; d) intercepts; e) values of a function for elements in its domain; and f) connections between and among multiple representations of functions using verbal descriptions, tables, equations, and graphs.
Statistics	
A.8 The student, given a situation in a real-world context, will analyze a relation to determine whether a direct or inverse variation exists, and represent a direct variation algebraically and graphically and an inverse variation algebraically.	A.8 The student, given a data set or practical situation, will analyze a relation to determine whether a direct or inverse variation exists, and represent a direct variation algebraically and graphically and an inverse variation algebraically.
A.9 The student, given a set of data, will interpret variation in real-world contexts and calculate and interpret mean absolute deviation, standard deviation, and z-scores. [Included in AFDA.7 and AII.11]	
A.10 The student will compare and contrast multiple univariate data sets, using box- and-whisker plots. [Moved to 8.12]	
A.11 The student will collect and analyze data, determine the equation of the curve of best fit in order to make predictions, and solve real-world problems, using mathematical models. Mathematical models will include linear and quadratic functions.	A.9 The student will collect and analyze data, determine the equation of the curve of best fit in order to make predictions, and solve practical problems, using mathematical models of linear and quadratic functions.

Strand: Expressions and Operations--Expressions: August 13 – 17

Standard(s) Essential Knowledge and Skills	Understanding the Standard(s)
A.1 The student will **a) represent verbal quantitative situations algebraically; and** **b) evaluate algebraic expressions for given replacement values of the variables.** ● Translate between verbal quantitative situations and algebraic expressions and equations. (a) ● Represent practical situations with algebraic expressions in a variety of representations (e.g., concrete, pictorial, symbolic, verbal). (a) ● Evaluate algebraic expressions, using the order of operations, which include absolute value, square roots, and cube roots for given replacement values to include rational numbers, without rationalizing the denominator. (b) **Vertical Articulation:** 7.11 and 8.14	● Mathematical modeling involves creating algebraic representations of quantitative practical situations. ● The numerical value of an expression depends upon the values of the replacement set for the variables. ● There are a variety of ways to compute the value of a numerical expression and evaluate an algebraic expression using order of operations. ● The operations and the magnitude of the numbers in an expression affect the choice of an appropriate computational technique (e.g., mental mathematics, calculator, paper and pencil).

Key Vocabulary:	DOE Lessons/Resources:	Teacher Notes and Elaborations:
operation, constant, coefficient, variable, expression, equation, verbal, algebraic, numerical, square roots, absolute value, cube roots, replacement, representations-concrete, pictorial, symbolic, verbal	➢ ESS Lessons ➢ Henrico Website	

Strand: Equations and Inequalities--Equations: August 20 – September 7

Standard(s) Essential Knowledge and Skills	Understanding the Standard(s)
A.4 The student will solve **a) multistep linear equations in one variable algebraically;** **c) literal equations for a specified variable;** ● Determine whether a linear equation in one variable has one, an infinite number, or no solutions. (a) ● Apply the properties of real numbers and properties of equality to simplify expressions and solve equations. (a, b) ● Solve multistep linear equations in one variable algebraically. (a) ● Solve a literal equation for a specified variable. (c) **Vertical Articulation:** 6.13, 7.12, and 8.17	● A solution to an equation is the value or set of values that can be substituted to make the equation true. ● Each point on the graph of a linear or quadratic equation in two variables is a solution of the equation. ● The process of solving linear and quadratic equations can be modeled in a variety of ways, using concrete, pictorial, and symbolic representations. ● Literal equations include formulas. ● Properties of real numbers and properties of equality are applied to solve equations. ● Properties of Real Numbers: - Associative Property of Addition - Associative Property of Multiplication - Commutative Property of Addition - Commutative Property of Multiplication - Identity Property of Addition (Additive Identity) - Identity Property of Multiplication (Multiplicative Identity) - Inverse Property of Addition (Additive Inverse) - Inverse Property of Multiplication (Multiplicative Inverse) - Distributive Property ● Properties of Equality: - Multiplicative Property of Zero - Zero Product Property - Reflexive Property - Symmetric Property - Transitive Property of Equality - Addition Property of Equality - Subtraction Property of Equality - Multiplication Property of Equality - Division Property of Equality - Substitution ● Solutions and intervals may be expressed in different formats, including set notation or using equations and inequalities. - Examples may include: **Equation/ Inequality** — **Set Notation** $x = 3$ — $\{3\}$ $x = 3$ or $x = 5$ — $\{3, 5\}$ $y \geq 3$ — $\{y: y \geq 3\}$ Empty (null) set □ — $\{\ \}$

