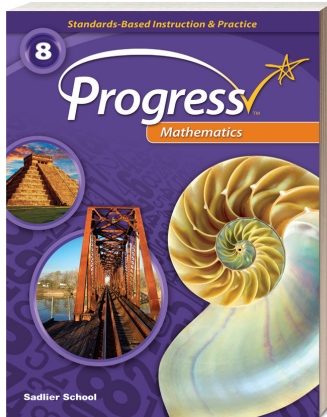SADLIER

Progress
Mathematics
Standards-Based Instruction & Practice

Aligned to the

South Carolina
College- and Career-Ready
Standards for Mathematics

Grade 8

Contents

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The Number System

STANDARDS	SADLIER *PROGRESS MATHEMATICS*, GRADE 8
The student will:	
8.NS.1 Explore the real number system and its appropriate usage in real-world situations.	
a. Recognize the differences between rational and irrational numbers.	**Lesson 1** **Understand Rational and Irrational Numbers**—pp. 10–17
b. Understand that all real numbers have a decimal expansion.	**Lesson 1** **Understand Rational and Irrational Numbers**—pp. 10–17
c. Model the hierarchy of the real number system, including natural, whole, integer, rational, and irrational numbers.	**Lesson 1** **Understand Rational and Irrational Numbers**—pp. 10–17
8.NS.2 Estimate and compare the value of irrational numbers by plotting them on a number line.	**Lesson 2** **Use Rational Approximations of Irrational Numbers**—pp. 18–25
8.NS.3 Extend prior knowledge to translate among multiple representations of rational numbers (fractions, decimal numbers, percentages). Include the conversion of repeating decimal numbers to fractions.	**Lesson 2** **Use Rational Approximations of Irrational Numbers**—pp. 18–25

Functions

STANDARDS	SADLIER *PROGRESS MATHEMATICS*, GRADE 8
The student will:	
8.F.1 Explore the concept of functions.	
a. Understand that a function assigns to each input exactly one output.	**Lesson 16** **Understand Functions**—pp. 142–149
b. Relate inputs (x-values or domain) and outputs (y-values or range) to independent and dependent variables.	**Lesson 17** **Represent Functions**—pp. 150–157
c. Translate among the multiple representations of a function, including mappings, tables, graphs, equations, and verbal descriptions.	**Lesson 17** **Represent Functions**—pp. 150–157
d. Determine if a relation is a function using multiple representations, including mappings, tables, graphs, equations, and verbal descriptions.	**Lesson 16** **Understand Functions**—pp. 142–149

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Functions

STANDARDS		SADLIER *PROGRESS MATHEMATICS*, GRADE 8
	e. Graph a function from a table of values. Understand that the graph and table both represent a set of ordered pairs of that function.	**Lesson 17** **Represent Functions**—pp. 150–157
8.F.2	Compare multiple representations of two functions, including mappings, tables, graphs, equations, and verbal descriptions, in order to draw conclusions.	**Lesson 18** **Compare Functions**—pp. 158–165
8.F.3	Investigate the differences between linear and nonlinear functions using multiple representations (i.e., tables, graphs, equations, and verbal descriptions).	
	a. Define an equation in slope-intercept form ($y = mx + b$) as being a linear function.	**Lesson 19** **Investigate Linear and Non-Linear Functions**—pp. 166–173
	b. Recognize that the graph of a linear function has a constant rate of change.	**Lesson 18** **Compare Functions**—pp. 158–165
	c. Provide examples of nonlinear functions.	**Lesson 19** **Investigate Linear and Non-Linear Functions**—pp. 166–173
8.F.4	Apply the concepts of linear functions to real-world and mathematical situations.	
	a. Understand that the slope is the constant rate of change and the y-intercept is the point where $x = 0$.	**Lesson 10** **Understand Proportional Relationships and Slope**—pp. 88–95
		Lesson 11 **Understand Slope**—pp. 96–103
	b. Determine the slope and the y-intercept of a linear function given multiple representations, including two points, tables, graphs, equations, and verbal descriptions.	**Lesson 19** **Investigate Linear and Non-Linear Functions**—pp. 166–173
		Lesson 20 **Use Functions to Model Relationships**—pp. 174–181
		Lesson 21 **Problem Solving: Use Linear Models**—pp. 182–189
	c. Construct a function in slope-intercept form that models a linear relationship between two quantities.	**Lesson 20** **Use Functions to Model Relationships**—pp. 174–181
		Lesson 21 **Problem Solving: Use Linear Models**—pp. 182–189
	d. Interpret the meaning of the slope and the y-intercept of a linear function in the context of the situation.	**Lesson 20** **Use Functions to Model Relationships**—pp. 174–181

