Pennsylvania Common Core Standards for Mathematics [JAN. 2013]

Common Core State Standards for Mathematics

SADLIER

Common Core Progress Mathematics

Crosswalk

Grade 8

Contents

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2.1 Numbers and Operations

(E) The Number System

PA Common Core Standards for Mathematics, Grade 8	Common Core State Standards for Mathematics, Grade 8	Sadlier *Common Core Progress Mathematics*, Grade 8
CC.2.1.8.E.1 Distinguish between rational and irrational numbers using their properties.	**8.NS.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.	**Lesson 1** **Understand Rational and Irrational Numbers**—pp. 10–17
CC.2.1.8.E.4 Estimate irrational numbers by comparing them to rational numbers.	**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 √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.*	**Lesson 2** **Use Rational Approximations of Irrational Numbers**—pp. 18–25

2.2 Algebraic Concepts

(B) Expressions & Equations

PA Common Core Standards for Mathematics, Grade 8	Common Core State Standards for Mathematics, Grade 8	Sadlier *Common Core Progress Mathematics*, Grade 8
CC.2.2.8.B.1 Apply concepts of radicals and integer exponents to generate equivalent expressions.	**8.EE.1** Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, 32 × 3–5 = 3–3 = 1/33 = 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

2.2 Algebraic Concepts

(B) Expressions & Equations

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	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 √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
CC.2.2.8.B.1 Apply concepts of radicals and integer exponents to generate equivalent expressions.	**8.EE.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.*	**Lesson 8** **Estimate and Compare Large or Small Quantities**—pp. 72–79
	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	**Lesson 9** **Calculate with Numbers in Scientific Notation**—pp. 80–87
CC.2.2.8.B.2 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

2.2 Algebraic Concepts

(B) Expressions & Equations

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	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
CC.2.2.8.B.3 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
	8.EE.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.	**Lesson 14** **Solve Systems of Equations**—pp. 120–127

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	b. 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.*	**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.	**Lesson 15** **Problem-Solving: Systems of Equations**—pp. 128–135

2.2 Algebraic Concepts

(C) Numbers and Operations—Fractions

PA Common Core Standards for Mathematics, Grade 8	Common Core State Standards for Mathematics, Grade 8	Sadlier *Common Core Progress Mathematics*, Grade 8
CC.2.1.8.C.1 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.	**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

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(C) Numbers and Operations—Fractions

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	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 = s2 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.*	**Lesson 19** **Investigate Linear and Non-Linear Functions**—pp. 166–173
CC.2.1.8.C.2 Use concepts of 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

2.3 Geometry

(A) Geometry

PA Common Core Standards for Mathematics, Grade 8	Common Core State Standards for Mathematics, Grade 8	Sadlier *Common Core Progress Mathematics*, Grade 8
CC.2.3.8.A.1 Understand and apply congruence and similarity using various tools.	**8.G.1** Verify experimentally the properties of rotations, reflections, and translations:	
	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
	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.	**Lesson 25** **Understand and Identify Congruent Figures**—pp. 220–227

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(A) Geometry

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	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.	**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
CC.2.3.8.A.2 Understand and apply the Pythagorean Theorem to solve problems.	**8.G.6** Explain 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

2.3 Geometry

(A) Geometry

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	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
CC.2.3.8.A.3 Apply the concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems.	**8.G.9** Know the formulas for the 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

2.4 Measurement, Data, and Probability

(B) Statistics and Probability

PA Common Core Standards for Mathematics, Grade 8	Common Core State Standards for Mathematics, Grade 8	Sadlier *Common Core Progress Mathematics*, Grade 8
CC.2.4.8.B.1 Analyze and/or interpret bivariate data displayed in multiple representations.	**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.	**Lesson 37** **Construct and Interpret Scatter Plots**—pp. 322–329
	8.SP.2 Know that straight lines are widely used to model relationships between two quantitative variables. For	**Lesson 38** **Fit Linear Models to Data**—pp. 330–337

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(B) Statistics and Probability

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	– continued from previous page – 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.	
	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.*	**Lesson 39** **Problem Solving: Use Linear Models**—pp. 338–345
CC.2.4.8.B.2 Understand that patterns of association can be seen in bivariate data utilizing frequencies.	**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 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?*	**Lesson 40** **Analyze Data in Two-Way Tables**—pp. 346–353