



**PowerTeaching<sup>®</sup> Math**

**3rd Edition**

**Alignment to the  
Virginia Mathematics  
Standards of Learning**

This document is organized as follows:

Section I: Grade 6 Alignment to the Virginia Mathematics Standards of Learning

Section II: Grade 7 Alignment to the Virginia Mathematics Standards of Learning

Section III: Grade 8 Alignment to the Virginia Mathematics Standards of Learning

Section IV: Algebra 1 Alignment to the Virginia Mathematics Standards of Learning

## Section I: Grade 6 Alignment to the Mathematics Standards of Learning

### Grade 6

#### Number and Number Sense

##### Relationships among Fractions, Decimals and Percents

**Virginia Mathematics Standards of Learning 6.1:** The student will describe and compare data, using ratios, and will use appropriate notations, such as  $\frac{a}{b}$ ,  $a$  to  $b$ , and  $a:b$ .

- Unit 5 Cycle 1 Lesson 1—What are ratios?
- Unit 5 Cycle 1 Lesson 2—Ratios and Tables
- Unit 5 Cycle 1 Lesson 3—Rate and Unit Rate
- Unit 5 Cycle 1 Lesson 4—Comparing Rates
- Unit 6 Cycle 1 Lesson 1—Converting Measurements
- Unit 6 Cycle 1 Lesson 3—Graphing Equivalent Ratios
- Unit 6 Cycle 1 Lesson 4—Problem Solving with Ratios and Tape Diagrams
- Unit 6 Cycle 1 Lesson 5—Rate and Ratio Problem Solving
- Unit 6 Cycle 3 Lessons 1–3—Ratio and Percent Applications Performance Task (Preparing for a Dinner Fundraiser)
- Unit 12 Cycle 1 Lesson 1—Converting Measurements

**Virginia Mathematics Standards of Learning 6.2:** The student will

- a) investigate and describe fractions, decimals, and percents as ratios;
- b) identify a given fraction, decimal, or percent from a representation;
- c) demonstrate equivalent relationships among fractions, decimals, and percents; and
- d) compare and order fractions, decimals, and percents.

- Unit 3 Cycle 2 Lesson 1—Estimating the Value of Fractions
- Unit 5 Cycle 1 Lesson 1—What are ratios?
- Unit 6 Cycle 1 Lesson 1—Converting Measurements
- Unit 6 Cycle 1 Lesson 5—Rate and Ratio Problem Solving
- Unit 6 Cycle 2 Lesson 1—Understanding Percent
- Unit 6 Cycle 2 Lesson 2—Comparing and Ordering Percents, Fractions, and Decimals
- Unit 6 Cycle 2 Lesson 3—Solving Percent Problems
- Unit 6 Cycle 3 Lessons 1–3—Ratio and Percent Applications Performance Task (Preparing for a Dinner Fundraiser)
- Unit 12 Cycle 1 Lesson 1—Converting Measurements

**Virginia Mathematics Standards of Learning 6.3:** The student will

- a) identify and represent integers;
- b) order and compare integers; and
- c) identify and describe absolute value of integers.

- Unit 4 Cycle 1 Lesson 1—Exploring Integers
- Unit 4 Cycle 2 Lesson 1—Comparing and Ordering Integers
- Unit 4 Cycle 2 Lesson 2—Absolute Value

Lessons in other grade levels:

- Grade 7 Cycle 1 Lesson 1—Definition of Rational Numbers

**Virginia Mathematics Standards of Learning 6.4:** The student will demonstrate multiple representations of multiplication and division of fractions.

- Unit 3 Cycle 2 Lesson 2—Multiplying Fractions
- Unit 3 Cycle 2 Lesson 3—Multiplying Mixed Numbers

The following units review earlier, related standards:

- Unit 3 Cycle 1 Lesson 1—Greatest Common Factor (VA SOL 4.5a)
- Unit 3 Cycle 1 Lesson 2—Least Common Multiple (VA SOL 4.5a)
- Unit 3 Cycle 1 Lesson 3—Problem Solving with GCF and LCM (VA SOL 5.4)

**Virginia Mathematics Standards of Learning 6.5:** The student will investigate and describe concepts of positive exponents and perfect squares.

- Unit 7 Cycle 1 Lesson 1—Understanding Exponents

<b>Computation and Estimation</b>	
<b>Applications of Operations with Rational Numbers</b>	
<b>Virginia Mathematics Standards of Learning 6.6:</b> The student will	
<ul style="list-style-type: none"> <li>a) multiply and divide fractions and mixed numbers; and</li> <li>b) estimate solutions and then solve single-step and multistep practical problems involving addition, subtraction, multiplication, and division of fractions.</li> </ul>	
<ul style="list-style-type: none"> <li>• Unit 3 Cycle 2 Lesson 2—Multiplying Fractions</li> <li>• Unit 3 Cycle 2 Lesson 3—Multiplying Mixed Numbers</li> <li>• Unit 3 Cycle 3 Lesson 1—Dividing Whole Numbers by Fractions</li> <li>• Unit 3 Cycle 3 Lesson 2—Dividing Fractions by Fractions</li> <li>• Unit 3 Cycle 3 Lesson 3—Problem Solving with Multiplying and Dividing Fractions</li> </ul>	
<b>Virginia Mathematics Standards of Learning 6.7:</b> The student will solve single-step and multistep practical problems involving addition, subtraction, multiplication, and division of decimals.	
<ul style="list-style-type: none"> <li>• Unit 2 Cycle 2 Lesson 2—Adding and Subtracting Decimals</li> <li>• Unit 2 Cycle 2 Lesson 3—Multiplying Decimals</li> <li>• Unit 2 Cycle 2 Lesson 4—Dividing Decimals</li> <li>• Unit 2 Cycle 2 Lesson 5—Problem Solving with Decimals</li> <li>• Unit 2 Cycle 3 Lessons 1–3—Computation Skills Performance Task (Starting a Food Truck Business)</li> </ul> <p>The following units review earlier, related standards:</p> <ul style="list-style-type: none"> <li>• Unit 2 Cycle 1 Lesson 1—Mental Math (VA SOL 4.4a)</li> <li>• Unit 2 Cycle 1 Lesson 2—Estimation (VA SOL 4.4a)</li> <li>• Unit 2 Cycle 1 Lesson 3—Whole Number Division 1 (VA SOL 4.4c, 5.4)</li> <li>• Unit 2 Cycle 1 Lesson 4—Whole Number Division 2 (VA SOL 4.4c, 5.4)</li> <li>• Unit 2 Cycle 2 Lesson 1—Estimating with Decimals (VA SOL 5.5a)</li> </ul>	
<b>Virginia Mathematics Standards of Learning 6.8:</b> The student will evaluate whole number numerical expressions, using the order of operations.	
<ul style="list-style-type: none"> <li>• Unit 7 Cycle 1 Lesson 1—Understanding Exponents</li> <li>• Unit 7 Cycle 1 Lesson 2—Order of Operations</li> <li>• Unit 7 Cycle 1 Lesson 3—Writing and Evaluating Numeric Expressions</li> </ul>	

<b>Measurement</b>
<b>Problem Solving with Area, Perimeter, Volume, and Surface Area</b>
<p><b>Virginia Mathematics Standards of Learning 6.9:</b> The student will make ballpark comparisons between measurements in the U.S. Customary System of measurement and measurements in the metric system.</p>
<ul style="list-style-type: none"> <li>• Unit 12 Cycle 1 Lesson 2—Measurements and Linear Relationships</li> <li>• Unit 12 Cycle 1 Lesson 3—Measurement in Problem Solving</li> </ul>
<p><b>Virginia Mathematics Standards of Learning 6.10:</b> The student will</p> <ol style="list-style-type: none"> <li>a) define <math>\pi</math> (pi) as the ratio of the circumference of a circle to its diameter;</li> <li>b) solve practical problems involving circumference and area of a circle, given the diameter or radius;</li> <li>c) solve practical problems involving area and perimeter; and</li> <li>d) describe and determine the volume and surface area of a rectangular prism.</li> </ol>
<ul style="list-style-type: none"> <li>• Unit 9 Cycle 1 Lesson 4—Geometry and Equations</li> <li>• Unit 11 Cycle 1 Lesson 3—Tables and Equations 2</li> <li>• Unit 12 Cycle 2 Lesson 2—Area of Rectangles and Triangles</li> <li>• Unit 12 Cycle 2 Lesson 3—Area of Quadrilaterals</li> <li>• Unit 12 Cycle 2 Lesson 4—Area of Complex Shapes</li> <li>• Unit 12 Cycle 2 Lesson 5—Problem Solving with Area</li> <li>• Unit 13 Cycle 1 Lesson 1—Unit Fraction Cubes</li> <li>• Unit 13 Cycle 1 Lesson 2—Finding Volume 1</li> <li>• Unit 13 Cycle 1 Lesson 3—Finding Volume 2</li> <li>• Unit 13 Cycle 1 Lesson 4—Additive and Subtractive Volumes</li> <li>• Unit 13 Cycle 1 Lesson 5—Problem Solving with Volume</li> <li>• Unit 13 Cycle 2 Lesson 1—Nets</li> <li>• Unit 13 Cycle 2 Lesson 2—Surface Area of Prisms</li> <li>• Unit 13 Cycle 2 Lesson 3—Surface Area of Pyramids</li> <li>• Unit 13 Cycle 2 Lesson 4—Problem Solving with Surface Area</li> <li>• Unit 13 Cycle 3 Lessons 1–3—Volume and Surface Area Performance Task (Kitchen Remodel)</li> </ul> <p>Lessons in other grade levels:</p> <ul style="list-style-type: none"> <li>• Grade 7 Unit 8 Cycle 1 Lesson 1—Area, Perimeter, and Volume</li> <li>• Grade 7 Unit 8 Cycle 3 Lessons 1–3—Geometry Performance Task (Bathroom Remodel)</li> <li>• Grade 7 Unit 9 Cycle 1 Lesson 1—Pi and the Parts of Circles</li> <li>• Grade 7 Unit 9 Cycle 1 Lesson 2—Circumference</li> <li>• Grade 7 Unit 9 Cycle 1 Lesson 3—Area of Circles</li> <li>• Grade 7 Unit 9 Cycle 1 Lesson 4—Problem Solving with Circles</li> </ul>