Key Vocabulary:	DOE Lessons/Resources:	Teacher Notes and Elaborations:
evaluate, linear, solutions, intervals, real numbers, complex numbers, set notation, properties, quadratic, solutions	➢ ESS Lessons ➢ Henrico Website	❖ emphasize parenthesis, especially fraction bars, radical signs, and (-3)^2 versus -3^2

Strand: Expressions and Operations--Laws of Exponents: September 10 – 20

Standard(s) Essential Knowledge and Skills	Understanding the Standard(s)
A.2 The student will perform operations on polynomials, including a) applying the laws of exponents to perform operations on expressions; ● Simplify monomial expressions and ratios of monomial expressions in which the exponents are integers, using the laws of exponents. (a) **Vertical Articulation:** 7.1a, 7.11, and 8.14	● Operations with polynomials can be represented concretely, pictorially, and symbolically. ● Polynomial expressions can be used to model practical situations. ● Polynomial expressions can be used to define functions and these functions can be represented graphically. ● The laws of exponents can be applied to perform operations involving numbers written in scientific notation.

Key Vocabulary:	DOE Lessons/Resources:	Teacher Notes and Elaborations:
expression, ratios, monomial, polynomials, ratios, exponents, law of exponents, integers, sum, differences, products, quotients, scientific notation, base, leading number	➢ ESS Lessons ➢ Henrico Website	❖ A relationship exists between the laws of exponents and scientific notation. Numbers in scientific notation are written as: 10^n a where $1 \leq a < 10$ and n is any integer.

Strand: Expressions and Operations--Simplifying Radicals: October 1 – 12

<table>
<tr><th colspan="2">Standard(s)
Essential Knowledge and Skills</th><th>Understanding the Standard(s)</th></tr>
<tr><td colspan="2">A.3 The student will simplify
a) square roots of whole numbers and monomial algebraic expressions;
b) cube roots of integers; and
c) numerical expressions containing square or cube roots.

● Express the square root of a whole number in simplest form. (a)
● Express the principal square root of a monomial algebraic expression in simplest form where variables are assumed to have positive values. (a)
● Express the cube root of an integer in simplest form. (b)
● Simplify a numerical expression containing square or cube roots. (c)
● Add, subtract, and multiply two monomial radical expressions limited to a numerical radicand. (c)

<u>Vertical Articulation:</u>
7.1 and 8.3</td><td>● A radical expression in Algebra I contains the square root symbol (√) or the cube root symbol (√ 3).
● A square root of a number is a number y such that y 2 = a.
● A cube root of a number b is a number y such that y 3 = b.
● A square root in simplest form is one in which the radicand has no perfect square factors other than one.
● The inverse of squaring a number is determining the square root.
● Any non-negative number other than a perfect square has a principal square root that lies between two consecutive whole numbers.
● A cube root in simplest form is one in which the radicand has no perfect cube factors other than one.
● The cube root of a perfect cube is an integer.
● The cube root of a non-perfect cube lies between two consecutive integers.
● The inverse of cubing a number is determining the cube root.</td></tr>
<tr><td><u>Key Vocabulary:</u>
factor, prime, composite, radical, radical expression, radicand (argument), index, square root, cube root, principal square root, non-negative number, inverse</td><td><u>DOE Lessons/Resources:</u>
➢ ESS Lessons
➢ Henrico Website</td><td><u>Teacher Notes and Elaborations:</u>
❖ A radical expression is in simplest form when all three statements are true.
1. The expression under the radical sign has no perfect square factors other than one.
2. The expression under the radical sign does not contain a fraction.
3. The denominator does not contain a radical expression.</td></tr>
</table>

