SADLIER

Foundations of Algebra

Aligned to the

Archdiocese of Detroit

Eighth Grade Mathematics Standards

Grade 8

Sadlier
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The Number System

Archdiocese of Detroit: Eighth Grade Mathematics Standards		Sadlier *Foundations of Algebra*, Grade 8
Know that there are numbers that are not rational, and approximate them by rational numbers.		
8.NS.A.1	Know that numbers that are not rational are called irrational. Understand that every number has a decimal expansion; for irrational numbers show that they are non-repeating nor terminating.	**1-1 The Rational Numbers**—TE pp. 2–3B; SB pp. 2–3 / PB pp. 1–2 Objective(s): To define the set of rational numbers. To identify subsets of rational numbers. To write rational numbers in equivalent forms. **1-2 The Rational Numbers on a Number Line**—TE pp. 4–5B; SB pp. 4–5 / PB pp. 3–4 Objective(s): To graph rational numbers on a number line. To identify additive inverses. To simplify rational numbers in absolute value **2-5 Irrational Numbers**—TE pp. 44–45B; SB pp. 44–45 / PB pp. 47–48 Objective(s): To classify numbers as rational or irrational. To find a rational approximate value of an irrational number to a given place.
8.NS.A.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2 falls between 9 and 10). *For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*	**2-4 Estimate Square Roots**—TE pp. 42–43B; SB pp. 42–43 / PB pp. 45–46 Objective(s): To estimate the decimal value of square roots that are nonperfect squares. To locate square roots of nonperfect squares on a number line. To simplify expressions involving square roots by using a calculator. **2-5 Irrational Numbers**—TE pp. 44–45B; SB pp. 44–45 / PB pp. 47–48 Objective(s): To classify numbers as rational or irrational. To find a rational approximate value of an irrational number to a given place. **2-7 The Real Number System**—TE pp. 48–49B; pp. SB 48–49 / PB pp. 51–52 Objective(s): To classify real numbers. To locate real numbers on a number line. To find the distance between two points on a line. To find the midpoint between two numbers on a number line.
8.NS.A.3	Understand the meaning of a square root of a number and its connection to the square whose area is the number; understand the meaning of a cube root and its connection to the volume of a cube.	**2-3 Perfect Squares and Square Roots**—TE pp. 40–41B; SB pp. 40–41 / PB pp. 43–44 Objective(s): To identify perfect squares To find the two square roots of a number. To simplify expressions involving squares. To simplify expressions involving square roots. **2-6 Square Roots as Irrational Numbers**—TE pp. 46–47B; SB 46–47 / PB pp. 49–50 Objective(s): To simplify irrational square roots. **12-5 Volume of Prisms and Cylinders**—TE pp. 326–327B; SB pp. 326–327 / PB pp. 369–370 Objective(s): To find the volume of prisms. To find the volume of cylinders. To compare and contrast the volume of prisms and cylinders.

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Archdiocese of Detroit: Eighth Grade Mathematics Standards	Sadlier *Foundations of Algebra*, Grade 8
	***12-5A Perfect Cubes and Cube Roots—Online** Objective(s): To evaluate cube roots of small perfect cubes. ***12-5B Use Cube Root Symbols—Online** Objective(s): To use cube root symbols to represent solutions to equations of the form $x^3 = p$, where p is a positive rational number.

Expressions & Equations

Archdiocese of Detroit: Eighth Grade Mathematics Standards		Sadlier *Foundations of Algebra*, Grade 8
Expressions and Equations Work with radicals and integer exponents.		
8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/2^7$.*	**1-12 Integral Exponents**—TE pp. 24–25B; SB pp. 24–25 / PB pp. 23–24 Objective(s): To write repeated multiplication in exponential form. To apply the multiplication law of exponents. To apply the division law of exponents. To understand zero and negative exponents. **1-13 Powers and Exponents**—TE pp. 26–27B; SB pp. 26–27 / PB pp. 25–26 Objective(s): To raise a power to a power. To raise a product to a power. To raise a quotient to a power. To apply the power laws.
8.EE.A.1a	Understand meanings for zero and negative integer exponents.	**1-12 Integral Exponents**—TE pp. 24–25B; SB pp. 24–25 / PB pp. 23–24 Objective(s): To write repeated multiplication in exponential form. To apply the multiplication law of exponents. To apply the division law of exponents. To understand zero and negative exponents.
8.EE.A.2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.	**2-3 Perfect Squares and Square Roots**—TE pp. 40–41B; SB pp. 40–41 / PB pp. 43–44 Objective(s): To identify perfect squares. To find the two square roots of a number. To simplify expressions involving squares. To simplify expressions involving square roots. **2-5 Irrational Numbers**—TE pp. 44–45B; SB pp. 44–45 / PB pp. 47–48 Objective(s): To classify numbers as rational or irrational. To find a rational approximate value of an irrational number to a given place. ***12-5A Perfect Cubes and Cube Roots—Online** Objective(s): To evaluate cube roots of small perfect cubes. ***12-5B Use Cube Root Symbols—Online** Objective(s): To use cube root symbols to represent solutions to equations of the form $x^3 = p$, where p is a positive rational number.
8.EE.A.3	Use numbers expressed in the form of a single digit times a whole-number power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 times 10^8 and the population of the world as 7 times 10^9, and determine that the world population is more than 20 times larger.*	**2-1 Scientific Notation**—TE pp. 36–37B; SB pp. 36–37 / PB pp. 39–40 Objective(s): To write very large or very small numbers in standard form in scientific notation. To write numbers in scientific notation as very large or very small numbers in standard form. To compare numbers in scientific notation. To order numbers in scientific notation. **2-2 Multiply and Divide in Scientific Notation**—TE pp. 38–39B; SB pp. 38–39 / PB pp. 41–42 Objective(s): To multiply numbers in scientific notation. To divide numbers in scientific notation.

