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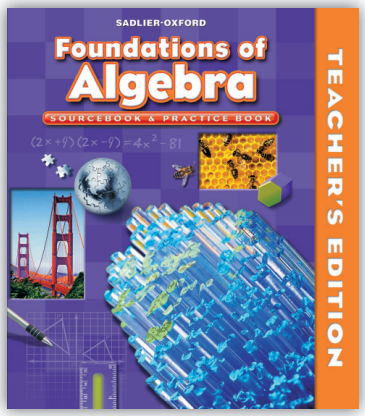
Progress in Mathematics

Correlated to the

Common Core State Standards

for Mathematics

GRADE 8



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The Number System 8.NS

Know that there are numbers that are not rational, and approximate them by rational numbers.

Common Core State Standards for Mathematics	Sadlier Foundations of Algebra
1. Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.	**Instruction** *11-2B Ratios and Unit Rates—Online 11-3 Rates (unit rate, unit price)—pp. 380–381
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., π2). *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.*	**Instruction** 2-4 Estimate Square Roots—TE pp. 42–43B; SB pp. 42–43 / PB pp. 45–46 2-5 Irrational Numbers—TE pp. 44–45B; SB pp. 44–45 / PB pp. 47–48

Expressions and Equations 8.EE

Work with radicals and integer exponents.

Common Core State Standards for Mathematics	Sadlier Foundations of Algebra
1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.*	**Instruction** 1-12 Integral Exponents—TE pp. 24–25B; SB pp. 24–25 / PB pp. 23–24 1-13 Powers and Exponents—TE pp. 26–27B; SB pp. 26–27 / PB pp. 25–26
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.	**Instruction** 2-3 Perfect Squares and Square Roots—TE pp. 40–41B; SB pp. 40–41 / PB pp. 43–44 2-5 Irrational Numbers—TE pp. 44–45B; SB pp. 44–45 / PB pp. 47–48 *12-5A Perfect Cubes and Cube Roots—Online *12-5B Use Cube Root Symbols—Online
3. Use numbers expressed in the form of a single digit times an integer 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 × 108 and the population of the world as 7 × 109, and determine that the world population is more than 20 times larger.*	**Instruction** 2-1 Scientific Notation—TE pp. 36–37B; SB pp. 36–37 / PB pp. 39–40 2-2 Multiply and Divide in Scientific Notation—TE pp. 38–39B; SB pp. 38–39 / PB pp. 41–42

*Online at progressinmathematics.com.

Page numbers cited refer to the *Foundations of Algebra* Teacher's Edition (TE), Source Book (SB), and Practice Book (PB); lettered page numbers, such as " 42A" or "103B," refer to the Teacher's Edition only.

April 5, 2012

Work with radicals and integer exponents.

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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.	**Instruction** 2-2 Multiply and Divide in Scientific Notation—TE pp. 38–39B; SB pp. 38–39 / PB pp. 41–42

Understand the connections between proportional relationships, lines, and linear equations.

Common Core State Standards for Mathematics	Sadlier Foundations of Algebra
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.*	**Instruction** 6-9 Direct Variation—TE pp. 172–173B; SB pp. 172–173 / PB pp. 191–192 7-1 Ratios, Rates, and Unit Rates—TE pp. 188–189B; SB pp. 188–189 / PB pp. 211–212 7-3 Conversion Factors and Measurement Systems—TE pp. 192–193B; SB pp. 192–193 / PB pp. 215–216 7-5 Direct Proportions—TE pp. 196–197B; SB pp. 196–197 / PB pp. 219–220 *7-5A Proportions and Unit Rates—Online *7-5B Graph Proportional Relationships—Online *7-5C Compare Proportional Relationships—Online
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.	**Instruction** 6-6 Linear Functions: Standard Form and Slope-Intercept Form—TE pp. 166–167B; SB pp. 166–167 / PB pp. 185–186 6-9 Direct Variation—TE pp. 172–173B; SB pp. 172–173 / PB pp. 191–192 10-7 Coordinate Plane and Polygons—TE pp. 278–279B; SB pp. 278–279 / PB pp. 313–314

Analyze and solve linear equations and pairs of simultaneous linear equations.