Strand: Expressions and Operations--Polynomials: October 15 – 26

Standard(s) Essential Knowledge and Skills	Understanding the Standard(s)
A.2 The student will perform operations on polynomials, including b) adding, subtracting, multiplying, and dividing polynomials; and ● Model sums, differences, products, and quotients of polynomials with concrete objects and their related pictorial and symbolic representations. (b) ● Determine sums and differences of polynomials. (b) ● Determine products of polynomials. The factors should be limited to five or fewer terms (i.e., (4x + 2)(3x + 5) represents four terms and (x + 1)(2x 2 + x + 3) represents five terms). (b) ● Determine the quotient of polynomials, using a monomial or binomial divisor, or a completely factored divisor. (b) **Vertical Articulation:**	• Operations with polynomials can be represented concretely, pictorially, and symbolically. • Polynomial expressions can be used to define functions and these functions can be represented graphically. • For division of polynomials in this standard, instruction on the use of long or synthetic division is not required, but students may benefit from experiences with these methods, which become more useful and prevalent in the study of advanced levels of algebra.

Key Vocabulary:	DOE Lessons/Resources:	Teacher Notes and Elaborations:
coefficient, variable, term, base, exponent, power, scientific notation, standard notation, prime, composite, factors, polynomial, trinomial, binomial, divisor	➢ ESS Lessons ➢ Henrico Website	❖ Area Model **By operation:** ❖ Addition (combining like terms): add coefficient, leave the exponent ❖ Multiplication: multiply coefficient, add the exponent ❖ Division: divide coefficient, subtract the exponent ❖ Power: raise coefficient, multiply the exponent

Strand: Expressions and Operations--Factoring Polynomials: October 29 – November 9

Standard(s) Essential Knowledge and Skills	Understanding the Standard(s)
A.2 The student will perform operations on polynomials, including **c) factoring completely first- and second-degree binomials and trinomials in one variable.** ● Factor completely first- and second-degree polynomials in one variable with integral coefficients. After factoring out the greatest common factor (GCF), leading coefficients should have no more than four factors. (c) ● Factor and verify algebraic factorizations of polynomials with a graphing utility. (c) **Vertical Articulation:**	• Operations with polynomials can be represented concretely, pictorially, and symbolically. • Polynomial expressions can be used to model practical situations. • Factoring reverses polynomial multiplication. • Trinomials may be factored by various methods including factoring by grouping. - Example of factoring by grouping $2x^2 + 5x – 3$ $2x^2 + 6x – x – 3$ $2x(x + 3) – (x + 3)$ $(x + 3)(2x – 1)$ • Prime polynomials cannot be factored over the set of integers into two or more factors, each of lesser degree than the original polynomial. • Polynomial expressions can be used to define functions and these functions can be represented graphically. • For division of polynomials in this standard, instruction on the use of long or synthetic division is not required, but students may benefit from experiences with these methods, which become more useful and prevalent in the study of advanced levels of algebra.

Key Vocabulary:	DOE Lessons/Resources:	Teacher Notes and Elaborations:
factor, factoring, divisor, roots or zeros, coefficient, variable,base, exponent, power, scientific notation, standard notation, prime, composite, GCF, polynomial, trinomial, binomial	➢ ESS Lessons ➢ Henrico Website	Guidelines for Factoring 1. Factor out the greatest monomial factor first. 2. Look for a difference of squares. 3. Look for a trinomial square. 4. If a trinomial is not a square, look for a pair of binomial factors. 5. If a polynomial has four or more terms, look for a way to group the terms in pairs or in a group of three terms that is a binomial square. 6. Make sure that each factor is prime. Check the work by multiplying the factors.