Geometry
<b>Properties and Relationships</b>
<b>Virginia Mathematics Standards of Learning 6.11:</b> The student will <ol style="list-style-type: none"> <li>identify the coordinates of a point in a coordinate plane; and</li> <li>graph ordered pairs in a coordinate plane.</li> </ol>
<ul style="list-style-type: none"> <li>Unit 4 Cycle 1 Lesson 2—Graphing Ordered Pairs in All Quadrants</li> <li>Unit 4 Cycle 1 Lesson 3—Exploring Graphing</li> <li>Unit 4 Cycle 2 Lesson 3—Problem Solving with Coordinates</li> </ul>
<b>Virginia Mathematics Standards of Learning 6.12:</b> The student will determine congruence of segments, angles, and polygons.
This standard is not covered.
<b>Virginia Mathematics Standards of Learning 6.13:</b> The student will describe and identify properties of quadrilaterals.
<ul style="list-style-type: none"> <li>Unit 12 Cycle 2 Lesson 1—Properties of Polygons</li> </ul> Lessons in other grade levels: <ul style="list-style-type: none"> <li>Grade 7 Unit 8 Cycle 2 Lesson 1—Identifying 2-D Shapes</li> </ul>

Probability and Statistics
<b>Practical Applications of Statistics</b>
<b>Virginia Mathematics Standards of Learning 6.14:</b> The student, given a problem situation, will <ol style="list-style-type: none"> <li>construct circle graphs;</li> <li>draw conclusions and make predictions, using circle graphs; and</li> <li>compare and contrast graphs that present information from the same data set.</li> </ol>
<ul style="list-style-type: none"> <li>Unit 14 Cycle 1 Lesson 1—Statistical Questions 1</li> <li>Unit 14 Cycle 1 Lesson 2—Statistical Questions 2</li> <li>Unit 14 Cycle 1 Lesson 3—Variability</li> <li>Unit 14 Cycle 2 Lesson 5—Line Graphs</li> <li>Unit 14 Cycle 2 Lesson 6—Data Displays</li> <li>Unit 15 Cycle 3 Lessons 1–3—Statistics Performance Task (Family Vacation)</li> </ul> The following units review earlier, related standards: <ul style="list-style-type: none"> <li>Unit 14 Cycle 2 Lesson 3—Line Plots (VA SOL 3.17b)</li> <li>Unit 14 Cycle 2 Lesson 4—Histograms (VA SOL 3.17b)</li> </ul>

Lessons in other grade levels:

- Grade 7 Unit 13 Cycle 1 Lesson 1—Read and Interpret a Numerical Data Display

**Virginia Mathematics Standards of Learning 6.15:** The student will

- a) describe mean as balance point; and
- b) decide which measure of center is appropriate for a given purpose.

- Unit 15 Cycle 1 Lesson 1—Describing the Distribution of Numerical Data
- Unit 15 Cycle 2 Lesson 1—Measures of Center 1
- Unit 15 Cycle 2 Lesson 2—Measures of Center 2
- Unit 15 Cycle 2 Lesson 3—Measures of Variability
- Unit 15 Cycle 2 Lesson 4—Describing Data
- Unit 15 Cycle 3 Lessons 1–3—Statistics Performance Task (Family Vacation)

Lessons in other grade levels:

- Grade 7 Unit 13 Cycle 2 Lesson 1—Find Measures of Center and Variability
- Grade 7 Unit 13 Cycle 2 Lesson 2—Compare and Contrast Measures of Center
- Grade 7 Unit 13 Cycle 2 Lesson 3—Compare and Contrast Measures of Variability
- Grade 7 Unit 13 Cycle 2 Lesson 4—Problem Solving with Data Distributions

**Virginia Mathematics Standards of Learning 6.16:** The student will

- a) compare and contrast dependent and independent events; and
- b) determine probabilities for dependent and independent events.

This standard is covered by lessons in other grade levels:

- Grade 7 Unit 11 Cycle 2 Lesson 1—Probability of Independent Compound Events
- Grade 7 Unit 11 Cycle 2 Lesson 2—Uniform Experimental Probability
- Grade 7 Unit 11 Cycle 2 Lesson 3—Nonuniform Experimental Probability
- Grade 7 Unit 11 Cycle 2 Lesson 4—Independent and Dependent Events
- Grade 7 Unit 11 Cycle 3 Lessons 1–3—Probability Performance Task (Consumer Contest)



## Patterns, Functions, and Algebra

### Variable Equations and Properties

**Virginia Mathematics Standards of Learning 6.17:** The student will identify and extend geometric and arithmetic sequences.

This standard is covered by lessons in other grade levels:

- Algebra 1 Unit 6 Cycle 2 Lesson 3—Arithmetic Sequences as Functions
- Algebra 1 Unit 6 Cycle 2 Lesson 4—Geometric Sequences as Functions
- Algebra 1 Unit 8 Cycle 2 Lesson 3—Modeling Situations with Arithmetic Sequences
- Algebra 1 Unit 8 Cycle 2 Lesson 4—Modeling Situations with Geometric Sequences

**Virginia Mathematics Standards of Learning 6.18:** The student will solve one-step linear equations in one variable involving whole number coefficients and positive rational solutions.

- Unit 7 Cycle 2 Lesson 2—Algebraic Expressions and Vocabulary
- Unit 9 Cycle 1 Lesson 1—Defining Equations
- Unit 9 Cycle 1 Lesson 2—Solutions to Equations
- Unit 9 Cycle 1 Lesson 3—Solving Equations
- Unit 9 Cycle 1 Lesson 4—Geometry and Equations
- Unit 9 Cycle 2 Lesson 1—Inverse Operations
- Unit 9 Cycle 2 Lesson 2—Solving Addition and Subtraction Equations
- Unit 9 Cycle 2 Lesson 3—Solving Multiplication and Division Equations
- Unit 9 Cycle 2 Lesson 4—Solving Equations to Answer Questions
- Unit 9 Cycle 3 Lesson 1—Choosing the Correct Equation 1
- Unit 9 Cycle 3 Lesson 2—Choosing the Correct Equation 2
- Unit 9 Cycle 3 Lesson 3—Writing and Solving Equations

The following units review earlier, related standards:

- Unit 7 Cycle 2 Lesson 1—Introduction to Variables (VA SOL 5.18)
- Unit 7 Cycle 3 Lesson 3—Expressions and Patterns (VA SOL 5.17CF)

This standard is covered by lessons in other grade levels:

- Algebra 1 Unit 2 Cycle 3 Lesson 1—Parts of Expressions
- Algebra 1 Unit 11 Cycle 1 Lesson 1—Parts of an Expression

**Virginia Mathematics Standards of Learning 6.19:** The student will investigate and recognize

- a) the identity properties for addition and multiplication;
- b) the multiplicative property of zero; and
- c) the inverse property for multiplication.

- Unit 8 Cycle 1 Lesson 1—Combining Like Terms
- Unit 8 Cycle 1 Lesson 2—Properties of Addition
- Unit 8 Cycle 1 Lesson 3—Proving Expressions Equivalent 1
- Unit 8 Cycle 2 Lesson 1—Properties of Multiplication
- Unit 8 Cycle 2 Lesson 2—Greatest Common Factors of Monomials
- Unit 8 Cycle 2 Lesson 3—Distributive Property
- Unit 8 Cycle 2 Lesson 4—Proving Expressions Equivalent 2

**Virginia Mathematics Standards of Learning 6.20:** The student will graph inequalities on a number line.

- Unit 10 Cycle 1 Lesson 1—Introduction to Inequalities
- Unit 10 Cycle 1 Lesson 2—Graphing Inequalities
- Unit 10 Cycle 1 Lesson 3—Solutions to Inequalities
- Unit 10 Cycle 1 Lesson 4—Problem Solving with Inequalities

## Section II: Grade 7 Alignment to the Mathematics Standards of Learning

### Grade 7

#### Number and Number Sense

##### Proportional Reasoning

**Virginia Mathematics Standards of Learning 7.1:** The student will

- a) investigate and describe the concept of negative exponents for powers of ten;
- b) determine scientific notation for numbers greater than zero;
- c) compare and order fractions, decimals, percents, and numbers written in scientific notation;
- d) determine square roots; and
- e) identify and describe absolute value for rational numbers.

- Unit 2 Cycle 1 Lesson 2—Adding Opposites
- Unit 2 Cycle 1 Lesson 3—Adding Rational Numbers 1

Lessons in other grade levels:

- Grade 8 Unit 2 Cycle 1 Lesson 1—Defining Irrational Numbers
- Grade 8 Unit 3 Cycle 2 Lesson 2—Scientific Notation 1
- Grade 8 Unit 3 Cycle 2 Lesson 3—Scientific Notation 2
- Grade 8 Unit 3 Cycle 3 Lessons 1–3—Rational and Irrational Numbers Performance Task (Volcano Exploration)

**Virginia Mathematics Standards of Learning 7.2:** The student will describe and represent arithmetic and geometric sequences, using variable expressions.

