SADLIER

Common Core Progress Mathematics

Aligned to the

Colorado Academic Standards in Mathematics

Sixth Grade

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Standard: 1. Number Sense, Properties, and Operations

Prepared Graduates:

- Make both relative (multiplicative) and absolute (arithmetic) comparisons between quantities. Multiplicative thinking underlies proportional reasoning

Concepts and skills students master:

1. Quantities can be expressed and compared using ratios and rates

Sixth Grade Evidence Outcomes	Sadlier Common Core Progress Mathematics, Grade 6
Students can:	
a. Apply the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.[1] (CCSS: 6.RP.1) [1]For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."	**Lesson 1** **Understand Ratios and Unit Rates**—pp. 10–17
b. Apply the concept of a unit rate *a/b* associated with a ratio *a:b* with $b \neq 0$, and use rate language in the context of a ratio relationship.[2] (CCSS: 6.RP.2) [2]For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."	**Lesson 1** **Understand Ratios and Unit Rates**—pp. 10–17
c. Use ratio and rate reasoning to solve real-world and mathematical problems.[3] (CCSS: 6.RP.3) [3]e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.	**Lesson 8** **Problem Solving: Ratios and Rates**—pp. 66–73
i. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. (CCSS: 6.RP.3a)	**Lesson 2** **Use Ratio Tables to Find Equivalent Ratios**—pp. 18–25 **Lesson 3** **Use Ratio Tables to Compare Ratios**—pp. 26–33
ii. Use tables to compare ratios. (CCSS: 6.RP.3a)	**Lesson 2** **Use Ratio Tables to Find Equivalent Ratios**—pp. 18–25 **Lesson 3** **Use Ratio Tables to Compare Ratios**—pp. 26–33
iii. Solve unit rate problems including those involving unit pricing and constant speed.[4] (CCSS: 6.RP.3b) [4]For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?	**Lesson 4** **Solve Unit Rate Problems**—pp. 34–41
iv. Find a percent of a quantity as a rate per 100.[5] (CCSS: 6.RP.3c) [5]e.g., 30% of a quantity means 30/100 times the quantity.	**Lesson 5** **Calculate a Percent of a Quantity**—pp. 42–49 **Lesson 6** **Find the Whole Given a Part and the Percent**—pp. 50–57

Sixth Grade Evidence Outcomes	Sadlier Common Core Progress Mathematics, Grade 6	
v. Solve problems involving finding the whole, given a part and the percent. (CCSS: 6.RP.3c)	**Lesson 5**	**Powers of 10: Use Patterns and Whole-Number Exponents**—pp. 48–55
vi. Use common fractions and percents to calculate parts of whole numbers in problem situations including comparisons of savings rates at different financial institutions (PFL)	**Lesson 6**	**Find the Whole Given a Part and the Percent**—pp. 50–57
vii. Express the comparison of two whole number quantities using differences, part-to-part ratios, and part-to-whole ratios in real contexts, including investing and saving (PFL)	**Lesson 3**	**Use Ratio Tables to Compare Ratios**—pp. 26–33
viii. Use ratio reasoning to convert measurement units.[6] (CCSS: 6.RP.3d) [6]manipulate and transform units appropriately when multiplying or dividing quantities.	**Lesson 7**	**Convert Measurement Units**—pp. 58–65

Standard: 1. Number Sense, Properties, and Operations

Prepared Graduates:

- Are fluent with basic numerical and symbolic facts and algorithms, and are able to select and use appropriate (mental math, paper and pencil, and technology) methods based on an understanding of their efficiency, precision, and transparency

Concepts and skills students master:

2. Formulate, represent, and use algorithms with positive rational numbers with flexibility, accuracy, and efficiency

Sixth Grade Evidence Outcomes	Sadlier Common Core Progress Mathematics, Grade 6	
Students can:		
a. Fluently divide multi-digit numbers using standard algorithms. (CCSS: 6.NS.2)	**Lesson 11**	**Divide Multi-digit Numbers**—pp. 96–103
b. Fluently add, subtract, multiply, and divide multi-digit decimals using standard algorithms for each operation. (CCSS: 6.NS.3)	**Lesson 12**	**Add and Subtract Multi-digit Decimals**—pp. 104–111
	Lesson 13	**Multiply and Divide Multi-digit Decimals**—pp. 112–119
c. Find the greatest common factor of two whole numbers less than or equal to 100. (CCSS: 6.NS.4)	**Lesson 14**	**Find the Greatest Common Factor and Least Common Multiple**—pp. 120–127
d. Find the least common multiple of two whole numbers less than or equal to 12. (CCSS: 6.NS.4)	**Lesson 14**	**Find the Greatest Common Factor and Least Common Multiple**—pp. 120–127
e. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.[7] (CCSS: 6.NS.4) [7]For example, express 36 + 8 as 4 (9 + 2).	**Lesson 14**	**Find the Greatest Common Factor and Least Common Multiple**—pp. 120–127

