

First Quarter	Second Quarter	Third Quarter	Fourth Quarter
<p>Unit 1: Expressions and Operations 2.5 weeks/6 blocks</p> <p>Unit 2: Equations 2.5 weeks/6 blocks</p> <p>Unit 3: Functions 1.5 weeks/4 blocks</p>	<p>Unit 4: Rate of Change/Variation 3 weeks/8 blocks</p> <p>Unit 5: Forms of Linear Equations 2.5 weeks/6 blocks</p> <p>Unit 6: Variation of Data (Statistics 1) 2 weeks/5 blocks</p> <p>Unit 7: Inequalities 2 weeks/5 blocks</p>	<p>Unit 8: Systems of Equations & Inequalities 3 weeks/8 blocks Pages 2-5</p> <ul style="list-style-type: none"> The student will solve and graph systems of linear equations and inequalities. <p>Unit 9: Exponents and Radicals 3 weeks/8 blocks Pages 6-9</p> <ul style="list-style-type: none"> The student will apply the laws of exponents and express square roots and cubic roots in simplest form. <p>Unit 10: Polynomials 4 weeks/10 blocks Pages 10-12</p> <ul style="list-style-type: none"> The student will add, subtract, multiply, and divide polynomials. 	<p>Unit 11: Quadratics 2.5 weeks/6 blocks</p> <p>Unit 12: Data Analysis (Statistics 2) 1.5 weeks/4 blocks</p>

Document Definitions	<p>Essential Understandings- This section delineates the key concepts, ideas and mathematical relationships that all students should grasp to demonstrate an understanding of the Standards of Learning.</p> <p>Correlated Standards- The essential standards for previous grade level or course and /or next grade level or course.</p> <p>Essential - Standard, benchmark, or indicator from the VDOE Standards of Learning document. In the absence of VDOE standards for a given course, content to testing such as AP and IB can be labeled Essential.</p> <p>Expected - Standard, benchmark, or indicator added by the FCPS Program of Studies to provide a context, a bridge, or an enhancement to the Essential SBIs.</p> <p>Extended - Standard, benchmark, or indicator added by the FCPS Program of Studies generally used to differentiate instruction for advanced learners. These indicators must be taught in Honors classes.</p>
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Essential Understandings

- A solution to an equation is the value or set of values that can be substituted to make the equation true.
- 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 graph of two lines that are parallel.
- A system of two linear equations having infinite solutions is characterized by two graphs that coincide (the graphs will appear to be the graph of one line), and the coordinates of all points on the line satisfy both equations.
- Systems of two linear equations can be used to model two real-world conditions that must be satisfied simultaneously.
- Equations and systems of equations can be used as mathematical models for real-world situations.
- Set builder notation may be used to represent solution sets of equations.

Vocabulary: Collinear, consistent systems, dependent systems, elimination/linear combinations, identity, inconsistent systems, independent systems, infinite solutions, intersecting lines, no solution, one solution, parallel, substitution, systems of equations

Correlated Standards

Course Level Below	Current Course Level	Course Level Above
Standard G7.14 The student will a) solve one- and two-step linear equations in one variable; and b) solve practical problems requiring the solution of one- and two-step linear equations.	From STANDARD ALG1.4 <u>The student will solve multistep linear and quadratic (Unit 11) equations in two variables, including</u> <u>e) solving systems of two linear equations in two variables algebraically and graphically;</u> <u>and</u> <u>f) solving real-world problems involving equations and systems of equations.</u>	Standard ALG2.5 The student will solve nonlinear systems of equations, including linear-quadratic and quadratic-quadratic, algebraically and graphically. Graphing calculators will be used as a tool to visualize graphs and predict the number of solutions.
Standard G8.15 The student will a) solve multistep linear equations in one variable on one and two sides of the equation; b) solve two-step linear inequalities and graph the results on a number line; and	From STANDARD ALG1.5 <u>The student will solve multistep linear inequalities in two variables, including</u> <u>d) solving systems of inequalities</u>	

<p>c) identify properties of operations used to solve an equation.</p> <p>Standard G6.13 The student will describe and identify properties of quadrilaterals.</p>		
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Textbook Correlation