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Expressions & Equations

Archdiocese of Detroit: Eighth Grade Mathematics Standards		Sadlier *Foundations of Algebra*, Grade 8
8.EE.A.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	**2-2 Multiply and Divide in Scientific Notation**—TE pp. 38–39B; SB pp. 38–39 / PB pp. 41–42 Objective(s): To multiply numbers in scientific notation. To divide numbers in scientific notation.
Understand the connections between proportional relationships, lines, and linear equations.		
8.EE.B.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*	**6-9 Direct Variation**—TE pp. 172–173B; SB pp. 172–173 / PB pp. 191–192 Objective(s): To determine whether a data set shows direct variation. To determine equations for direct variations. To solve problems involving direct variation by using proportion. **7-1 Ratios, Rates, and Unit Rates**—TE pp. 188–189B; SB pp. 188–189 / PB pp. 211–212 Objective(s): To identify and apply equal ratios. To identify and apply rates. To compare rates as whole numbers, decimals, and fractions. To compare ratios as whole numbers, decimals, and fractions. **7-3 Conversion Factors and Measurement Systems**—TE pp. 192–193B; SB pp. 192–193 / PB pp. 215–216 Objective(s): To solve measurement problems using rate formulas. To rename metric units of measure using conversion factors. To rename customary units of measure using conversion factors. **7-5 Direct Proportions**—TE pp. 196–197B; SB pp. 196–197 / PB pp. 219–220 Objective(s): To write and solve direct proportions using equation form. To write and solve direct proportions using cross products. ***7-5A Proportions and Unit Rates** (graph)—Online Objective(s): To rewrite a proportion to find a unit rate. ***7-5B Graph Proportional Relationships**—Online Objective(s): To use the unit-rate form of a ratio to graph the proportional relationship (use unit rate as slope). ***7-5C Compare Proportional Relationships**—Online Objective(s): To compare two different proportional relationships represented in different ways.
8.EE.B.6	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.	**6-6 Linear Functions: Standard Form and Slope-Intercept Form**—TE pp. 166–167B; SB pp. 166–167 / PB pp. 185–186 Objective(s): To identify the slope from an equation of a line. To identify the y-intercept from an equation of a line. To graph an equation in slope-intercept form. To write an equation of a line from a graph using the y-intercept and slope.

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		6-9 Direct Variation—TE pp. 172–173B; SB pp. 172–173 / PB pp. 191–192 Objective(s): To determine whether a data set shows direct variation. To determine equations for direct variations. To solve problems involving direct variation by using proportion. **10-7 Coordinate Plane and Polygons**—TE pp. 278–279B; SB pp. 278–279 / PB pp. 313–314 Objective(s): To graph polygons on a coordinate plane. To apply perimeter formulas to polygons on a coordinate plane. To apply area formulas to polygons on a coordinate plane. To apply the Pythagorean Theorem to polygons on a coordinate plane. To determine whether three points are collinear without graphing.
Analyze and solve linear equations and pairs of simultaneous linear equations.		
8.EE.C.7	Solve linear equations in one variable.	
8.EE.C.7a	Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).	**3-3 Equations**—TE pp. 68–69B; SB pp. 68–69 / PB pp. 75–76 Objective(s): To write word sentences as equations. To determine whether a given number is a solution to a given equation. To identify the Properties of Equality. To determine whether an equation is a conditional equation or an identity. ***3-5A Identify Equations with One, Many, or No Solutions**—Online Objective(s): To give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. ***3-5B Solve Equations with One, Many, or No Solutions**—Online Objective(s): To solve one-step linear equations in one variable with one solution, infinitely many solutions, or no solutions by reducing them to the form $x = a$, $a = a$, or $a = b$.
8.EE.C.7b	Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and combining like terms.	**1-15 Problem-Solving Strategy: Make a Drawing**—TE pp. 30–31B; SB pp. 30–31 / PB pp. 29–30 Objective(s): To solve problems using the strategy *Make a Drawing*. **3-3 Equations**—TE pp. 68–69B; SB pp. 68–69 / PB pp. 75–76 Objective(s): To write word sentences as equations. To determine whether a given number is a solution to a given equation. To identify the Properties of Equality. To determine whether an equation is a conditional equation or an identity. **3-4 One-Step Addition and Subtraction Equations**—TE pp. 70–71B; SB pp. 70–71 / PB pp. 77–78 Objective(s): To solve equations by using the Addition Property of Equality. To solve equations by using the Subtraction Property of Equality.