Common Core State Standards for Mathematics	Sadlier Foundations of Algebra
7. Solve linear equations in one variable.	
a. 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).	**Instruction** 3-3 Equations—TE pp. 68–69B; SB pp. 68–69 / PB pp. 75–76 *3-5A Identify Equations with One, Many, or No Solutions—Online *3-5B Solve Equations with One, Many, or No Solutions—Online

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Analyze and solve linear equations and pairs of simultaneous linear equations.

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b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	**Instruction** 1-15 Problem-Solving Strategy: Make a Drawing—TE pp. 30–31B; SB pp. 30–31 / PB pp. 29–30 3-3 Equations—TE pp. 68–69B; SB pp. 68–69 / PB pp. 75–76 3-4 One-Step Addition and Subtraction Equations—TE pp. 70–71B; SB pp. 70–71 / PB pp. 77–78 3-5 One-Step Multiplication and Division Equations—TE pp. 72–73B; SB pp. 72–73 / PB pp. 79–80 3-6 Model Two-Step Equations—TE pp. 74–75B; SB pp. 74–75 / PB pp. 81–82 3-7 Two-Step Equations—TE pp. 76–77B; SB pp. 76–77 / PB pp. 83–84 3-8 Multistep Equations with Grouping Symbols—TE pp. 78–79B; SB pp. 78–79 / PB pp. 85–86 3-9 Multistep Equations with Variables on Both Sides—TE pp. 80–81B; SB pp. 80–81 / PB pp. 87–88 3-10 Multistep Equations: Fractions and Decimals—TE pp. 82–83B; SB pp. 82–83 / PB pp. 89–90 3-14 Problem-Solving Strategy: Guess and Test—TE pp. 90–91B; SB pp. 90–91 / PB pp. 97–98 6-14 Problem-Solving Strategy: Reason Logically—TE pp. 182–183B; SB pp. 182–183 / PB pp. 201–202 7-2 Proportions—TE pp. 190–191B; SB pp. 190–191 / PB pp. 213–214 7-12 Problem-Solving Strategy: Solve a Simpler Problem—TE pp. 210–211B; SB pp. 210–211 / PB pp. 233–234 9-13 Problem-Solving Strategy: Adopt a Different Point of View—TE pp. 260–261B; SB pp. 260–261 / PB pp. 291–292 10-12 Problem-Solving Strategy: Work Backward—TE pp. 288–289B; SB pp. 288–289 / PB pp. 323–324 **Application** 12-11 Problem-Solving Strategy: Review of Strategies—TE pp. 338–339B; SB pp. 338–339 / PB pp. 381–382
8. Analyze and solve pairs of simultaneous linear equations.	
a. 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.	**Instruction** 6-1 Relations and Functions—TE pp. 156–157B; SB pp. 156–157 / PB pp. 175–176 6-2 Graphs of Functions—TE pp. 158–159B; SB pp. 158–159 / PB pp.177–178
b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.	**Instruction** 3-14 Problem-Solving Strategy: Guess and Test—TE pp. 90–91B; SB pp. 90–91 / PB pp. 97–98

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Analyze and solve linear equations and pairs of simultaneous linear equations.

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For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.	6-10 Solve Systems of Equations by Graphing—TE pp. 174–175B; SB pp. 174–175 / PB pp. 193–194 6-11 Solve Systems of Equations by Substitution and Elimination—TE pp. 176–177B; SB pp. 176–177 / PB pp. 195–196 6-14 Problem-Solving Strategy: Reason Logically—TE pp. 182–183B; SB pp. 182–183 / PB pp. 201–202 9-13 Problem-Solving Strategy: Adopt a Different Point of View—TE pp. 260–261B; SB pp. 260–261 / PB pp. 291–292 11-10 Problem-Solving Strategy: Account for All Possibilities—TE pp. 312–313B; SB pp. 312–313 / PB pp. 351–352
c. 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.*	**Instruction** 3-14 Problem-Solving Strategy: Guess and Test—TE pp. 90–91B; SB pp. 90–91 / PB pp. 97–98 6-10 Solve Systems of Equations by Graphing—TE pp. 174–175B; SB pp. 174–175 / PB pp. 193–194 6-11 Solve Systems of Equations by Substitution and Elimination—TE pp. 176–177B; SB pp. 176–177 / PB pp. 195–196 *6-11A Use Systems to Solve Problems—Online 11-10 Problem-Solving Strategy: Account for All Possibilities—TE pp. 312–313B; SB pp. 312–313 / PB pp. 351–352

Functions 8.F

Define, evaluate, and compare functions.