Strand: Equations/Inequalities--Solving Quadratic Equations: November 12 – 20

Standard(s) Essential Knowledge and Skills	Understanding the Standard(s)
A.4 The student will solve **b) quadratic equations in one variable algebraically; and** **e) practical problems involving equations and systems of equations.** ● Apply the properties of real numbers and properties of equality to simplify expressions and solve equations. (a, b) ● Solve quadratic equations in one variable algebraically. Solutions may be rational or irrational. (b) ● Write a system of two linear equations that models a practical situation. (e) ● Interpret and determine the reasonableness of the algebraic or graphical solution of a system of two linear equations that models a practical situation. (e) ● Solve practical problems involving equations and systems of equations. (e) **Vertical Articulation:** 6.13, 7.12, and 8.17	● A solution to an equation is the value or set of values that can be substituted to make the equation true. ● Each point on the graph of a linear or quadratic equation in two variables is a solution of the equation. ● Practical problems may be interpreted, represented, and solved using linear and quadratic equations. ● The process of solving linear and quadratic equations can be modeled in a variety of ways, using concrete, pictorial, and symbolic representations. ● Quadratic equations in one variable may be solved algebraically by factoring and applying properties of equality or by using the quadratic formula over the set of real numbers (Algebra I) or the set of complex numbers (Algebra II). ● Systems of two linear equations can be used to model two practical conditions that must be satisfied simultaneously. Equations and systems of equations can be used as mathematical models for practical situations. ● Solutions and intervals may be expressed in different formats, including set notation or using equations and inequalities. - Examples may include: **Equation/ Inequality** — **Set Notation** $x = 3$ — $\{3\}$ $x = 3$ or $x = 5$ — $\{3, 5\}$ $y \geq 3$ — $\{y: y \geq 3\}$ Empty (null) set □ — $\{\ \}$

Key Vocabulary:	DOE Lessons/Resources:	Teacher Notes and Elaborations:
	➢ ESS Lessons ➢ Henrico Website	❖ Quadratic equations can be solved in a variety of ways: 1. factoring, 2. graphing 3. completing the square, and 4. using the graphing calculator ❖ May have no solutions, one solution, or two solutions.

Strand: Functions—Functions of Linear Equations: November 26 – 30

Standard(s) Essential Knowledge and Skills	Understanding the Standard(s)
A.7 The student will investigate and analyze linear and quadratic function families and their characteristics both algebraically and graphically, including **a) determining whether a relation is a function;** **b) domain and range;** **e) values of a function for elements in its domain; and** **f) connections between and among multiple representations of functions using verbal descriptions, tables, equations, and graphs.** ● Determine whether a relation, represented by a set of ordered pairs, a table, a mapping, or a graph is a function. (a) ● Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically. (b, c, d) ● For any value, *x,* in the domain of *f*, determine *f*(*x*). (e) ● Represent relations and functions using verbal descriptions, tables, equations, and graph. Given one representation, represent the relation in another form. (f) ● Investigate and analyze characteristics and multiple representations of functions with a graphing utility. (a, b, c, d, e, f) **Vertical Articulation:** 7.10, 8.15, and 8.16	● A relation is a function if and only if each element in the domain is paired with a unique element of the range. ● Functions describe the relationship between two variables where each input is paired to a unique output. ● Function families consist of a parent function and all transformations of the parent function. ● The domain of a function is the set of all possible values of the independent variable. ● The range of a function is the set of all possible values of the dependent variable. ● For each x in the domain of f, x is a member of the input of the function f, f(x) is a member of the output of f, and the ordered pair (x, f(x)) is a member of f. ● The domain of a function may be restricted by the practical situation modeled by a function. ● Solutions and intervals may be expressed in different formats, including set notation or using equations and inequalities. - Examples may include: **Equation/ Inequality** — **Set Notation** $x = 3$ — $\{3\}$ $x = 3$ or $x = 5$ — $\{3, 5\}$ $y \geq 3$ — $\{y: y \geq 3\}$ Empty (null) set □ — $\{\ \}$

Key Vocabulary:	DOE Lessons/Resources:	Teacher Notes and Elaborations:
	➢ ESS Lessons ➢ Henrico Website	❖ The zeros of a function or the x-intercepts are the real root(s) or solution(s) of the quadratic equation that is formed by setting the given quadratic expression equal to zero. ❖ Quadratic equations can be solved in a variety of ways: 1. factoring, 2. graphing 3. completing the square, and 4. using the graphing calculator ❖ May have no solutions, one solution, or two solutions.