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	3-5 One-Step Multiplication and Division Equations—TE pp. 72–73B; SB pp. 72–73 / PB pp. 79–80 Objective(s): To solve equations by using the Multiplication Property of Equality. To solve equations by using the Division Property of Equality. **3-6 Model Two-Step Equations**—TE pp. 74–75B; SB pp. 74–75 / PB pp. 81–82 Objective(s): To model two-step equations with algebra tiles. To solve two-step equations by modeling. **3-7 Two-Step Equations**—TE pp. 76–77B; SB pp. 76–77 / PB pp. 83–84 Objective(s): To solve two-step equations. **3-8 Multistep Equations with Grouping Symbols**—TE pp. 78–79B; SB pp. 78–79 / PB pp. 85–86 Objective(s): To solve multistep equations with grouping symbols. **3-9 Multistep Equations with Variables on Both Sides**—TE pp. 80–81B; SB pp. 80–81 / PB pp. 87–88 Objective(s): To solve multistep equations with variables on both sides. **3-10 Multistep Equations: Fractions and Decimals**—TE pp. 82–83B; SB pp. 82–83 / PB pp. 89–90 Objective(s): To solve multistep equations involving decimals and fractions. To solve equations with variables in denominators. **3-14 Problem-Solving Strategy: Guess and Test**—TE pp. 90–91B; SB pp. 90–91 / PB pp. 97–98 Objective(s): To solve problems using the strategy *Guess and Test*. **6-14 Problem-Solving Strategy: Reason Logically**—TE pp. 182–183B; SB pp. 182–183 / PB pp. 201–202 Objective(s): To solve problems using the strategy *Reason Logically*. **7-2 Proportions**—TE pp. 190–191B; SB pp. 190–191 / PB pp. 213–214 Objective(s): To determine whether two ratios form a proportion, using cross products. To identify and solve proportions, including proportions with an algebraic expression as a term. **7-12 Problem-Solving Strategy: Solve a Simpler Problem**—TE pp. 210–211B; SB pp. 210–211 / PB pp. 233–234 Objective(s): To solve problems using the strategy *Solve a Simpler Problem*. **9-13 Problem-Solving Strategy: Adopt a Different Point of View**—TE pp. 260–261B; SB pp. 260–261 / PB pp. 291–292 Objective(s): To solve problems using the strategy *Adopt a Different Point of View*. **10-12 Problem-Solving Strategy: Work Backward**—TE pp. 288–289B; SB pp. 288–289 / PB pp. 323–324 Objective(s): To solve problems using the strategy *Work Backward*.