Indicators	Textbook Resources	Additional Resources
<p>Essential</p> <p>4.e.1 4.e.2 4.e.3 4.f.1 4.f.2 5.d.1</p>	<p>6-2, 6-3, 6-4 6-1, 6-4 6-1, 6-2, 6-3 6-1, 6-2, 6-3, 6-4 No Correlation 6-6 (including Concept Byte)</p>	<p>Learn 360 - Battle Plan: Systems of Equations</p>
<p>Expected</p> <p>4.e.4 4.f.3 5.d.2</p>	<p>6-1 Concept Byte 6-1, 6-2, 6-3, 6-4 6-6</p>	
<p>Extended</p> <p>4.e.5</p>		

STANDARD ALG1.4

The student will solve multistep linear and quadratic equations in two variables, including

- a) solving literal equations (formulas) for a given variable (Unit 2);
- 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 (Unit 2);
- c) solving quadratic equations algebraically and graphically (Unit 11);
- d) solving multistep linear equations algebraically and graphically (Unit 2);
- 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.

ESSENTIAL KNOWLEDGE AND SKILLS	FCPS TEACHER NOTES
<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to</p> <p>Essential</p> <p>4.e.1 Solve a system of two linear equations by substitution or elimination.</p> <p>4.e.2 Solve a system of two linear equations graphically.</p> <p>4.e.3 Determine the number of solutions for a system of two linear equations (one solution, no solution, or infinite solutions).</p> <p>4.f.1 Write a system of linear equations that models a real-world situation.</p> <p>4.f.2 Determine reasonableness of a solution of a system of linear equations.</p> <p>Expected</p> <p>4.e.4 Use a graphing calculator to check a solution to a system of equations.</p> <p>4.f.3 Write and solve a system of linear equations that models a real world situation.</p> <p>Extended</p> <p>4.e.5 Solve a linear system of equations with three or more equations using graphing, substitution and linear combinations.</p>	<p>Standard 4.e.5: Graphing - A system of 3 equations would be limited to 2 variables.</p>

Unit 8: Systems of Equations and Inequalities

STRAND: EQUATIONS AND INEQUALITIES

STANDARD ALG1.5

The student will solve multistep linear inequalities in two variables, including

- a) solving multistep linear inequalities algebraically and graphically (Unit 7);
- 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 (Unit 7);
- c) solving real-world problems involving inequalities (Unit 7); and
- d) **solving systems of inequalities.**

ESSENTIAL KNOWLEDGE AND SKILLS	FCPS TEACHER NOTES
<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to</p> <p>Essential 5.d.1 Solve systems of linear inequalities algebraically and graphically.</p> <p>Expected 5.d.2 Write a system of linear inequalities from a graph.</p>	<p>Standard 5.d.1: Students should be able to verify solutions to systems of linear inequalities.</p> <p>Standard 5.d.2: Systems of linear inequalities can be comprised of 2 or 3 inequalities</p>

Essential Understandings

- The laws of exponents can be investigated using inductive reasoning.
- A relationship exists between the laws of exponents and scientific notation.
- A square root in simplest form is one in which the radicand (argument) has no perfect square factors other than one.
- A cube root in simplest form is one in which the argument has no perfect cube factors other than one.
- The cube root of a perfect cube is an integer.
- The cube root of a nonperfect cube lies between two consecutive integers.
- The inverse of cubing a number is determining the cube root.
- In the real number system, the argument of a square root must be nonnegative while the argument of a cube root may be any real number.

Vocabulary: argument, base, cube root, degree, exponent, negative exponent, perfect square, power, radical, radicand, rationalize the denominator, square root, zero power

Correlated Standards

Course Level Below	Current Course Level	Course Level Above
From Standard G7.1 The student will a) investigate and describe the concept of negative exponents for powers of ten; d) determine square roots; Standard G8.1 The student will a) simplify numerical expressions involving positive exponents, using rational numbers, order of operations, and properties of operations with real numbers; and b) compare and order decimals, fractions, percents, and numbers written in scientific notation.	STANDARD ALG1.1 <u>The student will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variable.</u> From STANDARD ALG1.2 <u>The student will perform operations on polynomials, including</u> <u>a) applying the laws of exponents to perform operations on expressions;</u> STANDARD ALG1.3 <u>The student will express the square roots and cube roots of whole numbers and the square root of a monomial algebraic expression in</u>	Standard GEOM.8 The student will solve real-world problems involving right triangles by using the Pythagorean Theorem and its converse, properties of special right triangles, and right triangle trigonometry. From Standard ALG2.1 The student, given rational, radical, or polynomial expressions, will b) add, subtract, multiply, divide, and simplify radical expressions containing rational numbers and variables, and expressions containing rational exponents;