This standard is covered by lessons in other grade levels:

- Algebra 1 Unit 8 Cycle 2 Lesson 1—Using Context to Find an Explicit Expression, a Recursive Process, or Steps for Calculation
- Algebra 1 Unit 13 Cycle 2 Lesson 1—Writing a Function from Context
- Algebra 1 Unit 13 Cycle 2 Lesson 2—Combining Functions 2

<b>Computation and Estimation</b>
<b>Integer Operations and Proportional Reasoning</b>
<p><b>Virginia Mathematics Standards of Learning 7.3:</b> The student will</p> <ul style="list-style-type: none"> <li>a) model addition, subtraction, multiplication, and division of integers; and</li> <li>b) add, subtract, multiply, and divide integers.</li> </ul>
<ul style="list-style-type: none"> <li>• Unit 2 Cycle 1 Lesson 2—Adding Opposites</li> <li>• Unit 2 Cycle 1 Lesson 3—Adding Rational Numbers 1</li> <li>• Unit 2 Cycle 1 Lesson 4—Adding Rational Numbers 2</li> <li>• Unit 2 Cycle 2 Lesson 1—Subtracting Integers</li> <li>• Unit 2 Cycle 2 Lesson 2—Using Properties to Subtract Rational Numbers</li> <li>• Unit 2 Cycle 2 Lesson 4—Adding and Subtracting Rational Numbers</li> <li>• Unit 3 Cycle 1 Lesson 1—Multiplying Integers</li> <li>• Unit 3 Cycle 1 Lesson 2—Using Properties to Multiply Integers</li> <li>• Unit 3 Cycle 2 Lesson 4—Using the Four Operations to Solve Real-World Problems</li> <li>• Unit 3 Cycle 3 Lessons 1–3—Rational Numbers Performance Task (Underwater Exploration)</li> </ul>
<p><b>Virginia Mathematics Standards of Learning 7.4:</b> The student will solve single-step and multistep practical problems, using proportional reasoning.</p>
<ul style="list-style-type: none"> <li>• Unit 4 Cycle 1 Lesson 1—Basic Unit Rates</li> <li>• Unit 4 Cycle 1 Lesson 2—Unit Rates with Fractions</li> <li>• Unit 4 Cycle 1 Lesson 3—Problem Solving with Unit Rates</li> <li>• Unit 4 Cycle 2 Lesson 1—Defining Proportional Relationships</li> <li>• Unit 4 Cycle 2 Lesson 2—Solving Proportions</li> <li>• Unit 4 Cycle 2 Lesson 3—Proportions in Tables and Graphs</li> <li>• Unit 4 Cycle 2 Lesson 4—Problem Solving with Proportions 1</li> <li>• Unit 4 Cycle 3 Lesson 1—Constant of Proportionality</li> <li>• Unit 4 Cycle 3 Lesson 2—Represent a Proportion as an Equation</li> <li>• Unit 4 Cycle 3 Lesson 3—Interpret Points of a Proportional Relationship</li> <li>• Unit 4 Cycle 3 Lesson 4—Problem Solving with Proportions 2</li> <li>• Unit 5 Cycle 1 Lesson 1—Understanding Percent</li> <li>• Unit 5 Cycle 1 Lesson 2—Discounts and Markups</li> <li>• Unit 5 Cycle 1 Lesson 3—Percent Change and Percent Error</li> <li>• Unit 5 Cycle 1 Lesson 4—Simple Interest</li> <li>• Unit 5 Cycle 1 Lesson 5—Multistep Percent Problems</li> </ul>

- Unit 5 Cycle 2 Lessons 1–3—Ratios and Percents Performance Task (Starting a Sports Team)
- Unit 6 Cycle 1 Lesson 3—Writing Expressions Multiple Ways
- Unit 8 Cycle 1 Lesson 2—Using Scale Drawings to Find Missing Lengths
- Unit 8 Cycle 1 Lesson 3—Completing Scale Drawings
- Unit 8 Cycle 1 Lesson 4—Using Scale Drawings to Find Area and Perimeter
- Unit 8 Cycle 1 Lesson 5—Using Scale Drawings to Find Volume and Surface Area

Lessons in other grade levels:

- Grade 6 Unit 5 Cycle 1 Lesson 2—Ratios and Tables
- Grade 6 Unit 5 Cycle 1 Lesson 3—Rate and Unit Rate
- Grade 6 Unit 5 Cycle 1 Lesson 4—Comparing Rates
- Grade 6 Unit 6 Cycle 1 Lesson 2—Problem Solving with Unit Rates
- Grade 6 Unit 6 Cycle 1 Lesson 3—Graphing Equivalent Ratios
- Grade 6 Unit 6 Cycle 1 Lesson 4—Problem Solving with Ratios and Tape Diagrams
- Grade 6 Unit 6 Cycle 1 Lesson 5—Rate and Ratio Problem Solving
- Grade 6 Unit 6 Cycle 2 Lesson 3—Solving Percent Problems
- Grade 6 Unit 6 Cycle 2 Lesson 4—Problem Solving with Percents
- Grade 6 Unit 6 Cycle 3 Lessons 1–3—Ratio and Percent Applications Performance Task (Preparing for a Dinner Fundraiser)
- Grade 6 Unit 12 Cycle 1 Lesson 1—Converting Measurements
- Grade 6 Unit 12 Cycle 1 Lesson 2—Measurements and Linear Relationships
- Grade 6 Unit 12 Cycle 1 Lesson 3—Measurement in Problem Solving

<b>Measurement</b>
<b>Proportional Reasoning</b>
<p><b>Virginia Mathematics Standards of Learning 7.5:</b> The student will</p> <ul style="list-style-type: none"> <li>a) describe volume and surface area of cylinders;</li> <li>b) solve practical problems involving the volume and surface area of rectangular prisms and cylinders; and</li> <li>c) describe how changing one measured attribute of a rectangular prism affects its volume and surface area.</li> </ul>
<ul style="list-style-type: none"> <li>• Unit 8 Cycle 3 Lessons 1–3—Geometry Performance Task (Bathroom Remodel)</li> <li>• Unit 10 Cycle 1 Lesson 1—Volume of Prisms</li> <li>• Unit 10 Cycle 1 Lesson 2—Volume of Pyramids</li> <li>• Unit 10 Cycle 1 Lesson 3—Volume of Cones and Cylinders</li> <li>• Unit 10 Cycle 1 Lesson 4—Problem Solving with Volume</li> <li>• Unit 10 Cycle 2 Lesson 1—Surface Area of Prisms</li> <li>• Unit 10 Cycle 2 Lesson 3—Surface Area of Cones and Cylinders</li> <li>• Unit 10 Cycle 2 Lesson 4—Problem Solving with Surface Area</li> </ul> <p>Lessons in other grade levels:</p> <ul style="list-style-type: none"> <li>• Grade 6 Unit 13 Cycle 2 Lesson 1—Nets</li> <li>• Grade 6 Unit 13 Cycle 2 Lesson 2—Surface Area of Prisms</li> <li>• Grade 6 Unit 13 Cycle 2 Lesson 3—Surface Area of Pyramids</li> <li>• Grade 6 Unit 13 Cycle 2 Lesson 4—Problem Solving with Surface Area</li> <li>• Grade 6 Unit 13 Cycle 3 Lessons 1–3—Volume and Surface Area Performance Task (Kitchen Remodel)</li> </ul>
<p><b>Virginia Mathematics Standards of Learning 7.6:</b> The student will determine whether plane figures—quadrilaterals and triangles—are similar and write proportions to express the relationships between corresponding sides of similar figures.</p>
<ul style="list-style-type: none"> <li>• Unit 4 Cycle 2 Lesson 1—Defining Proportional Relationships</li> <li>• Unit 8 Cycle 1 Lesson 2—Using Scale Drawings to Find Length</li> <li>• Unit 8 Cycle 1 Lesson 3—Completing Scale Drawings</li> </ul> <p>Lessons in other grade levels:</p> <ul style="list-style-type: none"> <li>• Grade 8 Unit 6 Cycle 2 Lesson 1—Reasoning with Similar Triangles</li> <li>• Grade 8 Unit 6 Cycle 2 Lesson 2—Real-World Scale Problems</li> <li>• Grade 8 Unit 6 Cycle 2 Lesson 3—Dilations on the Coordinate Plane</li> <li>• Grade 8 Unit 6 Cycle 2 Lesson 4—Verifying Similarity</li> <li>• Grade 8 Unit 6 Cycle 3 Lessons 1–3—Geometry Performance Task (Architecture, Maps, and Art)</li> <li>• Grade 8 Unit 7 Cycle 2 Lesson 2—Triangles and Slope</li> </ul>

<b>Geometry</b>	
<b>Relationships between Figures</b>	
<b>Virginia Mathematics Standards of Learning 7.7:</b> The student will compare and contrast the following quadrilaterals based on properties: parallelogram, rectangle, square, rhombus, and trapezoid.	
<ul style="list-style-type: none"><li>• Unit 8 Cycle 2 Lesson 1—Identifying 2-D Shapes</li><li>• Unit 8 Cycle 2 Lesson 2—2-D Figures Within 3-D Figures</li><li>• Unit 8 Cycle 2 Lesson 3—Constructing Quadrilaterals</li></ul>	
<b>Virginia Mathematics Standards of Learning 7.8:</b> The student, given a polygon in the coordinate plane, will represent transformations (reflections, dilations, rotations, and translations) by graphing in the coordinate plane.	
This standard is covered by lessons in other grade levels: <ul style="list-style-type: none"><li>• Grade 8 Unit 5 Cycle 1 Lesson 1—Experimenting with Translations</li><li>• Grade 8 Unit 5 Cycle 1 Lesson 2—Experimenting with Reflections</li><li>• Grade 8 Unit 5 Cycle 1 Lesson 3—Experimenting with Rotations</li><li>• Grade 8 Unit 5 Cycle 1 Lesson 4—Rotations and Circles</li><li>• Grade 8 Unit 5 Cycle 2 Lesson 1—The Effects of Transformations</li><li>• Grade 8 Unit 5 Cycle 2 Lesson 2—Reasoning About Transformations</li><li>• Grade 8 Unit 5 Cycle 2 Lesson 3—Combining Transformations</li><li>• Grade 8 Unit 5 Cycle 2 Lesson 4—Verifying Congruence</li><li>• Grade 8 Unit 5 Cycle 3 Lessons 1–3—Geometry Performance Task (Architecture, Maps, and Art)</li></ul>	

<b>Probability and Statistics</b>	
<b>Applications of Statistics and Probability</b>	
<b>Virginia Mathematics Standards of Learning 7.9:</b> The student will investigate and describe the difference between the experimental probability and theoretical probability of an event.	
<ul style="list-style-type: none"> <li>• Unit 11 Cycle 2 Lesson 2—Uniform Experimental Probability</li> <li>• Unit 11 Cycle 2 Lesson 3—Nonuniform Experimental Probability</li> <li>• Unit 11 Cycle 3 Lessons 1–3—Probability Performance Task (Consumer Contest)</li> </ul> <p>The following units review earlier, related standards:</p> <ul style="list-style-type: none"> <li>• Unit 11 Cycle 1 Lesson 1—Understanding Probability (VA SOL 4.13, 5.14)</li> <li>• Unit 11 Cycle 1 Lesson 2—Decimal and Percent Probability (VA SOL 4.13, 5.14)</li> <li>• Unit 11 Cycle 1 Lesson 3—Describing Probability (VA SOL 4.13, 5.14)</li> </ul>	
<b>Virginia Mathematics Standards of Learning 7.10:</b> The student will determine the probability of compound events, using the Fundamental (Basic) Counting Principle.	
<ul style="list-style-type: none"> <li>• Unit 2 Cycle 2 Lesson 5—Think Like a Mathematician: Build a Math Model 1</li> <li>• Unit 11 Cycle 2 Lesson 1—Probability of Independent Compound Events</li> <li>• Unit 11 Cycle 3 Lessons 1–3—Probability Performance Task (Consumer Contest)</li> </ul>	
<b>Virginia Mathematics Standards of Learning 7.11:</b> The student, given data for a practical situation, will	
<ul style="list-style-type: none"> <li>a) construct and analyze histograms; and</li> <li>b) compare and contrast histograms with other types of graphs presenting information from the same data set.</li> </ul>	
<p>This standard is covered by lessons in other grade levels:</p> <ul style="list-style-type: none"> <li>• Grade 6 Unit 14 Cycle 2 Lesson 4—Histograms</li> <li>• Algebra 1 Unit 10 Cycle 1 Lesson 1—Dot Plots, Histograms, and Box Plots</li> </ul>	



## Patterns, Functions, and Algebra

### Linear Equations

**Virginia Mathematics Standards of Learning 7.12:** The student will represent relationships with tables, graphs, rules, and words.