Expressions & Equations

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8.EE.C.8	Analyze and solve pairs of simultaneous linear equations (systems of equations).	
8.EE.C.8a	Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.	**6-1 Relations and Functions**—TE pp. 156–157B; SB pp. 156–157 / PB pp. 175–176 Objective(s): To identify relations. To identify functions. To represent relations with tables. To represent relations with mapping diagrams. To represent relations with graphs. To represent relations with equations. To identify the domain of a relation. To identify the range of a relation. To evaluate a function using function notation. **6-2 Graphs of Functions**—TE pp. 158–159B; SB pp. 158–159 / PB pp. 177–178 Objective(s): To write a function rule. To use a table to graph functions. To find solutions of a function using a graph.
8.EE.C.8b	Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.*	**3-14 Problem-Solving Strategy: Guess and Test**—TE pp. 90–91B; SB pp. 90–91 / PB pp. 97–98 Objective(s): To solve problems using the strategy *Guess and Test*. **6-10 Solve Systems of Equations by Graphing**—TE pp. 174–175B; SB pp. 174–175 / PB pp. 193–194 Objective(s): To solve a system of linear equations by graphing. **6-11 Solve Systems of Equations by Substitution and Elimination**—TE pp. 176–177B; SB pp. 176–177 / PB pp. 195–196 Objective(s): To solve a system of linear equations by substitution. To solve a system of linear equations by elimination. **6-14 Problem-Solving Strategy: Reason Logically**—TE pp. 182–183B; SB pp. 182–183 / PB pp. 201–202 Objective(s): To solve problems using the strategy *Reason Logically*. **9-13 Problem-Solving Strategy: Adopt a Different Point of View**—TE pp. 260–261B; SB pp. 260–261 / PB pp. 291–292 Objective(s): To solve problems using the strategy *Adopt a Different Point of View*. **11-10 Problem-Solving Strategy: Account for All Possibilities**—TE pp. 312–313B; SB pp. 312–313 / PB pp. 351–352 Objective(s): To solve problems by using the strategy *Account for All Possibilities*.
8.EE.C.8c	Solve simultaneous linear equations in two variables by graphing, by substitution, and by linear combination; estimate solutions using graphs; include examples with no solutions and infinitely many solutions.	**6-10 Solve Systems of Equations by Graphing**—TE pp. 174–175B; SB pp. 174–175 / PB pp. 193–194 Objective(s): To solve a system of linear equations by graphing. **6-11 Solve Systems of Equations by Substitution and Elimination**—TE pp. 176–177B; SB pp. 176–177 / PB pp. 195–196 Objective(s): To solve a system of linear equations by substitution. To solve a system of linear equations by elimination.

Expressions & Equations

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8.EE.C.8d	Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*	**3-14 Problem-Solving Strategy: Guess and Test**—TE pp. 90–91B; SB pp. 90–91 / PB pp. 97–98 Objective(s): To solve problems using the strategy *Guess and Test*. **6-10 Solve Systems of Equations by Graphing**—TE pp. 174–175B; SB pp. 174–175 / PB pp. 193–194 Objective(s): To solve a system of linear equations by graphing. **6-11 Solve Systems of Equations by Substitution and Elimination**—TE pp. 176–177B; SB pp. 176–177 / PB pp. 195–196 Objective(s): To solve a system of linear equations by substitution. To solve a system of linear equations by elimination. ***6-11A Use Systems to Solve Problems**—Online Objective(s): To solve systems of equations where the determining information for both lines is given but not both equations. **11-10 Problem-Solving Strategy: Account for All Possibilities**—TE pp. 312–313B; SB pp. 312–313 / PB pp. 351–352 Objective(s): To solve problems by using the strategy *Account for All Possibilities*.
8.EE.C.9	Analyze and solve pairs of simultaneous linear inequalities.	
8.EE.C.9a	Solve linear inequalities in one and two variables, and graph the solution sets.	**6-12 Linear Inequalities in Two Variables**—TE pp. 178–179B; SB pp. 178–179 / PB pp. 197–198 Objective(s): To determine whether an ordered pair is a solution of a linear inequality. To graph linear inequalities.
8.EE.C.9b	Set up and solve applied problems involving simultaneous linear equations and linear inequalities.	**6-13 Systems of Linear Inequalities**—TE pp. 180–181B; SB pp. 180–181 / PB pp. 199–200 Objective(s): To determine if an ordered pair is a solution to a system of inequalities. To graph systems of linear inequalities. To model a real-world situation using a system of linear inequalities.

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Functions

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Define, evaluate, and compare functions.		
8.F.A.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. *For example, Use the vertical line test.*	**6-1 Relations and Functions**—TE pp. 156–157B; SB pp. 156–157 / PB pp. 175–176 Objective(s): To identify relations. To identify functions. To represent relations with tables. To represent relations with mapping diagrams. To represent relations with graphs. To represent relations with equations. To identify the domain of a relation. To identify the range of a relation. To evaluate a function using function notation. **6-2 Graphs of Functions**—TE pp. 158–159B; SB pp. 158–159 / PB pp. 177–178 Objective(s): To write a function rule. To use a table to graph functions. To find solutions of a function using a graph.
8.F.A.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*	**6-2 Graphs of Functions**—TE pp. 158–159B; SB pp. 158–159 / PB pp. 177–178 Objective(s): To write a function rule. To use a table to graph functions. To find solutions of a function using a graph. ***6-2A Compare Functions**—Online Objective(s): To compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
8.F.A.3	Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*	**6-6 Linear Functions: Standard Form and Slope-Intercept Form**—TE pp. 166–167B; SB pp. 166–167 / PB pp. 185–186 Objective(s): To identify the slope from an equation of a line. To identify the *y*-intercept from an equation of a line. To graph an equation in slope-intercept form. To write an equation of a line from a graph using the *y*-intercept and slope. **11-6 Nonlinear Functions: Quadratic**—TE pp. 304–305B; SB pp. 304–305 / PB pp. 343–344 Objective(s): To recognize equations of quadratic functions. To recognize graphs of quadratic functions. To recognize tables of quadratic functions. **11-7 Other Nonlinear Functions**—TE pp. 306–307B; SB pp. 306–307 / PB pp. 345–346 Objective(s): To recognize graphs of other nonlinear functions, such as step, absolute-value, and exponential functions. **11-9 Technology: Graphs of Nonlinear Functions**—TE pp. 310–311B; SB pp. 310–311 / PB pp. 349–350 Objective(s): To graph nonlinear functions using a calculator. To explore how changes to the equations for nonlinear functions affect the graph.