Strand: Equation and Inequalities--Slope and Writing Equations of Lines: December 3 – 14

Standard(s) Essential Knowledge and Skills	Understanding the Standard(s)
A.6 The student will **a) determine the slope of a line when given an equation of the line, the graph of the line, or two points on the line;** **b) write the 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; and** **c) graph linear equations in two variables.** ● Determine the slope of the line, given the equation of a linear function. (a) ● Determine the slope of a line, given the coordinates of two points on the line. (a) ● Determine the slope of a line, given the graph of a line. (a) ● Recognize and describe a line with a slope or rate of change that is positive, negative, zero, or undefined. (a) ● Write the equation of a line when given the graph of a line. (b) ● Write the equation of a line when given two points on the line whose coordinates are integers. (b) ● Write the equation of a line when given the slope and a point on the line whose coordinates are integers. (b) ● Write the equation of a vertical line as x = a. (b) ● Write the equation of a horizontal line as y = c. (b) ● Write the equation of a line parallel or perpendicular to a given line through a given point. (b) ● Graph a linear equation in two variables, including those that arise from a variety of practical situations. (c) ● Use the parent function y = x and describe transformations defined by changes in the slope or y-intercept. (c) ● **Vertical Articulation:** 6.12-13, 7.10-12, and 8.15-17	● Changes in slope may be described by dilations or reflections or both. ● Changes in the y-intercept may be described by translations. ● Linear equations can be graphed using slope, x- and y-intercepts, and/or transformations of the parent function. ● The slope of a line represents a constant rate of change in the dependent variable when the independent variable changes by a constant amount. ● The equation of a line defines the relationship between two variables. ● The graph of a line represents the set of points that satisfies the equation of a line. ● A line can be represented by its graph or by an equation. Students should have experiences writing equations of lines in various forms, including standard form, slope-intercept form, or point-slope form. ● Parallel lines have equal slopes. ● The product of the slopes of perpendicular lines is -1 unless one of the lines has an undefined slope. ● Slope can be described as a rate of change and will be positive, negative, zero, or undefined.

Key Vocabulary:	DOE Lessons/Resources:	Teacher Notes and Elaborations:
slope, y-intercept, graph, rate of change, vertical, horizontal, positive, negative, zero, undefined	➢ ESS Lessons ➢ Henrico Website	❖ Standard: Ax + By = C, A, B, and C are integers and A is positive. ❖ Vertical line: x = a and a Horizontal line (constant function): y = b ❖ The parent function for a linear equation is y = x.

