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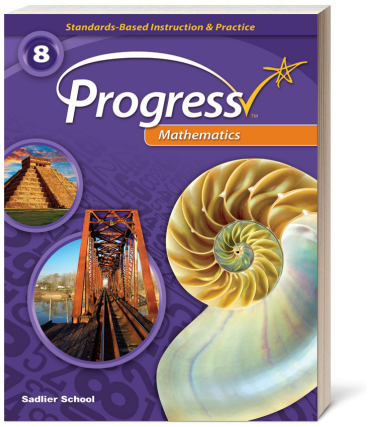
Progress Mathematics

Standards-Based Instruction & Practice



Aligned to

Ohio's Learning Standards

Mathematics | 2017

Grade 8

Contents

The Number System	2
Expressions and Equations	3
Functions	4
Geometry	5
Statistics and Probability	7

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The Number System

Standards	Sadlier *Progress Mathematics*, Grade 8
Know that there are numbers that are not rational, and approximate them by rational numbers.	
8.NS.1 Know that real numbers are either rational or irrational. Understand informally that every number has a decimal expansion which is repeating, terminating, or is non-repeating and non-terminating.	**Lesson 1** **Understand Rational and Irrational Numbers**—pp. 10–17
8.NS.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). *For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*	**Lesson 2** **Use Rational Approximations of Irrational Numbers**—pp. 18–25

Expressions and Equations

Standards	Sadlier *Progress Mathematics*, Grade 8
Work with radicals and integer exponents.	
8.EE.1 Understand, explain, and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.*	**Lesson 3** **Understand Zero and Negative Exponent**—pp. 32–39
	Lesson 4 **Learn Properties of Exponents**—pp. 40–47
	Lesson 5 **Use Properties of Exponents Generate Equivalent Expressions**—pp. 48–55
8.EE.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 $\sqrt{2}$ is irrational.	**Lesson 6** **Evaluate Square Roots and Cube Roots**—pp. 56–63
	Lesson 7 **Solve Simple Equations Involving Squares and Cubes**—pp. 64–71
8.EE.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 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.*	**Lesson 8** **Estimate and Compare Large or Small Quantities**—pp. 72–79

Expressions and Equations

Standards		Sadlier *Progress Mathematics*, Grade 8	
8.EE.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.	**Lesson 9**	**Calculate with Numbers in Scientific Notation**—pp. 80–87
Understand the connections between proportional relationships, lines, and linear equations.			
8.EE.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.*	**Lesson 10**	**Understand Proportional Relationships and Slope**—pp. 88–95
8.EE.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.	**Lesson 11**	**Understand Slope**—pp. 96–103
		Lesson 12	**Write Equations for Lines**—pp. 104–111
Analyze and solve linear equations and pairs of simultaneous linear equations.			
8.EE.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).	**Lesson 13**	**Solve Linear Equations**—pp. 112–119
	b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	**Lesson 13**	**Solve Linear Equations**—pp. 112–119

Expressions and Equations

Standards		Sadlier *Progress Mathematics*, Grade 8
8.EE.8	Analyze and solve pairs of simultaneous linear equations.	
	a. Understand that the solution to a pair of two linear equations in two variables correspond to point(s) of intersection of their graphs, because the point(s) of intersection satisfy both equations simultaneously.	**Lesson 14** **Solve Systems of Equations**—pp. 120–127
	b. Use graphs to find or estimate the solution to a pair of two simultaneous linear equations in two variables. Equations should include all three solution types: one solution, no solution, and infinitely many solutions. 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.*	**Lesson 14** **Solve Systems of Equations**—pp. 120–127
	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.* (Limit solutions to those that can be addressed by graphing.)	**Lesson 15** **Problem-Solving: Systems of Equations**—pp. 128–135

Functions

Standards		Sadlier *Progress Mathematics*, Grade 8
Define, evaluate, and compare functions.		
8.F.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. Function notation is not required in Grade 8.	**Lesson 16** **Understand Functions**—pp. 142–149 **Lesson 17** **Represent Functions**—pp. 150–157
8.F.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.*	**Lesson 17** **Represent Functions**—pp. 150–157 **Lesson 18** **Compare Functions**—pp. 158–165
8.F.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*	**Lesson 19** **Investigate Linear and Non-Linear Functions**—pp. 166–173