- Unit 4 Cycle 2 Lesson 1—Defining Proportional Relationships
- Unit 4 Cycle 2 Lesson 3—Proportions in Tables and Graphs
- Unit 4 Cycle 3 Lesson 3—Interpret Points of a Proportional Relationship
- Unit 4 Cycle 3 Lesson 4—Problem Solving with Proportions 2
- Unit 6 Cycle 1 Lesson 3—Writing Expressions with Percents

Lessons in other grade levels:

- Grade 6 Unit 5 Cycle 1 Lesson 2—Ratios and Tables
- Grade 6 Unit 6 Cycle 1 Lesson 2—Problem Solving with Unit Rates
- Grade 6 Unit 6 Cycle 1 Lesson 3—Graphing Equivalent Ratios
- Grade 6 Unit 6 Cycle 1 Lesson 4—Problem Solving with Ratios and Tape Diagrams
- Grade 6 Unit 7 Cycle 3 Lesson 4—Writing and Evaluating Algebraic Expressions
- Grade 6 Unit 11 Cycle 1 Lesson 1—Independent and Dependent Variables
- Grade 6 Unit 11 Cycle 1 Lesson 2—Tables and Equations 1
- Grade 6 Unit 11 Cycle 1 Lesson 3—Tables and Equations 2
- Grade 6 Unit 11 Cycle 1 Lesson 4—Graphing Equations
- Grade 8 Unit 10 Cycle 3 Lessons 1–3—Linear Functions Performance Task (Renting vs. Buying a Home)

**Virginia Mathematics Standards of Learning 7.13:** The student will

- a) write verbal expressions as algebraic expressions and sentences as equations and vice versa; and
- b) evaluate algebraic expressions for given replacement values of the variables.

- Unit 6 Cycle 1 Lesson 1—Equivalent Algebraic Expressions
- Unit 6 Cycle 1 Lesson 2—Evaluating Algebraic Expressions
- Unit 6 Cycle 1 Lesson 4—Writing Expressions Multiple Ways
- Unit 6 Cycle 1 Lesson 5—Writing and Evaluating Expressions

Lessons in other grade levels:

- Grade 6 Unit 7 Cycle 2 Lesson 3—Writing Expressions 1
- Grade 6 Unit 7 Cycle 2 Lesson 4—Writing Expressions 2
- Grade 6 Unit 7 Cycle 3 Lesson 1—Evaluating Expressions 1
- Grade 6 Unit 7 Cycle 3 Lesson 2—Evaluating Expressions 2
- Grade 6 Unit 7 Cycle 3 Lesson 4—Writing and Evaluating Algebraic Expressions
- Grade 6 Unit 8 Cycle 1 Lesson 3—Proving Expressions Equivalent 1

**Virginia Mathematics Standards of Learning 7.14:** 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.

- Unit 7 Cycle 1 Lesson 1—Solving Two-Step Equations

**Virginia Mathematics Standards of Learning 7.15:** The student will

- a) solve one-step inequalities in one variable; and
- b) graph solutions to inequalities on the number line.

- Unit 7 Cycle 2 Lesson 1—Solving Single-Step Inequalities
- Unit 7 Cycle 2 Lesson 3—Solving Inequalities to Answer Questions
- Unit 7 Cycle 2 Lesson 4—Writing and Solving Inequalities for Real-World Situations

**Virginia Mathematics Standards of Learning 7.16:** The student will apply the following properties of operations with real numbers

- a) the commutative and associative properties for addition and multiplication;
- b) the distributive property;
- c) the additive and multiplicative identity properties;
- d) the additive and multiplicative inverse properties; and
- e) the multiplicative property of zero.

- Unit 2 Cycle 1 Lesson 2—Adding Opposites
- Unit 2 Cycle 1 Lesson 4—Adding Rational Numbers 2
- Unit 2 Cycle 2 Lesson 2—Using Properties to Subtract Rational Numbers
- Unit 2 Cycle 2 Lesson 3—Subtracting Rational Numbers
- Unit 2 Cycle 2 Lesson 4—Adding and Subtracting Rational Numbers
- Unit 3 Cycle 1 Lesson 2—Using Properties to Multiply Integers
- Unit 3 Cycle 1 Lesson 3—Multiplying Rational Numbers
- Unit 3 Cycle 1 Lesson 4—Multiplying Rational Numbers to Solve Real-World Problems
- Unit 3 Cycle 2 Lesson 1—Using Properties to Divide Integers
- Unit 3 Cycle 2 Lesson 2—Dividing Rational Numbers
- Unit 3 Cycle 2 Lesson 4—Using the Four Operations to Solve Real-World Problems
- Unit 3 Cycle 3 Lessons 1–3—Rational Numbers Performance Task (Underwater Exploration)

Lessons in other grade levels:

- Grade 6 Unit 8 Cycle 1 Lesson 3—Proving Expressions Equivalent 1
- Grade 6 Unit 8 Cycle 2 Lesson 3—Distributive Property
- Grade 6 Unit 8 Cycle 2 Lesson 4—Proving Expressions Equivalent 2

## Section III: Grade 8 Alignment to the Mathematics Standards of Learning

Grade 8
Number and Number Sense
<b>Relationships within the Real Number System</b>
<b>Virginia Mathematics Standards of Learning 8.1:</b> 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.
<ul style="list-style-type: none"><li>• Unit 3 Cycle 1 Lesson 1—Properties of Powers 1</li><li>• Unit 3 Cycle 1 Lesson 2—Properties of Powers 2</li><li>• Unit 3 Cycle 1 Lesson 5—Solving Equations with Exponents</li><li>• Unit 3 Cycle 2 Lesson 1—Estimating with Powers of 10</li><li>• Unit 3 Cycle 2 Lesson 2—Scientific Notation 1</li><li>• Unit 3 Cycle 2 Lesson 3—Scientific Notation 2</li><li>• Unit 3 Cycle 3 Lessons 1–3—Rational and Irrational Numbers Performance Task (Volcano Exploration)</li></ul>
<b>Virginia Mathematics Standards of Learning 8.2:</b> The student will describe orally and in writing the relationships between the subsets of the real number system.
<ul style="list-style-type: none"><li>• Unit 2 Cycle 1 Lesson 1—Defining Irrational Numbers</li><li>• Unit 2 Cycle 1 Lesson 2—Classifying Numbers</li><li>• Unit 2 Cycle 1 Lesson 3—Converting a Decimal Expansion</li><li>• Unit 2 Cycle 1 Lesson 4—Ordering Rational and Irrational Numbers</li></ul> <p>Lessons in other grade levels:</p> <ul style="list-style-type: none"><li>• Grade 7 Unit 3 Cycle 2 Lesson 3—Rational Numbers as Decimals</li><li>• Algebra 1 Unit 14 Cycle 1 Lesson 4—The Distance Formula</li></ul>

<b>Computation and Estimation</b>	
<b>Practical Applications of Operations with Real Numbers</b>	
<b>Virginia Mathematics Standards of Learning 8.3:</b> The student will	
<ul style="list-style-type: none"> <li>a) solve practical problems involving rational numbers, percents, ratios, and proportions; and</li> <li>b) determine the percent increase or decrease for a given situation.</li> </ul>	
<p>This standard is covered by lessons in other grade levels:</p> <ul style="list-style-type: none"> <li>• Grade 7 Unit 5 Cycle 1 Lesson 1—Understanding Percent</li> <li>• Grade 7 Unit 5 Cycle 1 Lesson 2—Discounts and Markups</li> <li>• Grade 7 Unit 5 Cycle 1 Lesson 3—Percent Change and Percent Error</li> <li>• Grade 7 Unit 5 Cycle 1 Lesson 4—Simple Interest</li> <li>• Grade 7 Unit 5 Cycle 1 Lesson 5—Multistep Percent Problems</li> <li>• Grade 7 Unit 5 Cycle 2 Lessons 1–3—Ratios and Percents Performance Task (Starting a Sports Team)</li> <li>• Algebra 1 Unit 2 Cycle 1 Lesson 1—Units as a Guide to Solving Problems</li> <li>• Algebra 1 Unit 2 Cycle 1 Lesson 2—Units in Formulas</li> <li>• Algebra 1 Unit 2 Cycle 1 Lesson 3—Units and Graphing</li> <li>• Algebra 1 Unit 14 Cycle 2 Lessons 1–3—Functions in Context Performance Task (Genetics in Medicine)</li> </ul>	
<b>Virginia Mathematics Standards of Learning 8.4:</b> The student will apply the order of operations to evaluate algebraic expressions for given replacement values of the variables.	
<p>This standard is covered by lessons in other grade levels:</p> <ul style="list-style-type: none"> <li>• Grade 7 Unit 6 Cycle 1 Lesson 2—Evaluating Algebraic Expressions</li> </ul>	
<b>Virginia Mathematics Standards of Learning 8.5:</b> The student will	
<ul style="list-style-type: none"> <li>a) determine whether a given number is a perfect square; and</li> <li>b) find the two consecutive whole numbers between which a square root lies.</li> </ul>	
<ul style="list-style-type: none"> <li>• Unit 2 Cycle 1 Lesson 1—Defining Irrational Numbers</li> <li>• Unit 2 Cycle 1 Lesson 4—Ordering Rational and Irrational Numbers</li> <li>• Unit 2 Cycle 1 Lesson 5—Estimating and Comparing Irrational Expressions</li> <li>• Unit 3 Cycle 1 Lesson 3—Square and Cube Roots</li> <li>• Unit 3 Cycle 1 Lesson 4—Simplifying Square Roots</li> <li>• Unit 3 Cycle 1 Lesson 5—Solving Equations with Exponents</li> <li>• Unit 3 Cycle 3 Lessons 1–3—Rational and Irrational Numbers Performance Task (Volcano Exploration)</li> </ul>	