Strand: Equation and Inequalities--Solving Inequalities: January 3 – 11

Standard(s) Essential Knowledge and Skills	Understanding the Standard(s)
A.5 The student will **a) solve multistep linear inequalities in one variable algebraically and represent the solution graphically;** **b) represent the solution of linear inequalities in two variables graphically;** **c) solve practical problems involving inequalities;** ● Solve multistep linear inequalities in one variable algebraically and represent the solution graphically. (a) ● Apply the properties of real numbers and properties of inequality to solve multistep linear inequalities in one variable algebraically. (a) ● Represent the solution of a linear inequality in two variables graphically. (b) ● Solve practical problems involving linear inequalities. (c) ● Determine whether a coordinate pair is a solution of a linear inequality or a system of linear inequalities. (c) ● Determine and verify algebraic solutions using a graphing utility. (a, b, c, d) **Vertical Articulation:** 6.14, 7.13, and 8.18	● A solution to an inequality is the value or set of values that can be substituted to make the inequality true. ● Practical problems may be modeled and solved using linear inequalities. ● Solutions and intervals may be expressed in different formats, including set notation or using equations and inequalities. - Examples may include: **Equation/ Inequality** — **Set Notation** $x = 3$ — $\{3\}$ $x = 3$ or $x = 5$ — $\{3, 5\}$ $y \geq 3$ — $\{y: y \geq 3\}$ Empty (null) set □ — $\{\ \}$ ● Properties of Real Numbers and Properties of Inequality are applied to solve inequalities. ● Properties of Real Numbers: - Associative Property of Addition - Associative Property of Multiplication - Commutative Property of Addition - Commutative Property of Multiplication - Identity Property of Addition (Additive Identity) - Identity Property of Multiplication (Multiplicative Identity) - Inverse Property of Addition (Additive Inverse) - Inverse Property of Multiplication (Multiplicative Inverse) - Distributive Property ● Properties of Inequality: - Transitive Property of Inequality - Addition Property of Inequality - Subtraction Property of Inequality - Multiplication Property of Inequality - Division Property of Inequality - Substitution

Key Vocabulary:	DOE Lessons/Resources:	Teacher Notes and Elaborations:
equation, inequality, set builder notaton	➢ ESS Lessons ➢ Henrico Website	❖ Solution to an equation being a value vs. a solution to an inequality being a range of values

Strand: Equation and Inequalities—Systems of Equations: January 14 – 25

Standard(s) Essential Knowledge and Skills	Understanding the Standard(s)
A.4 The student will solve **d) systems of two linear equations in two variables algebraically and graphically;** **e) practical problems involving equations and systems of equations.** • Given a system of two linear equations in two variables that has a unique solution, solve the system by substitution or elimination to identify the ordered pair which satisfies both equations. (d) • Given a system of two linear equations in two variables that has a unique solution, solve the system graphically by identifying the point of intersection. (d) • Solve and confirm algebraic solutions to a system of two linear equations using a graphing utility. (d) • Determine whether a system of two linear equations has one, an infinite number, or no solutions. (d) • Write a system of two linear equations that models a practical situation. (e) • Interpret and determine the reasonableness of the algebraic or graphical solution of a system of two linear equations that models a practical situation. (e) • Solve practical problems involving equations and systems of equations. (e) **Vertical Articulation:** 7.10 & 12 and 8.16-17	• A solution to an equation is the value or set of values that can be substituted to make the equation true. • Each point on the graph of a linear or quadratic equation in two variables is a solution of the equation. • The process of solving linear and quadratic equations can be modeled in a variety of ways, using concrete, pictorial, and symbolic representations. • A system of linear equations with exactly one solution is characterized by the graphs of two lines whose intersection is a single point, and the coordinates of this point satisfy both equations. • A system of two linear equations with no solution is characterized by the graphs of two parallel lines that do not intersect. • A system of two linear equations having an infinite number of solutions is characterized by two lines that coincide (the lines appear to be the graph of one line), and the coordinates of all points on the line that satisfy both equations. These lines will have the same slope and y-intercept.

Key Vocabulary:	DOE Lessons/Resources:	Teacher Notes and Elaborations:
	➢ ESS Lessons ➢ Henrico Website	❖

Strand: Equation and Inequalities—Systems of Inequalities: January 14 – February 8