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Functions

Standards		Sadlier *Progress Mathematics*, Grade 8	
	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.		
Use functions to model relationships between quantities.			
8.F.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.	**Lesson 20**	**Use Functions to Model Relationships**—pp. 174–181
		Lesson 21	**Problem Solving: Use Linear Models**—pp. 182–189
8.F.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.	**Lesson 22**	**Analyze Graphs of Functions**—pp. 190–197

Geometry

Standards		Sadlier *Progress Mathematics*, Grade 8	
Understand congruence and similarity using physical models, transparencies, or geometry software.			
8.G.1	Verify experimentally the properties of rotations, reflections, and translations (include examples both with and without coordinates).		
	a. Lines are taken to lines, and line segments to line segments of the same length.	**Lesson 23**	**Verify Properties of Reflections and Translations**—pp. 204–211
		Lesson 24	**Verify Properties of Rotations**—pp. 212–219
	b. Angles are taken to angles of the same measure.	**Lesson 23**	**Verify Properties of Reflections and Translations**—pp. 204–211
		Lesson 24	**Verify Properties of Rotations**—pp. 212–219
	c. Parallel lines are taken to parallel lines.	**Lesson 23**	**Verify Properties of Reflections and Translations**—pp. 204–211
		Lesson 24	**Verify Properties of Rotations**—pp. 212–219

Geometry

Standards		Sadlier *Progress Mathematics*, Grade 8	
8.G.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. (Include examples both with and without coordinates.)	**Lesson 25**	**Understand and Identify Congruent Figures**—pp. 220–227
8.G.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	**Lesson 26**	**Reflect and Translate Figures on the Coordinate Plane**—pp. 228–235
		Lesson 27	**Rotate Figures on the Coordinate Plane**—pp. 236–243
		Lesson 28	**Dilate Figures on the Coordinate Plane**—pp. 244–251
8.G.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. (Include examples both with and without coordinates.)	**Lesson 29**	**Identify Similar Figures**—pp. 252–259
8.G.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.*	**Lesson 30**	**Establish Facts about Parallel Lines and Angles**—pp. 260–265
		Lesson 31	**Establish Facts about Triangles and Angles**—pp. 266–275
Understand and apply the Pythagorean Theorem.			
8.G.6	Analyze and justify an informal proof of the Pythagorean Theorem and its converse.	**Lesson 32**	**Understand the Pythagorean Theorem**—pp. 276–283
		Lesson 33	**Understand the Converse of the Pythagorean Theorem**—pp. 284–291
8.G.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	**Lesson 34**	**Problem Solving: The Pythagorean Theorem**—pp. 292–299
8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	**Lesson 35**	**Calculate Distances in the Coordinate Plane**—pp. 300–307

Geometry

Standards	Sadlier *Progress Mathematics*, Grade 8
Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	
8.G.9 Solve real-world and mathematical problems involving volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	**Lesson 36** **Learn and Apply Volume Formulas**—pp. 308–315

Statistics and Probability

Standards	Sadlier *Progress Mathematics*, Grade 8
Investigate patterns of association in bivariate data.	
8.SP.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. (GAISE Model, steps 3 and 4)	**Lesson 37** **Construct and Interpret Scatter Plots**—pp. 322–329
8.SP.2 Understand 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. (GAISE Model, steps 3 and 4)	**Lesson 38** **Fit Linear Models to Data**—pp. 330–337
8.SP.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.* (GAISE Model, steps 3 and 4)	**Lesson 39** **Problem Solving: Use Linear Models**—pp. 338–345
8.SP.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*	**Lesson 40** **Analyze Data in Two-Way Tables**—pp. 346–353

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Statistics and Probability

STANDARDS	SADLIER *PROGRESS MATHEMATICS*, GRADE 8
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?	