<b>Measurement</b>
<b>Problem Solving</b>
<p><b>Virginia Mathematics Standards of Learning 8.6:</b> The student will</p> <ol style="list-style-type: none"> <li>a) verify by measuring and describe the relationships among vertical angles, adjacent angles, supplementary angles, and complementary angles; and</li> <li>b) measure angles of less than <math>360^\circ</math>.</li> </ol>
<ul style="list-style-type: none"> <li>• Unit 6 Cycle 1 Lesson 1—Exploring Vertical Angles</li> <li>• Unit 6 Cycle 1 Lesson 2—Lines and Transversals</li> <li>• Unit 6 Cycle 1 Lesson 3—Parallel Lines</li> <li>• Unit 6 Cycle 1 Lesson 4—Triangle Angle Sum Theorem</li> <li>• Unit 6 Cycle 3 Lessons 1–3—Geometry Performance Task (Architecture, Maps, and Art)</li> </ul> <p>Lessons in other grade levels:</p> <ul style="list-style-type: none"> <li>• Grade 7 Unit 9 Cycle 2 Lesson 2—Complementary and Supplementary Angles</li> <li>• Grade 7 Unit 9 Cycle 2 Lesson 3—Adjacent and Vertical Angles</li> <li>• Grade 7 Unit 9 Cycle 2 Lesson 4—Problem Solving with Angles</li> </ul> <p>The following units review earlier, related standards:</p> <ul style="list-style-type: none"> <li>• Grade 7 Unit 9 Cycle 2 Lesson 1—Identifying Types of Angles (VA SOL 5.12)</li> </ul>
<p><b>Virginia Mathematics Standards of Learning 8.7:</b> The student will</p> <ol style="list-style-type: none"> <li>a) investigate and solve practical problems involving volume and surface area of prisms, cylinders, cones, and pyramids; and</li> <li>b) describe how changing one measured attribute of a figure affects the volume and surface area.</li> </ol>
<ul style="list-style-type: none"> <li>• Unit 12 Cycle 1 Lesson 1—Volume of Cylinders</li> <li>• Unit 12 Cycle 1 Lesson 2—Volume of Cones</li> <li>• Unit 12 Cycle 1 Lesson 3—Volume of Spheres</li> <li>• Unit 12 Cycle 1 Lesson 4—Problem Solving with Volume</li> <li>• Unit 12 Cycle 2 Lesson 1—Percent and Fractional Volume</li> <li>• Unit 12 Cycle 2 Lesson 2—Is Volume Additive?</li> <li>• Unit 12 Cycle 2 Lesson 3—Measuring Volume with Objects</li> <li>• Unit 12 Cycle 2 Lesson 4—Filling Containers</li> </ul> <p>Lessons in other grade levels:</p> <ul style="list-style-type: none"> <li>• Grade 7 Unit 8 Cycle 2 Lesson 2— 2-D Figures Within 3-D Figures</li> <li>• Grade 7 Unit 10 Cycle 1 Lesson 3—Volume of Cones and Cylinders</li> <li>• Grade 7 Unit 10 Cycle 1 Lesson 4—Problem Solving with Volume</li> <li>• Grade 7 Unit 10 Cycle 2 Lesson 2—Surface Area of Pyramids</li> <li>• Grade 7 Unit 10 Cycle 2 Lesson 3—Surface Area of Cones and Cylinders</li> <li>• Grade 7 Unit 10 Cycle 2 Lesson 4—Problem Solving with Surface Area</li> </ul>

<b>Geometry</b>
<b>Problem Solving with 2- and 3-Dimensional Figures</b>
<p><b>Virginia Mathematics Standards of Learning 8.8:</b> The student will</p> <ul style="list-style-type: none"> <li>a) apply transformations to plane figures; and</li> <li>b) identify applications of transformations.</li> </ul>
<ul style="list-style-type: none"> <li>• Unit 5 Cycle 1 Lesson 1—Experimenting with Translations</li> <li>• Unit 5 Cycle 1 Lesson 2—Experimenting with Reflections</li> <li>• Unit 5 Cycle 1 Lesson 3—Experimenting with Rotations</li> <li>• Unit 5 Cycle 1 Lesson 4—Rotations and Circles</li> <li>• Unit 5 Cycle 2 Lesson 1—The Effects of Transformations</li> <li>• Unit 5 Cycle 2 Lesson 2—Reasoning About Transformations</li> <li>• Unit 5 Cycle 2 Lesson 3—Combining Transformations</li> <li>• Unit 5 Cycle 2 Lesson 4—Verifying Congruence</li> <li>• Unit 6 Cycle 2 Lesson 1—Reasoning with Similar Triangles</li> <li>• Unit 6 Cycle 2 Lesson 2—Real-World Scale Problems</li> <li>• Unit 6 Cycle 2 Lesson 3—Dilations on the Coordinate Plane</li> <li>• Unit 6 Cycle 2 Lesson 4—Verifying Similarity</li> <li>• Unit 6 Cycle 3 Lessons 1–3—Geometry Performance Task (Architecture, Maps, and Art)</li> </ul>
<p><b>Virginia Mathematics Standards of Learning 8.9:</b> The student will construct a three-dimensional model, given the top or bottom, side, and front views.</p>
<p>This standard is not covered.</p>

**Virginia Mathematics Standards of Learning 8.10:** The student will

- a) verify the Pythagorean Theorem; and
- b) apply the Pythagorean Theorem.

- Unit 4 Cycle 1 Lesson 1—Exploring Right Triangles
- Unit 4 Cycle 1 Lesson 2—The Pythagorean Theorem 1
- Unit 4 Cycle 1 Lesson 3—The Pythagorean Theorem 2
- Unit 4 Cycle 1 Lesson 4—Special Right Triangles
- Unit 4 Cycle 2 Lesson 1—The Converse of the Pythagorean Theorem
- Unit 4 Cycle 2 Lesson 2—The Pythagorean Theorem and the Coordinate System
- Unit 4 Cycle 2 Lesson 3—The Pythagorean Theorem and 3-D Figures
- Unit 4 Cycle 2 Lesson 4—Problem Solving with the Pythagorean Theorem
- Unit 6 Cycle 3 Lessons 1–3—Geometry Performance Task (Architecture, Maps, and Art)

Lessons in other grade levels:

- Algebra 1 Unit 14 Cycle 1 Lesson 1—The Pythagorean Theorem and Its Converse
- Algebra 1 Unit 14 Cycle 1 Lesson 3—Special Right Triangles
- Algebra 1 Unit 14 Cycle 1 Lesson 4—The Distance Formula

**Virginia Mathematics Standards of Learning 8.11:** The student will solve practical area and perimeter problems involving composite plane figures.

This standard is covered by lessons in other grade levels:

- Grade 6 Unit 12 Cycle 2 Lesson 4—Area of Complex Shapes
- Grade 7 Unit 7 Cycle 1 Lesson 1—Area, Perimeter, and Volume

## Probability and Statistics

### Statistical Analysis of Graphs and Problem Situations

**Virginia Mathematics Standards of Learning 8.12:** The student will determine the probability of independent and dependent events with and without replacement.

This standard is covered by lessons in other grade levels:

- Grade 7 Unit 11 Cycle 2 Lesson 4—Independent and Dependent Events



**Virginia Mathematics Standards of Learning 8.13:** The student will

- a) make comparisons, predictions, and inferences, using information displayed in graphs; and
- b) construct and analyze scatterplots.

- Unit 13 Cycle 1 Lesson 1—Constructing and Interpreting Scatterplots
- Unit 13 Cycle 1 Lesson 2—Lines of Best Fit
- Unit 13 Cycle 1 Lesson 3—Linear vs. Nonlinear Associations 1
- Unit 13 Cycle 1 Lesson 4—Linear vs. Nonlinear Associations 2
- Unit 13 Cycle 1 Lesson 5—Problem Solving with Scatterplots
- Unit 13 Cycle 3 Lessons 1–3—Real-World Data Associations Performance Task (Analyzing Survey Data)

Lessons in other grade levels:

- Algebra 1 Unit 2 Cycle 1 Lesson 3—Units and Graphing
- Algebra 1 Unit 10 Cycle 2 Lesson 2—Constructing Scatter Plots for Bivariate Data
- Algebra 1 Unit 10 Cycle 2 Lesson 3—Residuals
- Algebra 1 Unit 10 Cycle 2 Lesson 4—Line of Best Fit
- Algebra 1 Unit 10 Cycle 3 Lesson 3—Correlation vs. Causation
- Algebra 1 Unit 14 Cycle 2 Lessons 1–3—Functions in Context Performance Task (Genetics in Medicine)