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Standards		Sadlier *Progress Mathematics*, Grade 8
	e. Explore the relationship between linear functions and arithmetic sequences.	
8.F.5	Apply the concepts of linear and nonlinear functions to graphs in real-world and mathematical situations.	**Lesson 15** **Problem-Solving: Systems of Equations**—pp. 128–135
	a. Analyze and describe attributes of graphs of functions (e.g., constant, increasing/decreasing, linear/nonlinear, maximum/minimum, discrete/continuous).	**Lesson 22** **Analyze Graphs of Functions**—pp. 190–197
	b. Sketch the graph of a function from a verbal description.	**Lesson 22** **Analyze Graphs of Functions**—pp. 190–197
	c. Write a verbal description from the graph of a function with and without scales.	**Lesson 22** **Analyze Graphs of Functions**—pp. 190–197

Expressions, Equations, and Inequalities

Standards		Sadlier *Progress Mathematics*, Grade 8
The student will:		
8.EEI.1	Understand and apply the laws of exponents (i.e., product rule, quotient rule, power to a power, product to a power, quotient to a power, zero power property, negative exponents) to simplify numerical expressions that include integer exponents.	**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.EEI.2	Investigate concepts of square and cube roots.	
	a. Find the exact and approximate solutions to equations of the form $x^2 = p$ and $x^3 = p$ where p is a positive rational number.	**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
	b. Evaluate square roots of perfect squares.	**Lesson 6** **Evaluate Square Roots and Cube Roots**—pp. 56–63
		Lesson 7 **Solve Simple Equations Involving Squares and Cubes**—pp. 64–71
	c. Evaluate cube roots of perfect cubes.	**Lesson 6** **Evaluate Square Roots and Cube Roots**—pp. 56–63

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Expressions, Equations, and Inequalities

STANDARDS			SADLIER *PROGRESS MATHEMATICS*, GRADE 8	
			Lesson 7	**Solve Simple Equations Involving Squares and Cubes**—pp. 64–71
	d.	Recognize that square roots of non-perfect squares are irrational.	**Lesson 6**	**Evaluate Square Roots and Cube Roots**—pp. 56–63
8.EEI.3		Explore the relationship between quantities in decimal and scientific notation.		
	a.	Express very large and very small quantities in scientific notation in the form $a \times 10^b = p$ where $1 \le a < 10$ and b is an integer	**Lesson 8**	**Estimate and Compare Large or Small Quantities**—pp. 72–79
	b.	Translate between decimal notation and scientific notation.	**Lesson 9**	**Calculate with Numbers in Scientific Notation**—pp. 80–87
	c.	Estimate and compare the relative size of two quantities in scientific notation.	**Lesson 8**	**Estimate and Compare Large or Small Quantities**—pp. 72–79
8.EEI.4		Apply the concepts of decimal and scientific notation to solve real-world and mathematical problems.		
	a.	Multiply and divide numbers expressed in both decimal and scientific notation.	**Lesson 9**	**Calculate with Numbers in Scientific Notation**—pp. 80–87
	b.	Select appropriate units of measure when representing answers in scientific notation.	**Lesson 9**	**Calculate with Numbers in Scientific Notation**—pp. 80–87
	c.	Translate how different technological devices display numbers in scientific notation.	**Lesson 9**	**Calculate with Numbers in Scientific Notation**—pp. 80–87
8.EEI.5		Apply concepts of proportional relationships to real-world and mathematical situations.		
	a.	Graph proportional relationships.	**Lesson 10**	**Understand Proportional Relationships and Slope**—pp. 88–95
	b.	Interpret unit rate as the slope of the graph.	**Lesson 10**	**Understand Proportional Relationships and Slope**—pp. 88–95
	c.	Compare two different proportional relationships given multiple representations, including tables, graphs, equations, diagrams, and verbal descriptions.	**Lesson 10**	**Understand Proportional Relationships and Slope**—pp. 88–95
8.EEI.6		Apply concepts of slope and y-intercept to graphs, equations, and proportional relationships.		
	a.	Explain why the slope, m, is the same between any two distinct points on a nonvertical line using similar triangles.	**Lesson 11**	**Understand Slope**—pp. 96–103

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Expressions, Equations, and Inequalities