Common Core State Standards for Mathematics	Sadlier Foundations of Algebra
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.	**Instruction** 6-1 Relations and Functions—TE pp. 156–157B; SB pp. 156–157 / PB pp. 175–176 6-2 Graphs of Functions—TE pp. 158–159B; SB pp. 158–159 / PB pp. 177–178
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.*	**Instruction** 6-2 Graphs of Functions—TE pp. 158–159B; SB pp. 158–159 / PB pp. 177–178 *6-2A Compare Functions—Online

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Define, evaluate, and compare functions.

Common Core State Standards for Mathematics	Sadlier Foundations of Algebra
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.*	**Instruction** 6-6 Linear Functions: Standard Form and Slope-Intercept Form—TE pp. 166–167B; SB pp. 166–167 / PB pp. 185–186 11-6 Nonlinear Functions: Quadratic—TE pp. 304–305B; SB pp. 304–305 / PB pp. 343–344 11-7 Other Nonlinear Functions—TE pp. 306–307B; SB pp. 306–307 / PB pp. 345–346 11-9 Technology: Graphs of Nonlinear Functions—TE pp. 310–311B; SB pp. 310–311 / PB pp. 349–350

Use functions to model relationships between quantities.

Common Core State Standards for Mathematics	Sadlier Foundations of Algebra
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.	**Instruction** 6-1 Relations and Functions—TE pp. 156–157B; SB pp. 156–157 / PB pp. 175–176 6-2 Graphs of Functions—TE pp. 158–159B; SB pp. 158–159 / PB pp. 177–178
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.	**Instruction** 6-4 Slope of a Line—TE pp. 162–163B; SB pp. 162–163 / PB pp. 181–182 6-5 The *x*- and *y*-Intercepts of a Line—TE pp. 164–165B; SB pp. 164–165 / PB pp. 183–184 6-6 Linear Functions: Standard Form and Slope-Intercept Form—TE pp. 166–167B; SB pp. 166–167 / PB pp. 185–186 6-7 Linear Functions: Point-Slope Form—TE pp. 168–169B; SB pp. 168–169 / PB pp. 187–188 11-5 Find Function Values—TE pp. 302–303B; SB pp. 302–303 / PB pp. 341–342 12-11 Problem-Solving Strategy: Review of Strategies—TE pp. 338–339B; SB pp. 338–339 / PB pp. 381–382

Geometry 8.G

Understand congruence and similarity using physical models, transparencies, or geometry software.

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1. Verify experimentally the properties of rotations, reflections, and translations:	

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Understand congruence and similarity using physical models, transparencies, or geometry software.