Functions

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Use functions to model relationships between quantities		
8.F.B.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (*x, y*) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	**6-1 Relations and Functions**—TE pp. 156–157B; SB pp. 156–157 / PB pp. 175–176 Objective(s): To identify relations. To identify functions. To represent relations with tables. To represent relations with mapping diagrams. To represent relations with graphs. To represent relations with equations. To identify the domain of a relation. To identify the range of a relation. To evaluate a function using function notation. **6-2 Graphs of Functions**—TE pp. 158–159B; SB pp. 158–159 / PB pp. 177–178 Objective(s): To write a function rule. To use a table to graph functions. To find solutions of a function using a graph.
8.F.B.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	**6-4 Slope of a Line**—TE pp. 162–163B; SB pp. 162–163 / PB pp. 181–182 Objective(s): To find the slope of a line given two points on the line. To interpret slopes of lines. **6-5 The x- and y-Intercepts of a Line—TE pp. 164–165B; SB pp. 164–165 / PB pp. 183–184** Objective(s): To find the *x*--intercept of a line given its equation. To find the *y*-intercept of a line given its equation. To graph an equation using *x*- and *y*-intercepts. To determine the *x*- and *y*-intercepts of a line from a graph. **6-6 Linear Functions: Standard Form and Slope-Intercept Form**—TE pp. 166–167B; SB pp. 166–167 / PB pp. 185–186 Objective(s): To identify the slope from an equation of a line. To identify the *y*-intercept from an equation of a line. To graph an equation in slope-intercept form. To write an equation of a line from a graph using the *y*-intercept and slope. **6-6 Linear Functions: Standard Form and Slope-Intercept Form**—TE pp. 166–167B; SB pp. 166–167 / PB pp. 185–186 Objective(s): To identify the slope from an equation of a line. To identify the *y*-intercept from an equation of a line. To graph an equation in slope-intercept form. To write an equation of a line from a graph using the *y*-intercept and slope. **6-7 Linear Functions: Point-Slope Form**—TE pp. 168–169B; SB pp. 168–169 / PB pp. 187–188 Objective(s): To write the equation of a line, given one point and the slope. To graph a linear equation, given one point and the slope. To recognize and use point-slope form and relate it to slope-intercept form. **11-5 Find Function Values**—TE pp. 302–303B; SB pp. 302–303 / PB pp. 341–342 Objective(s): To evaluate functions given in function notation for various values of a variable.

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		12-11 Problem-Solving Strategy: Review of Strategies—TE pp. 338–339B; SB pp. 338–339 / PB pp. 381–382
Recognize, Represent, and Apply Common Formulas		
8.F.C.6	Recognize and preform operations with polynomials. Understand FOIL method.	
8.F.C.6a	Factor simple quadratic expressions with integer coefficients, Ex. $x^2 + 6x + 9$, $x^2 + 2x - 3$, and $x^2 - 4$; solve simple quadratic equations. Ex. $x^2 = 16$ or $x^2 = 5$ (by taking square roots); $x^2 - x - 6 = 0$, $x^2 - 2x = 15$ (by factoring); verify solutions by evaluation.	**5-11 Factoring Trinomials: $x^2 + bx + c$**—TE pp. 144–145B; SB pp. 144–145 / PB pp. 159–160 Objective(s): To factor quadratic trinomials of the form $x^2 + bx + c$, when $a \neq 1$, $b \neq 0$, and $c \neq 0$.
8.F.C.6b	Recognize and apply the common formulas: $(a + b)^2 = a^2 + 2ab + b^2$ $(a - b)^2 = a^2 - 2ab + b^2$ $(a + b)(a - b) = a^2 - b^2$; represent geometrically	n/a
Understand and represent quadratic functions.		
8.F.C.7	Solve applied problems involving simple quadratic equations.	
8.F.C.7a	Graph factorable quadratic functions, finding where the graph intersects the x-axis and the coordinates of the vertex; use words "parabola" and "roots"; include functions in vertex form and those with leading coefficient -1 ex. $y = x^2 - 36$, $y = (x - 2)^2 - 9$; $y = -x^2$, $y = -(x - 3)^2$.	**11-6 Nonlinear Functions: Quadratic**—TE pp. 304–305B; SB pp. 304–305 / PB pp. 343–344 Objective(s): To recognize equations of quadratic functions. To recognize graphs of quadratic functions. To recognize tables of quadratic functions.