<p>Standard G8.5 The student will</p> <p>a) determine whether a given number is a perfect square; and</p> <p>b) find the two consecutive whole numbers between which a square root lies.</p>	<p><u>simplest radical form.</u></p>	<p>Standard ALG2.3 The student will perform operations on complex numbers, express the results in simplest form using patterns of the powers of i, and identify field properties that are valid for the complex numbers.</p>
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Textbook Correlation

Indicators	Textbook Resources	Additional Resources
<p>Essential</p> <p>1.a.6</p> <p>2.a.1</p> <p>3.a.1</p> <p>3.a.2</p> <p>3.a.3</p>	<p>1-3, 10-2, VA-1</p> <p>7-1, 7-2, 7-3, 7-4 (including Concept Byte), 7-5</p> <p>1-3, 10-2, VA-1</p> <p>VA-1</p> <p>10-2</p>	<p>VDOE - Simply Radical</p>
<p>Expected</p> <p>2.a.2</p> <p>3.a.4</p>	<p>7-1, 7-2, 7-3, 7-4, 7-5, 10-1, 10-4</p> <p>10-2</p>	
<p>Extended</p> <p>3.a.5</p> <p>3.a.6</p> <p>2.a.3</p>	<p>10-3</p> <p>10-2</p> <p>No Correlation</p>	

STRAND: EXPRESSIONS AND OPERATIONS

STANDARD ALG1.1

The student will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variable.

ESSENTIAL KNOWLEDGE AND SKILLS

FCPS TEACHER NOTES

The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to

Essential

1.a.6 Evaluate expressions with square roots and/or cube roots.

STRAND: EXPRESSIONS AND OPERATIONS

STANDARD ALG1.2

The student will perform operations on polynomials, including

- a) **applying laws of exponents to perform operations on expressions;**
- b) adding, subtracting, multiplying, and dividing polynomials (Unit 10); 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 (Unit 10).

ESSENTIAL KNOWLEDGE AND SKILLS	FCPS TEACHER NOTES
<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to</p> <p>Essential 2.a.1 Simplify monomial expressions using laws of exponents.</p> <p>Expected 2.a.2 Apply the laws of exponents to solve practical problems.</p>	<p>Standard 2.a.2: Include Scientific Notation when solving practical problems</p>

STRAND: EXPRESSIONS AND OPERATIONS

STANDARD ALG1.3

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.

ESSENTIAL KNOWLEDGE AND SKILLS

FCPS TEACHER NOTES

The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to

Essential

- 3.a.1 Express square roots of a whole number in simplest form.
- 3.a.2 Express the cube root of a whole number in simplest form.
- 3.a.3 Express the principal square root of a monomial algebraic expression.

Expected

- 3.a.4 Multiply radical expressions.

Extended

- 3.a.5 Add and subtract radical expressions.
- 3.a.6 Simplify a radical by rationalizing the denominator.

Standard 3.a.6: Limit these problems to monomial denominators. Unit 10 introduces binomial denominators.

Essential Understandings

- Operations with polynomials can be represented concretely, pictorially, and symbolically.
- Polynomial expressions can be used to model real-world situations.
- The distributive property is the unifying concept for polynomial operations.
- Factoring reverses polynomial multiplication.
- Some polynomials are prime polynomials and cannot be factored over the set of real numbers.
- Polynomial expressions can be used to define functions and these functions can be represented graphically.
- There is a relationship between the factors of any polynomial and the x -intercepts of the graph of its related function.