Common Core State Standards for Mathematics	Sadlier Foundations of Algebra
a. Lines are taken to lines, and line segments to line segments of the same length.	**Instruction** *10-9A Properties of Rigid Transformations—Online
b. Angles are taken to angles of the same measure.	**Instruction** *10-9A Properties of Rigid Transformations—Online
c. Parallel lines are taken to parallel lines.	**Instruction** *10-9A Properties of Rigid Transformations—Online
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.	**Instruction** 9-5 Congruent Polygons—TE pp. 244–245B; SB pp. 244–245 / PB pp. 275–276 9-13 Problem-Solving Strategy: Adopt a Different Point of View—TE pp. 260–261B; SB pp. 260–261 / PB pp. 291–292 10-8 Coordinate Plane: Reflections and Translations—TE pp. 280–281B; SB pp. 280–281 / PB pp. 315–316 10-9 Coordinate Plane: Rotations—TE pp. 282–283B; SB pp. 282–283 / PB pp. 317–318 10-11 Combine Transformations—TE pp. 286–287B; SB pp. 286–287 / PB pp. 321–322 *10-11A Transformations and Congruence—Online
3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	**Instruction** 10-7 Coordinate Plane and Polygons—TE pp. 278–279B; SB pp. 278–279 / PB pp. 313–314 10-8 Coordinate Plane: Reflections and Translations—TE pp. 280–281B; SB pp. 280–281 / PB pp. 315–316 10-9 Coordinate Plane: Rotations—TE pp. 282–283B; SB pp. 282–283 / PB pp. 317–318 10-10 Coordinate Plane: Dilations—TE pp. 284–285B; SB pp. 284–285 / PB pp. 319–320
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.	**Instruction** 10-10 Coordinate Plane: Dilations—TE pp. 284–285B; SB pp. 284–285 / PB pp. 319–320 10-11 Combine Transformations—TE pp. 286–287B; SB pp. 286–287 / PB pp. 321–322 *10-11B Transformations and Similarity—Online
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.*	**Instruction** 7-9 Similarity—TE pp. 204–205B; SB pp. 204–205 / PB pp. 227–228 7-12 Problem-Solving Strategy: Solve a Simpler Problem—TE pp.210–211B; SB pp. 210–211 / PB pp. 233–234 9-1 Angle Pairs—TE pp. 236–237B; SB pp. 236–237 / PB pp. 267–268 9-2 Angles of Parallel Lines—TE pp. 238–239B; SB pp. 238–239 / PB pp. 269–270 9-4 Angles of Polygons—TE pp. 242–243B; SB pp. 242–243 / PB pp. 273–274

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Understand congruence and similarity using physical models, transparencies, or geometry software.

Common Core State Standards for Mathematics	Sadlier Foundations of Algebra
	*9-4A Angle-Angle Criterion for Similar Triangles—Online 13-12 Problem-Solving Strategy: Consider Extreme Cases—TE pp. 366–367B; SB pp. 366–367 / PB pp. 413–414

Understand and apply the Pythagorean Theorem.

Common Core State Standards for Mathematics	Sadlier Foundations of Algebra
6. Explain a proof of the Pythagorean Theorem and its converse.	**Instruction** 2-9 Pythagorean Theorem (includes converse)—TE pp. 52–53B; SB pp. 52–53 / PB pp. 55–56 *2-9A Proof of the Pythagorean Theorem—Online
7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	**Instruction** 2-9 Pythagorean Theorem—TE pp. 52–53B; SB pp. 52–53 / PB pp. 55–56 *12-6A Compute Missing Dimensions of Three-Dimensional Figures—Online
8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	**Instruction** 10-7 Coordinate Plane and Polygons—TE pp. 278–279B; SB pp. 278–279 / PB pp. 313–314 *10-7A Apply Pythagorean Theorem—Online

Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

Common Core State Standards for Mathematics	Sadlier Foundations of Algebra
9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	**Instruction** 12-5 Volume of Prisms and Cylinders—TE pp. 326–327B; SB pp. 326–327 / PB pp. 369–370 12-6 Volume of Pyramids and Cones—TE pp. 328–329B; SB pp. 328–329 / PB pp. 371–372 12-7 Volume of Spheres—TE pp. 330–331B; SB pp. 330–331 / PB pp. 373–374 13-12 Problem-Solving Strategy: Consider Extreme Cases—TE pp. 366–367B; SB pp. 366–367 / PB pp. 413–414

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Statistics and Probability 8.SP

Investigate patterns of association in bivariate data.

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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.	**Instruction** 6-3 Scatter Plots—TE pp. 160–161B; SB pp. 160–161 / PB pp. 179–180 *6-3A Analyze outliers—Online *6-3B Clustering—Online *6-3C Analyze Scatter Plots—Online
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.	**Instruction** 6-3 Scatter Plots—TE pp. 160–161B; SB pp. 160–161 / PB pp. 179–180
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.*	**Instruction** *6-7A Analyzing Trend Lines—Online *6-7B Use Linear Models to Solve Problems—Online
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?*	**Instruction** 2-12 Problem-Solving Strategy: Organize Data—TE pp. 58–59B; SB 58–59 / PB pp. 61–62 11-10 Problem-Solving Strategy: Account for All Possibilities—TE pp. 312–313B; SB pp. 312–313 / PB pp. 351–352 *13-5A Patterns of Association in Categorical Data—Online *13-5B Examine Patterns of Association—Online

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