Geometry

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Understand congruence and similarity using physical models, transparencies, or geometry software.		
8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations.	
8.G.A.1a	Lines are taken to lines, and line segments to line segments of the same length.	***10-9A Properties of Rigid Transformations**—Online Objective(s): To verify experimentally that under rigid transformations the image of a line segment is a line segment and the image of a line is a line. To verify experimentally that under rigid transformations the image of an angle is an angle. To verify experimentally that under rigid transformations the image of parallel lines is parallel lines.
8.G.A.1b	Angles are taken to angles of the same measure.	***10-9A Properties of Rigid Transformations**—Online Objective(s): To verify experimentally that under rigid transformations the image of a line segment is a line segment and the image of a line is a line. To verify experimentally that under rigid transformations the image of an angle is an angle. To verify experimentally that under rigid transformations the image of parallel lines is parallel lines.
8.G.A.1c	Parallel lines are taken to parallel lines.	***10-9A Properties of Rigid Transformations**—Online Objective(s): To verify experimentally that under rigid transformations the image of a line segment is a line segment and the image of a line is a line. To verify experimentally that under rigid transformations the image of an angle is an angle. To verify experimentally that under rigid transformations the image of parallel lines is parallel lines.
8.G.A.2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	**9-5 Congruent Polygons**—TE pp. 244–245B; SB pp. 244–245 / PB pp. 275–276 Objective(s): To identify congruent corresponding parts of polygons. To determine congruence among polygons. To use the triangle congruence rules, SSS, SAS, ASA, SAA, and HL, to determine if triangles are congruent. **9-13 Problem-Solving Strategy: Adopt a Different Point of View**—TE pp. 260–261B; SB pp. 260–261 / PB pp. 291–292 Objective(s): To solve problems using the strategy *Adopt a Different Point of View*. **10-8 Coordinate Plane: Reflections and Translations**—TE pp. 280–281B; SB pp. 280–281 / PB pp. 315–316 Objective(s): To transform plane figures using reflections. To transform plane figures using translations. To relate reflections to symmetry. **10-9 Coordinate Plane: Rotations**—TE pp. 282–283B; SB pp. 282–283 / PB pp. 317–318 Objective(s): To transform plane figures using rotations. To relate rotations to symmetry. To find the coordinates of the final image of a polygon after a combined transformation.

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		10-11 Combine Transformations—TE pp. 286–287B; SB pp. 286–287 / PB pp. 321–322 Objective(s): To determine what combination of transformations produces a given image. ***10-11A Transformations and Congruence**—Online Objective(s): To understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations. To describe a sequence of rigid transformations that exhibits the congruence between two given congruent figures.
8.G.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	**10-7 Coordinate Plane and Polygons**—TE pp. 278–279B; SB pp. 278–279 / PB pp. 313–314 Objective(s): To graph polygons on a coordinate plane. To apply perimeter formulas to polygons on a coordinate plane. To apply area formulas to polygons on a coordinate plane. To apply the Pythagorean Theorem to polygons on a coordinate plane. To determine whether three points are collinear without graphing. **10-8 Coordinate Plane: Reflections and Translations**—TE pp. 280–281B; SB pp. 280–281 / PB pp. 315–316 Objective(s): To transform plane figures using reflections. To transform plane figures using translations. To relate reflections to symmetry. **10-9 Coordinate Plane: Rotations**—TE pp. 282–283B; SB pp. 282–283 / PB pp. 317–318 Objective(s): To transform plane figures using rotations. To relate rotations to symmetry. **10-10 Coordinate Plane: Dilations**—TE pp. 284–285B; SB pp. 284–285 / PB pp. 319–320 Objective(s): To identify and create dilations of plane figures.
8.G.A.4	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	**10-10 Coordinate Plane: Dilations**—TE pp. 284–285B; SB pp. 284–285 / PB pp. 319–320 Objective(s): To identify and create dilations of plane figures. **10-11 Combine Transformations**—TE pp. 286–287B; SB pp. 286–287 / PB pp. 321–322 Objective(s): To determine what combination of transformations produces a given image. To find the coordinates of the final image of a polygon after a combined transformation. ***10-11B Transformations and Similarity**—Online Objective(s): To understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations. To describe a sequence of transformations between two similar two-dimensional figures that exhibits the similarity between them.