<b>Patterns, Functions, and Algebra</b>	
<b>Linear Relationships</b>	
<b>Virginia Mathematics Standards of Learning 8.14:</b> The student will make connections between any two representations (tables, graphs, words, and rules) of a given relationship.	
<ul style="list-style-type: none"> <li>• Unit 7 Cycle 1 Lesson 1—Analyzing Graphs of Proportional Relationships</li> <li>• Unit 7 Cycle 1 Lesson 2—Finding the Slope of Proportional Relationships</li> <li>• Unit 7 Cycle 1 Lesson 3—Comparing Proportional Relationships</li> <li>• Unit 9 Cycle 1 Lesson 1—Definition of a Function</li> <li>• Unit 9 Cycle 1 Lesson 2—Describing Functions in Words</li> <li>• Unit 9 Cycle 1 Lesson 3—Comparing Functions 1</li> <li>• Unit 9 Cycle 1 Lesson 4—Linear vs. Nonlinear Functions</li> <li>• Unit 10 Cycle 1 Lesson 1—Representing Functions</li> <li>• Unit 10 Cycle 1 Lesson 2—Functions and Real-World Situations</li> <li>• Unit 10 Cycle 1 Lesson 3—Rate of Change and Initial Value of a Function</li> <li>• Unit 10 Cycle 2 Lesson 1—Exploring Distance-Time Graphs</li> <li>• Unit 10 Cycle 2 Lesson 2—Matching Distance-Time Graphs</li> <li>• Unit 10 Cycle 2 Lesson 3—Comparing Functions 2</li> <li>• Unit 10 Cycle 2 Lesson 4—Sketching Functions</li> <li>• Unit 10 Cycle 3 Lessons 1–3—Linear Functions Performance Task (Renting vs. Buying a Home)</li> </ul> <p>Lessons in other grade levels:</p> <ul style="list-style-type: none"> <li>• Algebra 1 Unit 6 Cycle 1 Lesson 1—Defining Functions</li> </ul>	
<b>Virginia Mathematics Standards of Learning 8.15:</b> The student will	
<ul style="list-style-type: none"> <li>a) solve multistep linear equations in one variable with the variable on one and two sides of the equation;</li> <li>b) solve two-step linear inequalities and graph the results on a number line; and</li> <li>c) identify properties of operations used to solve an equation.</li> </ul>	
<p>Unit 8 Cycle 1 Lesson 1—Solving Linear Equations 1            Unit 8 Cycle 1 Lesson 3—Solving Linear Equations 2</p> <p>Lessons in other grade levels:</p> <ul style="list-style-type: none"> <li>• Grade 7 Unit 7 Cycle 1 Lesson 2—Solving Equations with Rational Numbers</li> <li>• Grade 7 Unit 7 Cycle 1 Lesson 3—Writing and Solving Equations for Real-World Situations</li> <li>• Grade 7 Unit 7 Cycle 2 Lesson 2—Solving Multiple-Step Inequalities</li> </ul>	

**Virginia Mathematics Standards of Learning 8.16:** The student will graph a linear equation in two variables.

- Unit 7 Cycle 1 Lesson 2—Finding the Slope of Proportional Relationships
- Unit 7 Cycle 1 Lesson 3—Comparing Proportional Relationships
- Unit 7 Cycle 2 Lesson 4—Linear Graphs and Real-World Situations
- Unit 9 Cycle 1 Lesson 1—Definition of a Function
- Unit 9 Cycle 1 Lesson 2—Describing Functions in Words
- Unit 9 Cycle 1 Lesson 4—Linear vs. Nonlinear Functions
- Unit 10 Cycle 1 Lesson 1—Representing Functions
- Unit 10 Cycle 1 Lesson 2—Functions and Real-World Situations
- Unit 10 Cycle 1 Lesson 3—Rate of Change and Initial Value of a Function
- Unit 10 Cycle 2 Lesson 1—Exploring Distance-Time Graphs
- Unit 10 Cycle 2 Lesson 2—Matching Distance-Time Graphs
- Unit 10 Cycle 2 Lesson 3—Comparing Functions 2
- Unit 10 Cycle 2 Lesson 4—Sketching Functions
- Unit 10 Cycle 3 Lessons 1–3—Linear Functions Performance Task (Renting vs. Buying a Home)

**Virginia Mathematics Standards of Learning 8.17:** The student will identify the domain, range, independent variable, or dependent variable in a given situation.

- Unit 9 Cycle 1 Lesson 1—Definition of a Function
- Unit 9 Cycle 1 Lesson 2—Describing Functions in Words
- Unit 10 Cycle 3 Lessons 1–3—Linear Functions Performance Task (Renting vs. Buying a Home)

Lessons in other grade levels:

- Algebra 1 Unit 7 Cycle 1 Lesson 3—Functions and Graphs 2

## Section IV: Algebra 1 Alignment to the Mathematics Standards of Learning

In PowerTeaching Math 3rd Edition, the Algebra 1 curriculum is intended for eighth-grade students on an accelerated track in mathematics. This course is traditional algebra 1 high school content plus key content from the grade 8 standards, including the Pythagorean Theorem and the introduction to functions. Note that the Grade 8 Alignment to the Virginia Mathematics Standards of Learning above (Section III) indicates where the PowerTeaching Math Algebra 1 course covers grade 8 standards. Overlap with high school content from Algebra II; Geometry; Algebra, Functions, and Data Analysis; and Probability and Statistics standards is noted below. Content covered in in this Algebra 1 course does not include all Algebra or high school standards.

Algebra 1
Expressions and Operations
<b>Virginia Mathematics Standards of Learning A.1:</b> The student will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variables.
<ul style="list-style-type: none"><li>• Unit 2 Cycle 2 Lesson 1—Defining Quantities</li><li>• Unit 2 Cycle 2 Lesson 4—Quantities in Complex Problems</li><li>• Unit 2 Cycle 3 Lesson 2—Describing Complicated Algebraic Expressions</li><li>• Unit 2 Cycle 3 Lesson 3—Expressions in Context</li><li>• Unit 2 Cycle 3 Lesson 4—Writing Complicated Expressions</li><li>• Unit 3 Cycle 1 Lesson 1—Creating Equations and Inequalities in One Variable</li><li>• Unit 3 Cycle 1 Lesson 2—Creating Equations in Two Variables</li><li>• Unit 3 Cycle 1 Lesson 3—Representing Constraints</li><li>• Unit 3 Cycle 3 Lessons 1–3—Equations and Inequalities Performance Task (Planning Healthy Menus)</li><li>• Unit 11 Cycle 1 Lesson 1—Parts of an Expression</li></ul>

**Virginia Mathematics Standards of Learning 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.

- Unit 2 Cycle 2 Lesson 2—Quantities in Scientific Notation
- Unit 4 Cycle 1 Lesson 1—Properties of Integer Exponents
- Unit 4 Cycle 1 Lesson 4—Rational Exponents
- Unit 4 Cycle 1 Lesson 5—Rewriting Expressions with Radicals and Rational Exponents
- Unit 11 Cycle 1 Lesson 2—Factoring Quadratic Expressions 1
- Unit 11 Cycle 1 Lesson 3—Rewriting Quadratic and Exponential Expressions
- Unit 11 Cycle 2 Lesson 1—Factoring Quadratic Expressions 2
- Unit 11 Cycle 2 Lesson 2—Completing the Square
- Unit 11 Cycle 2 Lesson 3—Transforming Exponential Expressions
- Unit 11 Cycle 3 Lesson 1—Adding and Subtracting Polynomials
- Unit 11 Cycle 3 Lesson 2—Multiplying Polynomials
- Unit 11 Cycle 3 Lesson 3—Combining Polynomials in Context

Lessons in other grade levels:

- Grade 8 Unit 3 Cycle 1 Lesson 2—Properties of Powers 2

**Virginia Mathematics Standards of Learning 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.

- Unit 4 Cycle 1 Lesson 2—Square Roots
- Unit 4 Cycle 1 Lesson 3—Cube Roots

Lessons in other grade levels:

- Grade 8 Unit 2 Cycle 1 Lesson 5—Estimating and Comparing Irrational Expressions
- Grade 8 Unit 3 Cycle 1 Lesson 3—Square and Cube Roots
- Grade 8 Unit 3 Cycle 1 Lesson 4—Simplifying Square Roots
- Grade 8 Unit 3 Cycle 1 Lesson 5—Solving Equations with Exponents
- Grade 8 Unit 3 Cycle 3 Lessons 1–3—Rational and Irrational Numbers Performance Task (Volcano Exploration)

## Equations and Inequalities

**Virginia Mathematics Standards of Learning 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.

- Unit 2 Cycle 1 Lesson 2—Units in Formulas
- Unit 3 Cycle 1 Lesson 4—Rearranging Linear Formulas
- Unit 3 Cycle 2 Lesson 1—Equation Proofs
- Unit 3 Cycle 2 Lesson 2—Solving Equations
- Unit 3 Cycle 3 Lessons 1–3—Equations and Inequalities Performance Task (Planning Healthy Menus)
- Unit 5 Cycle 1 Lesson 2—Intersections on Graphs
- Unit 5 Cycle 1 Lesson 3—Graphing Solutions to Systems of Equations
- Unit 5 Cycle 2 Lesson 1—Solving Systems of Equations Using Algebra 1
- Unit 5 Cycle 2 Lesson 2—Solving Systems of Equations Using Algebra 2
- Unit 5 Cycle 2 Lesson 3—Solving Systems of Equations Using Graphing Technology
- Unit 5 Cycle 2 Lesson 4—Problem Solving with Systems of Equations
- Unit 11 Cycle 2 Lesson 1—Factoring Quadratic Expressions 2
- Unit 11 Cycle 3 Lesson 1—Adding and Subtracting Polynomials
- Unit 11 Cycle 3 Lesson 2—Multiplying Polynomials
- Unit 11 Cycle 3 Lesson 3—Combining Polynomials in Context
- Unit 12 Cycle 1 Lesson 1—Creating Equations and Inequalities in One Variable 2
- Unit 12 Cycle 1 Lesson 1—Creating Equations and Inequalities in One Variable 2
- Unit 12 Cycle 1 Lesson 3—Solving Formulas for a Given Variable
- Unit 12 Cycle 2 Lesson 1—Solving Quadratic Equations by Factoring
- Unit 12 Cycle 2 Lesson 2—Deriving the Quadratic Formula
- Unit 12 Cycle 2 Lesson 3—Solving Quadratic Equations Using the Quadratic Formula
- Unit 12 Cycle 3 Lessons 1–3—Quadratic and Exponential Equations Performance Task (Hotel Revenue)

- Unit 13 Cycle 1 Lesson 3—Rewriting Functions
- Unit 14 Cycle 2 Lesson 1–3—Functions in Context Performance Task (Genetics in Medicine)

Lessons in other grade levels:

- Grade 8 Unit 8 Cycle 1 Lesson 2—Solving Geometric Equations
- Grade 8 Unit 8 Cycle 1 Lesson 4—No Solution, Many Solutions, One Solution
- Grade 8 Unit 8 Cycle 1 Lesson 5—Working with Solutions
- Grade 8 Unit 11 Cycle 1 Lesson 1—Introduction to Simultaneous Linear Equations
- Grade 8 Unit 11 Cycle 1 Lesson 2—Solving Simultaneous Linear Equations 1
- Grade 8 Unit 11 Cycle 1 Lesson 3—Solving Simultaneous Linear Equations 2
- Grade 8 Unit 11 Cycle 1 Lesson 4—Problem Solving with Simultaneous Linear Equations
- Grade 8 Unit 11 Cycle 2 Lesson 1—Writing Equations for Given Intersecting Lines
- Grade 8 Unit 11 Cycle 2 Lesson 2—Graphing Lines for a Given Solution
- Grade 8 Unit 11 Cycle 2 Lesson 3—Solving Systems of Linear Equations for Real-World Situations
- Grade 8 Unit 11 Cycle 2 Lesson 4—Graphing Systems of Linear Equations for Real-World Situations

**Virginia Mathematics Standards of Learning 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;
- c) solving real-world problems involving inequalities; and
- d) solving systems of inequalities.