STANDARDS			SADLIER *PROGRESS MATHEMATICS*, GRADE 8	
	b.	Derive the slope-intercept form ($y = mx + b$) for a non-vertical line.	**Lesson 12**	**Write Equations for Lines**—pp. 104–111
	c.	Relate equations for proportional relationships ($y = kx$) with the slope-intercept form ($y = mx + b$) where $b = 0$.	**Lesson 12**	**Write Equations for Lines**—pp. 104–111
8.EEI.7		Extend concepts of linear equations and inequalities in one variable to more complex multi-step equations and inequalities in real-world and mathematical situations.		
	a.	Solve linear equations and inequalities with rational number coefficients that include the use of the distributive property, combining like terms, and variables on both sides.	**Lesson 13**	**Solve Linear Equations**—pp. 112–119
	b.	Recognize the three types of solutions to linear equations: one solution ($x = a$), infinitely many solutions ($a = a$), or no solutions ($a = b$).	**Lesson 13**	**Solve Linear Equations**—pp. 112–119
	c.	Generate linear equations with the three types of solutions	**Lesson 13**	**Solve Linear Equations**—pp. 112–119
	d.	Justify why linear equations have a specific type of solution.	**Lesson 13**	**Solve Linear Equations**—pp. 112–119
8.EEI.8		Investigate and solve real-world and mathematical problems involving systems of linear equations in two variables with integer coefficients and solutions.		
	a.	Graph systems of linear equations and estimate their point of intersection.	**Lesson 14**	**Solve Systems of Equations**—pp. 120–127
	b.	Understand and verify that a solution to a system of linear equations is represented on a graph as the point of intersection of the two lines.	**Lesson 14**	**Solve Systems of Equations**—pp. 120–127
	c.	Solve systems of linear equations algebraically, including methods of substitution and elimination, or through inspection.	**Lesson 14**	**Solve Systems of Equations**—pp. 120–127
	d.	Understand that systems of linear equations can have one solution, no solution, or infinitely many solutions.	**Lesson 14**	**Solve Systems of Equations**—pp. 120–127

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Geometry and Measurement

STANDARDS	SADLIER *PROGRESS MATHEMATICS*, GRADE 8
The student will:	
8.GM.1 Investigate the properties of rigid transformations (rotations, reflections, translations) using a variety of tools (e.g., grid paper, reflective devices, graphing paper, technology).	
a. Verify that lines are mapped to lines, including parallel lines.	**Lesson 23** **Verify Properties of Reflections and Translations**—pp. 204–211
	Lesson 24 **Verify Properties of Rotations**—pp. 212–219
b. Verify that corresponding angles are congruent.	**Lesson 23** **Verify Properties of Reflections and Translations**—pp. 204–211
	Lesson 24 **Verify Properties of Rotations**—pp. 212–219
c. Verify that corresponding line segments are congruent.	**Lesson 23** **Verify Properties of Reflections and Translations**—pp. 204–211
	Lesson 24 **Verify Properties of Rotations**—pp. 212–219
8.GM.2 Apply the properties of rigid transformations (rotations, reflections, translations).	
a. Rotate geometric figures 90, 180, and 270 degrees, both clockwise and counterclockwise, about the origin.	**Lesson 27** **Rotate Figures on the Coordinate Plane**—pp. 236–243
b. Reflect geometric figures with respect to the x-axis and/or y-axis.	**Lesson 26** **Reflect and Translate Figures on the Coordinate Plane**—pp. 228–235
c. Translate geometric figures vertically and/or horizontally.	**Lesson 26** **Reflect and Translate Figures on the Coordinate Plane**—pp. 228–235
d. Recognize that two-dimensional figures are only congruent if a series of rigid transformations can be performed to map the pre-image to the image.	**Lesson 25** **Understand and Identify Congruent Figures**—pp. 220–227
e. Given two congruent figures, describe the series of rigid transformations that justifies this congruence.	**Lesson 25** **Understand and Identify Congruent Figures**—pp. 220–227