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8.G.A.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*	**7-9 Similarity**—TE pp. 204–205B; SB pp. 204–205 / PB pp. 227–228 Objective(s): To determine whether figures are similar. To use scale factors and to find missing dimensions in similar figures. **7-12 Problem-Solving Strategy: Solve a Simpler Problem**—TE pp. 210–211B; SB pp. 210–211 / PB pp. 233–234 Objective(s): To solve problems using the strategy *Solve a Simpler Problem*. **9-1 Angle Pairs—**TE pp. 236–237B; SB pp. 236–237 / PB pp. 267–268 Objective(s): To identify complementary angles. To identify supplementary angles. To identify adjacent angles. To identify linear angles. To identify vertical angle pairs. To calculate algebraically the measures of angles. **9-2 Angles of Parallel Lines**—TE pp. 238–239B; SB pp. 238–239 / PB pp. 269–270 Objective(s): To identify alternate interior angles; To identify alternate exterior angles. To identify corresponding angles. To determine the relationships of angle pairs formed by a transversal of parallel lines. To solve problems involving angle measures and transversals algebraically. **9-4 Angles of Polygons**—TE pp. 242–243B; SB pp. 242–243 / PB pp. 273–274 Objective(s): To find the sum of the measures of interior angles of a convex polygon. To find the sum of the measures of exterior angles of a convex polygon. To find the measures of an exterior angle of a regular polygon. To find the measures of an interior angle of a regular polygon. To solve problems involving angles of polygons. ***9-4A Angle-Angle Criterion for Similar Triangles**—Online Objective(s): To use the angle-angle criterion to determine whether two triangles are similar. **13-12 Problem-Solving Strategy: Consider Extreme Cases**—TE pp. 366–367B; SB pp. 366–367 / PB pp. 413–414 Objective(s): To solve problems using the strategy *Consider Extreme Cases*.
8.G.A.6	Understand at least one proof of the Pythagorean Theorem; use the Pythagorean Theorem and its converse to solve applied problems including perimeter, area, and volume problem.	**2-9 Pythagorean Theorem**—TE pp. 52–53B; SB pp. 52–53 / PB pp. 55–56 Objective(s): To use the Pythagorean Theorem to find a missing side of a right triangle. To determine whether a given triangle is a right triangle. ***2-9A Proof of the Pythagorean Theorem**—Online Objective(s): To explain a proof of the Pythagorean Theorem and its converse.

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	10-2 Perimeter and Missing Dimensions—TE pp. 268–269B; SB pp. 268–269 / PB pp. 303–304 Objective(s): To use formulas to find perimeters of regular polygons. To find missing dimensions given the perimeter of a polygon. To investigate how changing the dimensions of a polygon affects the perimeter. To solve problems on perimeter and missing dimensions algebraically.
	10-5 Area of Complex Figures (using the Pythagorean Theorem)—TE pp. 274–275B; SB pp. 274–275 / PB pp. 309–310 Objective(s): To find the area of irregular shapes involving polygons and circles
	10-6 Area and Missing Dimensions—TE pp. 276–277B; SB pp. 276–277 / PB pp. 311–312 Objective(s): To find missing dimensions given the area of a polygon. To investigate how changing the dimensions of a polygon affects the area.
	10-7 Coordinate Plane and Polygons—TE pp. 278–279B; SB pp. 278–279 / PB pp. 313–314 Objective(s): To graph polygons on a coordinate plane. To apply perimeter formulas to polygons on a coordinate plane. To apply area formulas to polygons on a coordinate plane. To apply the Pythagorean Theorem to polygons on a coordinate plane. To determine whether three points are collinear without graphing.
	***12-6A Compute Missing Dimensions of Three-Dimensional Figures**—Online Objective(s): To apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in three dimensions.
	12-8 Similar Three-Dimensional Figures—TE pp. 332–333B; SB pp. 332–333 / PB pp. 375–376 Objective(s): To find linear dimensions of similar three-dimensional figures. To find the surface area of similar three-dimensional figures. To find the volume of similar three-dimensional figures.
	12-9 Effect of Changing Dimensions—TE pp. 334–335B; SB pp. 334–335 / PB pp. 377–378 Objective(s): To determine the effect of changing linear dimensions of a three-dimensional figure on its surface area and volume. To project the measures of scale models of three-dimensional figures, given scale factors.