Vocabulary: binomial, degree of a polynomial, discriminant, difference of squares, factoring, greatest common factor, leading coefficient, monomial, perfect square trinomial, polynomial, prime, prime factorization, standard form of polynomial (descending order when in one variable), term, trinomial

Correlated Standards

Course Level Below	Current Grade Level Standards	Course Level Above
<p>Standard G7.16 The student will apply the following properties of operations with real numbers:</p> <p>a) the commutative and associative properties for addition and multiplication;</p> <p>b) the distributive property;</p> <p>c) the additive and multiplicative identity properties;</p> <p>d) the additive and multiplicative inverse properties; and</p> <p>e) the multiplicative property of zero.</p> <p>From Standard G8.15 The student will</p> <p>c) identify properties of operations used to solve an equation</p>	<p>From Standard ALG1. 2 <u>The student will perform operations on polynomials, including</u></p> <p><u>b) adding, subtracting, multiplying, and dividing polynomials; and</u></p> <p><u>c) factoring completely first- and second-degree binomials and trinomials in one or two variables.</u></p> <p><u>Graphing calculators will be used as a tool for factoring and for confirming algebraic factorizations.</u></p> <p>STANDARD ALG1.3 <u>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.</u></p>	<p>Standard GEOM.8 The student will solve real-world problems involving right triangles by using the Pythagorean Theorem and its converse, properties of special right triangles, and right triangle trigonometry.</p> <p>Standard ALG2.3 The student will perform operations on complex numbers, express the results in simplest form using patterns of the powers of i, and identify field properties that are valid for the complex numbers.</p>

Textbook Correlation

Indicators	Textbook Resources	Additional Resources
Essential 2.b.1, 2.b.2 2.b.3 2.b.4 2.b.5 2.c.1 2.c.2	8-3 (including concept byte), 8-4, 8-5 (including concept byte), 8-6 8-1 8-2, 8-3, 8-4 11-3 8-2, 8-5, 8-6, VA-2 No Correlation	
Expected 2.b.6 2.c.4, 2.c.5 2.c.6	8-1 8-7, VA-2 8-8, VA-2	VDOE - Dividing Polynomials using Algebra Tiles
Extended 2.b.7 2.c.7 2.c.8 3.a.7	11-3 No Correlation 11-1, 11-2, 11-4 10-3	

STRAND: EXPRESSIONS AND OPERATIONS

STANDARD ALG1.2

The student will perform operations on polynomials, including

- a) applying the laws of exponents to perform operations on expressions (Unit 9);
 - 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.**

ESSENTIAL KNOWLEDGE AND SKILLS	FCPS TEACHER NOTES
<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to</p> <p>Essential</p> <p>2.b.1 Model sums, differences, products, and quotients of polynomials with concrete objects and their related pictorial representations.</p> <p>2.b.2 Relate concrete and pictorial manipulations that model polynomial operations to their corresponding symbolic representations.</p> <p>2.b.3 Find sums and differences of polynomials.</p> <p>2.b.4 Find products of polynomials. The factors will have no more than five total terms (i.e. $(4x + 2)(3x + 5)$ represents four terms and $(x + 1)(2x^2 + x + 3)$ represents five terms).</p> <p>2.b.5 Find the quotient of polynomials, using a monomial or binomial divisor, or a completely factored divisor.</p> <p>2.c.1 Factor completely first- and second-degree polynomials with integral coefficients.</p> <p>2.c.2 Identify prime polynomials.</p> <p>Expected</p> <p>2.b.6 Classify polynomials according to the number of terms they have or by the degree of the polynomial.</p> <p>2.c.4 Factor completely polynomials using difference of squares.</p>	<p>Standard 2.b.5: Not long division or synthetic division.</p>

- 2.c.5 Factor completely polynomials that are perfect square trinomials.
- 2.c.6 Factor completely polynomials with four terms using factoring by grouping, and applying this method to factoring trinomials.

Extended

- 2.b.7 Find the quotient of polynomials using a binomial divisor that is not a factor of the dividend.
- 2.c.7 Factor completely first and second degree polynomials with rational number coefficients.
- 2.c.8 Simplify rational expressions containing polynomials in the numerator and/or denominator.

Standard 2.b.7: Use long division or synthetic division.

STRAND: EXPRESSIONS AND OPERATIONS

STANDARD ALG1.3

Simplify radicals by rationalize the denominator using conjugates.

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.

ESSENTIAL KNOWLEDGE AND SKILLS

FCPS TEACHER NOTES

The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to

Extended

3.a.7 Simplify a radical by rationalizing the denominator by using conjugates.