- Unit 3 Cycle 2 Lesson 3—Solving Linear Inequalities
- Unit 3 Cycle 3 Lessons 1–3—Equations and Inequalities Performance Task (Planning Healthy Menus)
- Unit 5 Cycle 3 Lesson 1—Graphing Linear Inequalities
- Unit 5 Cycle 3 Lesson 2—Solutions to Inequalities in Context
- Unit 5 Cycle 3 Lesson 3—Solving Systems of Inequalities
- Unit 12 Cycle 1 Lesson 1—Creating Equations and Inequalities in One Variable 2
- Unit 14 Cycle 2 Lesson 1–3—Functions in Context Performance Task (Genetics in Medicine)

**Virginia Mathematics Standards of Learning 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.

- Unit 3 Cycle 1 Lesson 2—Creating Equations in Two Variables
- Unit 5 Cycle 1 Lesson 1—Solutions to Equations in Two Variables
- Unit 5 Cycle 3 Lesson 1—Graphing Linear Inequalities
- Unit 5 Cycle 3 Lesson 2—Solutions to Inequalities in Context
- Unit 5 Cycle 3 Lesson 3—Solving Systems of Inequalities
- Unit 6 Cycle 2 Lesson 1—Linear Functions
- Unit 6 Cycle 2 Lesson 2—Exponential Functions
- Unit 7 Cycle 1 Lesson 1—Rate of Change
- Unit 8 Cycle 3 Lesson 1—Vertical Translations of Linear Functions
- Unit 8 Cycle 3 Lesson 2—Vertical Translations of Exponential Functions
- Unit 8 Cycle 3 Lesson 3—Scaling Functions
- Unit 9 Cycle 2 Lessons 1–3—Modeling Functions Performance Task (Commuting Cost Models)
- Unit 10 Cycle 3 Lesson 1—Interpreting Slope and Intercept of a Linear Function in Context
- Unit 12 Cycle 1 Lesson 2—Creating Equations in Two Variables 2
- Unit 13 Cycle 2 Lesson 3—Building New Functions 1
- Unit 13 Cycle 2 Lesson 4—Building New Functions 2
- Unit 14 Cycle 2 Lesson 1–3—Functions in Context Performance Task (Genetics in Medicine)

Lessons in other grade levels:

- Grade 8 Unit 7 Cycle 1 Lesson 2—Finding the Slope of Proportional Relationships
- Grade 8 Unit 7 Cycle 1 Lesson 3—Comparing Proportional Relationships
- Grade 8 Unit 7 Cycle 2 Lesson 1—Exploring Linear Relationships
- Grade 8 Unit 7 Cycle 2 Lesson 2—Triangles and Slope
- Grade 8 Unit 7 Cycle 2 Lesson 3—Finding the Slope and the Equation
- Grade 8 Unit 7 Cycle 2 Lesson 4—Linear Graphs and Real-World Situations
- Grade 8 Unit 9 Cycle 1 Lesson 4—Linear vs. Nonlinear Functions
- Grade 8 Unit 10 Cycle 2 Lesson 4—Sketching Functions
- Grade 8 Unit 10 Cycle 3 Lessons 1–3—Linear Functions Performance Task (Renting vs. Buying a Home)
- Grade 8 Unit 13 Cycle 1 Lesson 2—Lines of Best Fit
- Grade 8 Unit 13 Cycle 1 Lesson 3—Linear vs. Nonlinear Associations 1
- Grade 8 Unit 13 Cycle 1 Lesson 4—Linear vs. Nonlinear Associations 2
- Grade 8 Unit 13 Cycle 1 Lesson 5—Problem Solving with Scatterplots
- Grade 8 Unit 13 Cycle 3 Lessons 1–3—Real-World Data Associations Performance Task (Analyzing Survey Data)



## Functions

**Virginia Mathematics Standards of Learning 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.

- Unit 6 Cycle 1 Lesson 1—Defining Functions
- Unit 6 Cycle 1 Lesson 2—Domain and Range
- Unit 6 Cycle 1 Lesson 3—Evaluating Functions
- Unit 6 Cycle 2 Lesson 2—Exponential Functions
- Unit 6 Cycle 2 Lesson 3—Arithmetic Sequences as Functions
- Unit 6 Cycle 2 Lesson 4—Geometric Sequences as Functions
- Unit 7 Cycle 1 Lesson 2—Functions and Graphs 1
- Unit 7 Cycle 1 Lesson 3—Functions and Graphs 2
- Unit 7 Cycle 2 Lessons 1–3—Constructing Functions Performance Task (Photography)
- Unit 8 Cycle 1 Lesson 1—Graphing and Analyzing Linear and Quadratic Functions
- Unit 8 Cycle 1 Lesson 3—Comparing Functions 1
- Unit 9 Cycle 1 Lesson 3—Constructing Linear and Exponential Functions
- Unit 9 Cycle 1 Lesson 5—Interpreting Parameters of Linear and Exponential Functions
- Unit 9 Cycle 2 Lessons 1–3—Modeling Functions Performance Task (Commuting Cost Models)
- Unit 13 Cycle 1 Lesson 1—Graphing Linear and Quadratic Functions
- Unit 13 Cycle 1 Lesson 2—Graphing Absolute Value, Step, and Piecewise Functions
- Unit 13 Cycle 1 Lesson 4—Interpreting Quadratic Functions
- Unit 13 Cycle 1 Lesson 5—Comparing Functions 2
- Unit 13 Cycle 2 Lesson 1—Writing a Function from Context
- Unit 13 Cycle 2 Lesson 2—Combining Functions 2
- Unit 13 Cycle 2 Lesson 3—Building New Functions 1
- Unit 13 Cycle 2 Lesson 4—Building New Functions 2

Lessons in other grade levels:

- Grade 8 Unit 9 Cycle 1 Lesson 2—Describing Functions in Words
- Grade 8 Unit 9 Cycle 1 Lesson 4—Linear vs. Nonlinear Functions

- Grade 8 Unit 10 Cycle 1 Lesson 1—Representing Functions
- Grade 8 Unit 10 Cycle 1 Lesson 2—Functions and Real-World Situations
- Grade 8 Unit 10 Cycle 1 Lesson 3—Rate of Change and Initial Value of a Function
- Grade 8 Unit 10 Cycle 2 Lesson 1—Exploring Distance-Time Graphs
- Grade 8 Unit 10 Cycle 2 Lesson 2—Matching Distance-Time Graphs
- Grade 8 Unit 10 Cycle 2 Lesson 3—Comparing Functions 2
- Grade 8 Unit 10 Cycle 2 Lesson 4—Sketching Functions Grade 8 Unit 10 Cycle 3 Lessons 1–3—Linear Functions Performance Task (Renting vs. Buying a Home)

**Virginia Mathematics Standards of Learning 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.

This standard is not covered.

## Statistics

**Virginia Mathematics Standards of Learning 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.

- Unit 10 Cycle 1 Lesson 2—Summary Statistics
- Unit 10 Cycle 1 Lesson 3—Interpreting Graphs in Context
- Unit 10 Cycle 2 Lesson 1—Categorical Data in Frequency Tables

Lessons in other grade levels:

- Grade 6 Unit 15 Cycle 2 Lesson 3—Measures of Variability
- Grade 7 Unit 13 Cycle 1 Lesson 2—Compare and Contrast Number Data
- Grade 7 Unit 13 Cycle 2 Lesson 3—Compare and Contrast Measures of Variability
- Grade 7 Unit 13 Cycle 2 Lesson 4—Problem Solving with Data Distributions

**Virginia Mathematics Standards of Learning A.10:** The student will compare and contrast multiple univariate data sets, using box-and-whisker plots.

- Unit 10 Cycle 1 Lesson 1—Dot Plots, Histograms, and Box Plots
- Unit 10 Cycle 1 Lesson 2—Summary Statistics
- Unit 10 Cycle 1 Lesson 3—Interpreting Graphs in Context
- Unit 10 Cycle 2 Lesson 1—Categorical Data in Frequency Tables

Lessons in other grade levels:

- Grade 6 Unit 15 Cycle 1 Lesson 2—Creating a Box Plot
- Grade 6 Unit 15 Cycle 1 Lesson 3—Comparing Data Shown on Box Plots
- Grade 7 Unit 13 Cycle 1 Lesson 3—Compare and Contrast Graphs
- Grade 7 Unit 13 Cycle 2 Lesson 4—Problem Solving with Data Distributions

**Virginia Mathematics Standards of Learning 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.

- Unit 9 Cycle 1 Lesson 1—Exponential and Linear Patterns of Growth
- Unit 9 Cycle 1 Lesson 2—Fitting Linear and Exponential Functions to the Same Points
- Unit 10 Cycle 2 Lesson 2—Constructing Scatter Plots for Bivariate Data
- Unit 10 Cycle 2 Lesson 3—Residuals
- Unit 10 Cycle 2 Lesson 4—Line of Best Fit
- Unit 10 Cycle 3 Lesson 1—Interpreting Slope and Intercept of a Linear Function in Context
- Unit 10 Cycle 3 Lesson 2—Correlation Coefficient
- Unit 12 Cycle 3 Lessons 1–3—Quadratic and Exponential Equations Performance Task (Hotel Revenue)
- Unit 13 Cycle 3 Lessons 1–3—Linear vs. Quadratic Functions Performance Task (Free-Falling Objects)

Lessons in other grade levels:

- Grade 8 Unit 13 Cycle 1 Lesson 2—Lines of Best Fit
- Grade 8 Unit 13 Cycle 1 Lesson 3—Linear vs. Nonlinear Associations 1
- Grade 8 Unit 13 Cycle 1 Lesson 4—Linear vs. Nonlinear Associations 2
- Grade 8 Unit 13 Cycle 1 Lesson 5—Problem Solving with Scatterplots
- Grade 8 Unit 13 Cycle 3 Lessons 1–3—Real-World Data Associations Performance Task (Analyzing Survey Data)

## Geometry / Reasoning, Lines, and Transformations

**Virginia Mathematics Standards of Learning G.2:** The student will use the relationships between angles formed by two lines cut by a transversal to

- a) determine whether two lines are parallel;
- b) verify the parallelism, using algebraic and coordinate methods as well as deductive proofs; and
- c) solve real-world problems involving angles formed when parallel lines are cut by a transversal.