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8.G.A.7	Find the distance between two points on the coordinate plane using the distance formula; recognize that the distance formula is an application of the Pythagorean Theorem.	**10-7 Coordinate Plane and Polygons**—TE pp. 278–279B; SB pp. 278–279 / PB pp. 313–314 Objective(s): To graph polygons on a coordinate plane. To apply perimeter formulas to polygons on a coordinate plane. To apply area formulas to polygons on a coordinate plane. To apply the Pythagorean Theorem to polygons on a coordinate plane. To determine whether three points are collinear without graphing. ***10-7A Apply Pythagorean Theorem**—Online Objective(s): To apply the Pythagorean Theorem to determine unknown side lengths in right triangles.

Statistics & Probability

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Investigate patterns of association in bivariate data.		
8.SP.A.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	**6-3 Scatter Plots**—TE pp. 160–161B; SB pp. 160–161 / PB pp. 179–180 Objective(s): To make and read scatter plots. To identify lines of best fit. To draw lines of best fit. To interpret data sets as having positive, negative, or no correlation. To recognize trends in correlated data. ***6-3A Analyze outliers**—Online Objective(s): To analyze data with and without outliers. ***6-3B Clustering**—Online Objective(s): To use clustering to identify the strength of the correlation data. ***6-3C Analyze Scatter Plots**—Online Objective(s): To identify when association between data is nonlinear and line of best fit is not predictive for extrapolation.
8.SP.A.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.	**6-3 Scatter Plots**—TE pp. 160–161B; SB pp. 160–161 / PB pp. 179–180 Objective(s): To make and read scatter plots. To identify lines of best fit. To draw lines of best fit. To interpret data sets as having positive, negative, or no correlation. To recognize trends in correlated data.
8.SP.A.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*	***6-7A Analyzing Trend Lines**—Online Objective(s): To find the equation of the line of best fit in situations that involve linear association. ***6-7B Use Linear Models to Solve Problems**—Online Objective(s): To use the equation of the line of best fit to solve problems.
8.SP.A.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*	**2-12 Problem-Solving Strategy: Organize Data**—TE pp. 58–59B; SB 58–59 / PB pp. 61–62 Objective(s): To solve problems using the strategy *Organize Data*. **11-10 Problem-Solving Strategy: Account for All Possibilities**—TE pp. 312–313B; SB pp. 312–313 / PB pp. 351–352 Objective(s): To solve problems by using the strategy *Account for All Possibilities*. ***13-5A Patterns of Association in Categorical Data**—Online Objective(s): To construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. ***13-5B Examine Patterns of Association**—Online Objective(s): To determine whether there are associations between variables in a two-way table.

Statistics & Probability

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8.SP.A.5	Determine which measure of central tendency (mean, median, mode) best represents a data set (salaries, home prices, for answering certain questions); justify the choice made.	**13-3 Stem-and-Leaf Plots** (Measures of Central Tendency)—TE pp. 348–349B; SB pp. 348–349 / PB pp. 395–396 Objective(s): To read and make single stem-and-leaf plots. To read and make back-to-back stem-and-leaf plots. To compare sets of data given in stem-and-leaf plots. To find measures of central tendency from data displayed on stem-and-leaf plots.
8.SP.A.6	Recognize practices of collecting and displaying data that may bias the presentation or analysis.	**13-2 Surveys and Samples** (bias)—TE pp. 346–347B; SB pp. 346–347 / PB pp. 393–394 Objective(s): To use frequency, relative frequency and cumulative frequency tables to organize data. To use line plots to display and order data. To interpret outliers in data sets. To interpret gaps in data sets. To interpret clusters in data sets.
8.SP.A.7	Find and/or compare the theoretical probability, the experimental probability, and/or the relative frequency of a given event.	**14-2 Theoretical Probability**—TE pp. 374–375B; SB pp. 374–375 / PB pp. 425–426 Objective(s): To find the theoretical probability of an event. To compute probabilities of simple events. To compute probabilities of combined events. **14-3 Experimental Probability**—TE pp. 376–377B; SB pp. 376–377 / PB pp. 427–428 Objective(s): To find experimental probabilities. To use experimental probabilities to make predictions. To use a calculator to generate random numbers.
8.SP.A.8	Understand the difference between independent and dependent events, and recognize common misconceptions involving probability (Alice rolls a 6 on a die three times in a row: she is just as likely to roll a 6 on the fourth roll as she was on any previous roll).	**14-4 Probability and Odds**—TE pp. 378–379B; SB pp. 378–379 / PB pp. 429–430 Objective(s): To find probabilities of complementary events. To understand the relationship between probabilities and odds. **14-5 Mutually Exclusive Events**—TE pp. 380–381B; SB pp. 380–381 / PB pp. 431–432 Objective(s): To compute probabilities of mutually exclusive or overlapping events. **14-6 Compound Events**—TE pp. 382–383B; SB pp. 382–383 / PB pp. 433–434 Objective(s): To compute probabilities of independent events. To compute probabilities of dependent events.