Standard(s) Essential Knowledge and Skills	Understanding the Standard(s)
A.4 The student will solve **d) systems of two linear equations in two variables algebraically and graphically;** **e) practical problems involving equations and systems of equations.** • Given a system of two linear equations in two variables that has a unique solution, solve the system by substitution or elimination to identify the ordered pair which satisfies both equations. (d) • Given a system of two linear equations in two variables that has a unique solution, solve the system graphically by identifying the point of intersection. (d) • Solve and confirm algebraic solutions to a system of two linear equations using a graphing utility. (d) • Determine whether a system of two linear equations has one, an infinite number, or no solutions. (d) • Write a system of two linear equations that models a practical situation. (e) • Interpret and determine the reasonableness of the algebraic or graphical solution of a system of two linear equations that models a practical situation. (e) • Solve practical problems involving equations and systems of equations. (e) **A.5 The student will** **d) represent the solution to a system of inequalities graphically** ● Represent the solution of a system of two linear inequalities graphically. (d) ● Determine and verify algebraic solutions using a graphing utility. (a, b, c, d) **Vertical Articulation:** 6.14, 7.13, and 8.18	● A solution to an equation is the value or set of values that can be substituted to make the equation true. ● Each point on the graph of a linear or quadratic equation in two variables is a solution of the equation. ● The process of solving linear and quadratic equations can be modeled in a variety of ways, using concrete, pictorial, and symbolic representations. ● A system of linear equations with exactly one solution is characterized by the graphs of two lines whose intersection is a single point, and the coordinates of this point satisfy both equations. ● A system of two linear equations with no solution is characterized by the graphs of two parallel lines that do not intersect. ● A system of two linear equations having an infinite number of solutions is characterized by two lines that coincide (the lines appear to be the graph of one line), and the coordinates of all points on the line that satisfy both equations. These lines will have the same slope and y-intercept. **A.5** ● The graph of the solutions of a linear inequality is a half-plane bounded by the graph of its related linear equation. Points on the boundary are included unless the inequality contains only < or > (no equality condition).

Key Vocabulary:	DOE Lessons/Resources:	Teacher Notes and Elaborations:
System, infinite	➢ ESS Lessons ➢ Henrico Website	❖

Strand: Functions--Quadratic Equations: February 11 – 22

Standard(s) Essential Knowledge and Skills	Understanding the Standard(s)
A.7 The student will investigate and analyze linear and quadratic function families and their characteristics both algebraically and graphically, including **b) domain and range;** **c) zeros;** **d) intercepts;** **e) values of a function for elements in its domain;** ● Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically. (b, c, d) ● Use the x-intercepts from the graphical representation of a quadratic function to determine and confirm its factors. (c, d) ● For any value, x, in the domain of f, determine f(x). (e) ● Represent relations and functions using verbal descriptions, tables, equations, and graph. Given one representation, represent the relation in another form. (f) ● Investigate and analyze characteristics and multiple representations of functions with a graphing utility. (a, b, c, d, e, f) **Vertical Articulation:** 7.10, 8.15, and 8.16	● The domain of a function is the set of all possible values of the independent variable. ● The range of a function is the set of all possible values of the dependent variable. ● For each x in the domain of f, x is a member of the input of the function f, f(x) is a member of the output of f, and the ordered pair (x, f(x)) is a member of f. ● A value x in the domain of f is an x-intercept or a zero of a function f if and only if f(x) = 0. ● Given a polynomial function f(x), the following statements are equivalent for any real number, k, such that f(k) = 0: - k is a zero of the polynomial function f(x), located at (k, 0); - (x – k) is a factor of f(x); - k is a solution or root of the polynomial equation f(x) =0; and - the point (k, 0) is an x-intercept for the graph of y = f(x). ● The x-intercept is the point at which the graph of a relation or function intersects with the x-axis. It can be expressed as a value or a coordinate. ● The y-intercept is the point at which the graph of a relation or function intersects with the y-axis. It can be expressed as a value or a coordinate. ● The domain of a function may be restricted by the practical situation modeled by a function.