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Geometry and Measurement

STANDARDS			SADLIER *PROGRESS MATHEMATICS*, GRADE 8	
8.GM.3	Investigate the properties of transformations (rotations, reflections, translations, dilations) using a variety of tools (e.g., grid paper, reflective devices, graphing paper, dynamic software).			
	a.	Use coordinate geometry to describe the effect of transformations on two-dimensional figures.	**Lesson 23**	**Verify Properties of Reflections and Translations**—pp. 204–211
			Lesson 24	**Verify Properties of Rotations**—pp. 212–219
			Lesson 25	**Understand and Identify Congruent Figures**—pp. 220–227
	b.	Relate scale drawings to dilations of geometric figures.	**Lesson 28**	**Dilate Figures on the Coordinate Plane**—pp. 244–251
			Lesson 29	**Identify Similar Figures**—pp. 252–259
8.GM.4	Apply the properties of transformations (rotations, reflections, translations, dilations).			
	a.	Dilate geometric figures using scale factors that are positive rational numbers.	**Lesson 28**	**Dilate Figures on the Coordinate Plane**—pp. 244–251
	b.	Recognize that two-dimensional figures are only similar if a series of transformations can be performed to map the pre-image to the image.	**Lesson 29**	**Identify Similar Figures**—pp. 252–259
	c.	Given two similar figures, describe the series of transformations that justifies this similarity.	**Lesson 29**	**Identify Similar Figures**—pp. 252–259
	d.	Use proportional reasoning to find the missing side lengths of two similar figures	**Lesson 29**	**Identify Similar Figures**—pp. 252–259
8.GM.5	Extend and apply previous knowledge of angles to properties of triangles, similar figures, and parallel lines cut by a transversal.			
	a.	Discover that the sum of the three angles in a triangle is 180 degrees.	**Lesson 31**	**Establish Facts about Triangles and Angles**—pp. 266–275
	b.	Discover and use the relationship between interior and exterior angles of a triangle.	**Lesson 31**	**Establish Facts about Triangles and Angles**—pp. 266–275
	c.	Identify congruent and supplementary pairs of angles when two parallel lines are cut by a transversal.	**Lesson 30**	**Establish Facts about Parallel Lines and Angles**—pp. 260–265
	d.	Recognize that two similar figures have congruent corresponding angles.	**Lesson 30**	**Establish Facts about Parallel Lines and Angles**—pp. 260–265

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Geometry and Measurement

STANDARDS		SADLIER *PROGRESS MATHEMATICS*, GRADE 8	
		Lesson 31	**Establish Facts about Triangles and Angles**—pp. 266–275
8.GM.6	Use models to demonstrate a 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.GM.7	Apply the Pythagorean Theorem to model and solve real-world and mathematical problems in two and three dimensions involving right triangles.	**Lesson 34**	**Problem Solving: The Pythagorean Theorem**—pp. 292–299
8.GM.8	Find the distance between any two points in the coordinate plane using the Pythagorean Theorem.	**Lesson 35**	**Calculate Distances in the Coordinate Plane**—pp. 300–307
8.GM.9	Solve real-world and mathematical problems involving volumes of cones, cylinders, and spheres and the surface area of cylinders.	**Lesson 36**	**Learn and Apply Volume Formulas**—pp. 308–315

Data Analysis, Statistics, and Probability

STANDARDS		SADLIER *PROGRESS MATHEMATICS*, GRADE 8	
The student will:			
8.DSP.1	Investigate bivariate data.		
	a. Collect bivariate data.	**Lesson 37**	**Construct and Interpret Scatter Plots**—pp. 322–329
	b. Graph the bivariate data on a scatter plot	**Lesson 37**	**Construct and Interpret Scatter Plots**—pp. 322–329
	c. Describe patterns observed on a scatter plot, including clustering, outliers, and association (positive, negative, no correlation, linear, nonlinear).	**Lesson 37**	**Construct and Interpret Scatter Plots**—pp. 322–329
8.DSP.2	Draw an approximate line of best fit on a scatter plot that appears to have a linear association and informally assess the fit of the line to the data points.	**Lesson 38**	**Fit Linear Models to Data**—pp. 330–337
8.DSP.3	Apply concepts of an approximate line of best fit in real-world situations.		
	a. Find an approximate equation for the line of best fit using two appropriate data points.	**Lesson 38**	**Fit Linear Models to Data**—pp. 330–337

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Data Analysis, Statistics, and Probability

STANDARDS			SADLIER *PROGRESS MATHEMATICS*, GRADE 8	
	b.	Interpret the slope and intercept.	**Lesson 39**	**Problem Solving: Use Linear Models**—pp. 338–345
	c.	Solve problems using the equation.	**Lesson 39**	**Problem Solving: Use Linear Models**—pp. 338–345
8.DSP.4		Investigate bivariate categorical data in two-way tables.		
	a.	Organize bivariate categorical data in a two-way table.	**Lesson 40**	**Analyze Data in Two-Way Tables**—pp. 346–353
	b.	Interpret data in two-way tables using relative frequencies.	**Lesson 40**	**Analyze Data in Two-Way Tables**—pp. 346–353
	c.	Explore patterns of possible association between the two categorical variables.	**Lesson 40**	**Analyze Data in Two-Way Tables**—pp. 346–353
8.DSP.5		Organize data in matrices with rational numbers and apply to real-world and mathematical situations.		
	a.	Understand that a matrix is a way to organize data.		
	b.	Recognize that a $m \times n$ matrix has m rows and n columns.		
	c.	Add and subtract matrices of the same size		
	d.	Multiply a matrix by a scalar.		