This standard is covered by lessons in other grade levels:

- Grade 8 Unit 6 Cycle 1 Lesson 2—Lines and Transversals
- Grade 8 Unit 6 Cycle 1 Lesson 3—Parallel Lines
- Grade 8 Unit 6 Cycle 1 Lesson 4—Triangle Angle Sum Theorem

**Virginia Mathematics Standards of Learning G.4:** The student will construct and justify the constructions of

- a) a line segment congruent to a given line segment;
- b) the perpendicular bisector of a line segment;
- c) a perpendicular to a given line from a point not on the line;
- d) a perpendicular to a given line at a given point on the line;
- e) the bisector of a given angle,
- f) an angle congruent to a given angle; and
- g) a line parallel to a given line through a point not on the given line.

This standard is covered by lessons in other grade levels:

- Grade 7 Unit 8 Cycle 2 Lesson 3—Constructing Quadrilaterals
- Grade 7 Unit 8 Cycle 2 Lesson 4—Constructing Triangles 1
- Grade 7 Unit 8 Cycle 2 Lesson 5—Constructing Triangles 2

## Algebra II / Expressions and Operations

**Virginia Mathematics Standards of Learning All.1:** The student, given rational, radical, or polynomial expressions, will

- a) add, subtract, multiply, divide, and simplify rational algebraic expressions;
- b) add, subtract, multiply, divide, and simplify radical expressions containing rational numbers and variables, and expressions containing rational exponents;
- c) write radical expressions as expressions containing rational exponents and vice versa; and
- d) factor polynomials completely.

- Unit 4 Cycle 1 Lesson 5—Rewriting Expressions with Radicals and Rational Exponents
- Unit 11 Cycle 1 Lesson 2—Factoring Quadratic Expressions 1
- Unit 11 Cycle 1 Lesson 3—Rewriting Quadratic and Exponential Expressions

**Virginia Mathematics Standards of Learning All.2:** The student will investigate and apply the properties of arithmetic and geometric sequences and series to solve real-world problems, including writing the first  $n$  terms, finding the  $n^{\text{th}}$  term, and evaluating summation formulas. Notation will include  $\Sigma$  and  $a_n$ .

\*Standard All.2 will be assessed in the Functions and Statistics reporting category. (Revised March 2011)

- Unit 6 Cycle 2 Lesson 3—Arithmetic Sequences as Functions
- Unit 6 Cycle 2 Lesson 4—Geometric Sequences as Functions
- Unit 7 Cycle 2 Lessons 1–3—Constructing Functions Performance Task (Photography)
- Unit 8 Cycle 2 Lesson 3—Modeling Situations with Arithmetic Sequences
- Unit 8 Cycle 2 Lesson 4—Modeling Situations with Geometric Sequences

## Algebra II / Functions

**Virginia Mathematics Standards of Learning All.7:** The student will investigate and analyze functions algebraically and graphically. Key concepts include

- a) domain and range, including limited and discontinuous domains and ranges;
- b) zeros;
- c)  $x$ - and  $y$ -intercepts;
- d) intervals in which a function is increasing or decreasing;
- e) asymptotes;
- f) end behavior;
- g) inverse of a function; and
- h) composition of multiple functions.

\*Graphing calculators will be used as a tool to assist in investigation of functions.

- Unit 8 Cycle 2 Lesson 2—Combining Functions 1
- Unit 13 Cycle 1 Lesson 2—Graphing Absolute Value, Step, and Piecewise Functions
- Unit 13 Cycle 2 Lesson 2—Combining Functions 2
- Unit 13 Cycle 2 Lesson 5—Finding the Inverse of a Function

## Algebra, Functions, and Data Analysis / Algebra and Functions

**Virginia Mathematics Standards of Learning AFDA.1:** The student will investigate and analyze function (linear, quadratic, exponential, and logarithmic) families and their characteristics. Key concepts include

- a) continuity;
- b) local and absolute maxima and minima;
- c) domain and range;
- d) zeros;
- e) intercepts;
- f) intervals in which the function is increasing/decreasing;
- g) end behaviors; and
- h) asymptotes.

- Unit 8 Cycle 1 Lesson 1—Graphing and Analyzing Linear and Quadratic Functions
- Unit 8 Cycle 1 Lesson 2—Graphing and Analyzing Exponential Functions
- Unit 8 Cycle 1 Lesson 3—Comparing Functions 1
- Unit 9 Cycle 1 Lesson 4—Comparing Linear and Exponential Function Models
- Unit 9 Cycle 1 Lesson 5—Interpreting Parameters of Linear and Exponential Functions

- Unit 9 Cycle 2 Lessons 1–3—Modeling Functions Performance Task (Commuting Cost Models)
- Unit 11 Cycle 2 Lesson 2—Completing the Square
- Unit 13 Cycle 1 Lesson 1—Graphing Linear and Quadratic Functions
- Unit 13 Cycle 1 Lesson 2—Graphing Absolute Value, Step, and Piecewise Functions
- Unit 13 Cycle 1 Lesson 4—Interpreting Quadratic Functions
- Unit 13 Cycle 1 Lesson 5—Comparing Functions 2
- Unit 13 Cycle 2 Lesson 1—Writing a Function from Context
- Unit 13 Cycle 2 Lesson 2—Combining Functions 2
- Unit 13 Cycle 3 Lessons 1–3—Linear vs. Quadratic Functions Performance Task (Free-Falling Objects)

**Virginia Mathematics Standards of Learning AFDA.2:** The student will use knowledge of transformations to write an equation, given the graph of a function (linear, quadratic, exponential, and logarithmic).

- Unit 8 Cycle 3 Lesson 1—Vertical Translations of Linear Functions
- Unit 8 Cycle 3 Lesson 2—Vertical Translations of Exponential Functions
- Unit 8 Cycle 3 Lesson 3—Scaling Functions
- Unit 9 Cycle 1 Lesson 5—Interpreting Parameters of Linear and Exponential Functions
- Unit 9 Cycle 2 Lessons 1–3—Modeling Functions Performance Task (Commuting Cost Models)
- Unit 13 Cycle 1 Lesson 4—Interpreting Quadratic Functions
- Unit 13 Cycle 1 Lesson 5—Comparing Functions 2
- Unit 13 Cycle 3 Lessons 1–3—Linear vs. Quadratic Functions Performance Task (Free-Falling Objects)

**Virginia Mathematics Standards of Learning AFDA.3:** The student will collect data and generate an equation for the curve (linear, quadratic, exponential, and logarithmic) of best fit to model real-world problems or applications. Students will use the best fit equation to interpolate function values, make decisions, and justify conclusions with algebraic and/or graphical models.

- Unit 9 Cycle 1 Lesson 2—Fitting Linear and Exponential Functions to the Same Points
- Unit 9 Cycle 1 Lesson 3—Constructing Linear and Exponential Functions
- Unit 10 Cycle 3 Lesson 2—Correlation Coefficient
- Unit 10 Cycle 3 Lesson 3—Correlation vs. Causation
- Unit 13 Cycle 1 Lesson 3—Rewriting Functions

### Algebra, Functions, and Data Analysis / Data Analysis

**Virginia Mathematics Standards of Learning AFDA.8:** The student will design and conduct an experiment/survey. Key concepts include

- a) sample size;
- b) sampling technique;
- c) controlling sources of bias and experimental error;
- d) data collection; and
- e) data analysis and reporting.

This standard is covered by lessons in other grade levels:

- Grade 7 Unit 12 Cycle 1 Lesson 1—Understanding Random Sampling
- Grade 7 Unit 12 Cycle 1 Lesson 2—Characteristics of Random Sampling
- Grade 7 Unit 12 Cycle 1 Lesson 3—Good vs. Bad Random Samples
- Grade 7 Unit 12 Cycle 2 Lesson 1—Analyzing a Random Sample
- Grade 7 Unit 12 Cycle 2 Lesson 2—Creating a Random Sample
- Grade 7 Unit 12 Cycle 2 Lesson 3—Conducting a Survey of a Random Sample

### Probability and Statistics

**Virginia Mathematics Standards of Learning PS.1:** The student will analyze graphical displays of univariate data, including dot plots, stem plots, and histograms, to identify and describe patterns and departures from patterns, using central tendency, spread, clusters, gaps, and outliers. Appropriate technology will be used to create graphical displays.

- Unit 10 Cycle 1 Lesson 1—Dot Plots, Histograms, and Box Plots

**Virginia Mathematics Standards of Learning PS.2:** The student will analyze numerical characteristics of univariate data sets to describe patterns and departures from patterns, using mean, median, mode, variance, standard deviation, interquartile range, range, and outliers.

- Unit 10 Cycle 1 Lesson 2—Summary Statistics
- Unit 10 Cycle 1 Lesson 3—Interpreting Graphs in Context

**Virginia Mathematics Standards of Learning PS.3:** The student will compare distributions of two or more univariate data sets, analyzing center and spread (within group and between group variations), clusters and gaps, shapes, outliers, or other unusual features.

- Unit 10 Cycle 1 Lesson 2—Summary Statistics
- Unit 10 Cycle 1 Lesson 3—Interpreting Graphs in Context



**Virginia Mathematics Standards of Learning PS.7:** The student, using two-way tables, will analyze categorical data to describe patterns and departure from patterns and to find marginal frequency and relative frequencies, including conditional frequencies.

- Unit 10 Cycle 2 Lesson 1—Categorical Data in Frequency Tables

Lessons in other grade levels:

- Grade 8 Unit 13 Cycle 2 Lesson 1—Frequency Tables
- Grade 8 Unit 13 Cycle 2 Lesson 2—Interpreting Two-Way Tables 1
- Grade 8 Unit 13 Cycle 2 Lesson 3—Interpreting Two-Way Tables 2
- Grade 8 Unit 13 Cycle 2 Lesson 4—Constructing Two-Way Tables
- Grade 8 Unit 13 Cycle 3 Lessons 1–3—Real-World Data Associations Performance Task (Analyzing Survey Data)