Key Vocabulary:	DOE Lessons/Resources:	Teacher Notes and Elaborations:
	➢ ESS Lessons ➢ Henrico Website	❖

Strand: Statistics--Direct and Inverse Variation: March 4 – 15

Standard(s) Essential Knowledge and Skills	Understanding the Standard(s)
A.8 The student, given a data set or practical situation, will analyze a relation to determine whether a direct or inverse variation exists, and represent a direct variation algebraically and graphically and an inverse variation algebraically. ● Given a data set or practical situation, determine whether a direct variation exists. ● Given a data set or practical situation, determine whether an inverse variation exists. ● Given a data set or practical situation, write an equation for a direct variation. ● Given a data set or practical situation, write an equation for an inverse variation. ● Given a data set or practical situation, graph an equation representing a direct variation **Vertical Articulation:** 6.12 and 7.3	● Practical problems may be represented and solved by using direct variation or inverse variation. ● A direct variation represents a proportional relationship between two quantities. The statement "y is directly proportional to x" is translated as y = kx. ● The constant of proportionality (k) in a direct variation is represented by the ratio of the dependent variable to the independent variable and can be referred to as the constant of variation. ● A direct variation can be represented by a line passing through the origin. ● An inverse variation represents an inversely proportional relationship between two quantities. The statement "y is inversely proportional to x" is translated as y = k x . ● The constant of proportionality (k) in an inverse variation is represented by the product of the dependent variable and the independent variable and can be referred to as the constant of variation. ● The value of the constant of proportionality is typically positive when applied in practical situations.

Key Vocabulary:	DOE Lessons/Resources:	Teacher Notes and Elaborations:
independent, dependent, proportional, direct, inverse, constant, rate of change	➢ ESS Lessons ➢ Henrico Website	❖

Strand: Statistics--Scatterplots: March 18 – 22 (and the week of 4/1, if more time is needed)

Standard(s) Essential Knowledge and Skills	Understanding the Standard(s)
A.9 The student will collect and analyze data, determine the equation of the curve of best fit in order to make predictions, and solve practical problems, using mathematical models of linear and quadratic functions. ● Determine an equation of a curve of best fit, using a graphing utility, given a set of no more than twenty data points in a table, a graph, or a practical situation. ● Make predictions, using data, scatterplots, or the equation of the curve of best fit. ● Solve practical problems involving an equation of the curve of best fit. ● Evaluate the reasonableness of a mathematical model of a practical situation. **Vertical Articulation:** 8.13	● Data and scatterplots may indicate patterns that can be modeled with an algebraic equation. ● Determining the curve of best fit for a relationship among a set of data points is a tool for algebraic analysis of data. In Algebra I, curves of best fit are limited to linear or quadratic functions. ● The curve of best fit for the relationship among a set of data points can be used to make predictions where appropriate. ● Knowledge of transformational graphing using parent functions can be used to verify a mathematical model from a scatterplot that approximates the data. ● Graphing utilities can be used to collect, organize, represent, and generate an equation of a curve of best fit for a set of data. ● Many problems can be solved by using a mathematical model as an interpretation of a practical situation. The solution must then refer to the original practical situation. ● Data that fit linear y = mx + b and quadratic y = ax2 + bx + c functions arise from practical situations. ● Rounding that occurs during intermediate steps of problem solving may reduce the accuracy of the final answer. ● Evaluation of the reasonableness of a mathematical model of a practical situation involves asking questions including: - "Is there another linear or quadratic curve that better fits the data?" - "Does the curve of best fit make sense?" - "Could the curve of best fit be used to make reasonable predictions?"

Key Vocabulary:	DOE Lessons/Resources:	Teacher Notes and Elaborations:
	➢ ESS Lessons ➢ Henrico Website	❖

Review for SOL and POST-TEST: March 19 – SOL TEST DATE

Curriculum Information	Essential Knowledge and Skills Key Vocabulary	Essential Questions and Understandings Teacher Notes and Elaborations
SOL:	**Essential Knowledge:**	**Essential Questions and Understandings:**
SOL Reporting Category:	**Key Vocabulary:**	**Teacher Notes and Elaborations:** ❖ 2015 SOL Released Test Analysis
DOE Lessons/Resources: ➢ 2014 and 2015 SOL Released Test ➢ Suffolk Website-Review Notes ➢ Henrico ➢ Spotslyvania ➢		