Sixth Grade Evidence Outcomes	Sadlier Common Core Progress Mathematics, Grade 6
f. Interpret and model quotients of fractions through the creation of story contexts.[8] (CCSS: 6.NS.1) [8]For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3.	**Lesson 9** **Divide a Fraction by a Fraction**—pp. 80–87 **Lesson 10** **Problem Solving: Fraction Division**—pp. 88–95
g. Compute quotients of fractions.[9] (CCSS: 6.NS.1) [9]In general, (*a*/*b*) ÷ (*c*/*d*) = *ad*/*bc*.).	**Lesson 9** **Divide a Fraction by a Fraction**—pp. 80–87 **Lesson 10** **Problem Solving: Fraction Division**—pp. 88–95
h. Solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.[10] (CCSS: 6.NS.1) [10]How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?	**Lesson 9** **Divide a Fraction by a Fraction**—pp. 80–87 **Lesson 10** **Problem Solving: Fraction Division**—pp. 88–95

Standard: 1. Number Sense, Properties, and Operations

Prepared Graduates:

- Understand the structure and properties of our number system. At their most basic level numbers are abstract symbols that represent real-world quantities

Concepts and skills students master:

3. In the real number system, rational numbers have a unique location on the number line and in space

Sixth Grade Evidence Outcomes	Sadlier Common Core Progress Mathematics, Grade 6
Students can:	
a. Explain why positive and negative numbers are used together to describe quantities having opposite directions or values.[11] (CCSS: 6.NS.5) [11]e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge).	
i. Use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (CCSS: 6.NS.5)	**Lesson 15** **Understand Positive and Negative Numbers and Opposites**—pp. 128–135
b. Use number line diagrams and coordinate axes to represent points on the line and in the plane with negative number coordinates.[12] (CCSS: 6.NS.6) [12]Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane	
i. Describe a rational number as a point on the number line. (CCSS: 6.NS.6)	**Lesson 16** **Locate Points with Rational Coordinates**—pp. 136–143

Sixth Grade Evidence Outcomes	Sadlier Common Core Progress Mathematics, Grade 6
ii. Use opposite signs of numbers to indicate locations on opposite sides of 0 on the number line. (CCSS: 6.NS.6a)	**Lesson 15** **Understand Positive and Negative Numbers and Opposites**—pp. 128–135
iii. Identify that the opposite of the opposite of a number is the number itself.[13] (CCSS: 6.NS.6a) [13]e.g., –(–3) = 3, and that 0 is its own opposite.	**Lesson 15** **Understand Positive and Negative Numbers and Opposites**—pp. 128–135
iv. Explain when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. (CCSS: 6.NS.6b)	**Lesson 16** **Locate Points with Rational Coordinates**—pp. 136–143
v. Find and position integers and other rational numbers on a horizontal or vertical number line diagram. (CCSS: 6.NS.6c)	**Lesson 16** **Locate Points with Rational Coordinates**—pp. 136–143
vi. Find and position pairs of integers and other rational numbers on a coordinate plane. (CCSS: 6.NS.6c)	**Lesson 16** **Locate Points with Rational Coordinates**—pp. 136–143
c. Order and find absolute value of rational numbers. (CCSS: 6.NS.7)	
i. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.[14] (CCSS: 6.NS.7a) [14]For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.	**Lesson 17** **Compare and Order Rational Numbers**—pp. 144–151
ii. Write, interpret, and explain statements of order for rational numbers in real-world contexts.[15] (CCSS: 6.NS.7b) [15]For example, write –3 °C > –7 °C to express the fact that –3 °C is warmer than –7 °C.	**Lesson 17** **Compare and Order Rational Numbers**—pp. 144–151
iii. Define the absolute value of a rational number as its distance from 0 on the number line and interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.[16] (CCSS: 6.NS.7c) [16]For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.	**Lesson 18** **Understand Absolute Value**—pp. 152–159
iv. Distinguish comparisons of absolute value from statements about order.[17] (CCSS: 6.NS.7d) [17]For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.	**Lesson 18** **Understand Absolute Value**—pp. 152–159
d. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane including the use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. (CCSS: 6.NS.8)	**Lesson 19** **Problem Solving: The Coordinate Plane**—pp. 160–167

Standard: 2. Patterns, Functions, and Algebraic Structures

Prepared Graduates:

- Make claims about relationships among numbers, shapes, symbols, and data and defend those claims by relying on the properties that are the structure of mathematics

Concepts and skills students master:

1. Algebraic expressions can be used to generalize properties of arithmetic

Sixth Grade Evidence Outcomes	Sadlier Common Core Progress Mathematics, Grade 6
Students can:	
a. Write and evaluate numerical expressions involving whole-number exponents. (CCSS: 6.EE.1)	**Lesson 20** **Write and Evaluate Numerical Expressions with Exponents** —pp. 174–181
b. Write, read, and evaluate expressions in which letters stand for numbers. (CCSS: 6.EE.2)	
i. Write expressions that record operations with numbers and with letters standing for numbers.[1] (CCSS: 6.EE.2a) [1]For example, express the calculation "Subtract y from 5" as 5 – *y*.	**Lesson 21** **Write Algebraic Expressions to Record Operations**—pp. 182–189
ii. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient) and describe one or more parts of an expression as a single entity.[2] (CCSS: 6.EE.2b) [2]For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.	**Lesson 22** **Identify Parts of an Expression**—pp. 190–197
iii. Evaluate expressions at specific values of their variables including expressions that arise from formulas used in real-world problems.[3] (CCSS: 6.EE.2c) [3]For example, use the formulas $V = s^3$ and $A = 6\ s^2$ to find the volume and surface area of a cube with sides of length $s = 1/2$.	**Lesson 23** **Evaluate Algebraic Expressions**—pp. 198–205
iv. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). (CCSS: 6.EE.2c)	**Lesson 23** **Evaluate Algebraic Expressions**—pp. 198–205
c. Apply the properties of operations to generate equivalent expressions.[4] (CCSS: 6.EE.3) [4]For example, apply the distributive property to the expression 3 (2 + *x*) to produce the equivalent expression 6 + 3*x*; apply the distributive property to the expression 24*x* + 18*y* to produce the equivalent expression 6 (4*x* + 3*y*); apply properties of operations to *y* + *y* + *y* to produce the equivalent expression 3*y*.	**Lesson 24** **Generate and Identify Equivalent Expressions**—pp. 206–213

Sixth Grade Evidence Outcomes	Sadlier Common Core Progress Mathematics, Grade 6
d. Identify when two expressions are equivalent.[5] (CCSS: 6.EE.4) [5]i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions $y + y + y$ and $3y$ are equivalent because they name the same number regardless of which number y stands for. Reason about and solve one-variable equations and inequalities.	**Lesson 24** **Generate and Identify Equivalent Expressions**—pp. 206–213

Standard: 2. Patterns, Functions, and Algebraic Structures

Prepared Graduates:

- Make claims about relationships among numbers, shapes, symbols, and data and defend those claims by relying on the properties that are the structure of mathematics

Concepts and skills students master:

2. Variables are used to represent unknown quantities within equations and inequalities

Sixth Grade Evidence Outcomes	Sadlier Common Core Progress Mathematics, Grade 6
Students can:	
a. Describe solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? (CCSS: 6.EE.5)	**Lesson 25** **Identify Solutions to Equations and Inequalities**—pp. 214–221
b. Use substitution to determine whether a given number in a specified set makes an equation or inequality true. (CCSS: 6.EE.5)	**Lesson 25** **Identify Solutions to Equations and Inequalities**—pp. 214–221
c. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem. (CCSS: 6.EE.6)	
i. Recognize that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (CCSS: 6.EE.6)	**Lesson 26** **Write Algebraic Expressions to Represent Problems**—pp. 222–229
d. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers. (CCSS: 6.EE.7)	**Lesson 27** **Solve Equations of the Form x + p = q**—pp. 230–237 **Lesson 28** **Solve Equations of the Form px = q**—pp. 238–245
e. Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. (CCSS: 6.EE.8)	**Lesson 29** **Graph Solutions to Inequalities**—pp. 246–253
f. Show that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams. (CCSS: 6.EE.8)	**Lesson 29** **Graph Solutions to Inequalities**—pp. 246–253

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g. Represent and analyze quantitative relationships between dependent and independent variables. (CCSS: 6.EE)	
i. Use variables to represent two quantities in a real-world problem that change in relationship to one another. (CCSS: 6.EE.9)	**Lesson 30** **Represent Relationships Between Variables**—pp. 254–261
ii. Write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. (CCSS: 6.EE.9)	**Lesson 30** **Represent Relationships Between Variables**—pp. 254–261
iii. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.[6] (CCSS: 6.EE.9) [6]For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d = 65t$ to represent the relationship between distance and time.	**Lesson 30** **Represent Relationships Between Variables**—pp. 254–261

Standard: 3. Data Analysis, Statistics, and Probability

Prepared Graduates:

- Solve problems and make decisions that depend on understanding, explaining, and quantifying the variability in data

Concepts and skills students master:

1. Visual displays and summary statistics of one-variable data condense the information in data sets into usable knowledge

Sixth Grade Evidence Outcomes	Sadlier Common Core Progress Mathematics, Grade 6
Students can:	
a. Identify a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.[1] (CCSS: 6.SP.1) [1]For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.	**Lesson 36** **Understand Statistical Questions and Describe Data**—pp. 314–321
b. Demonstrate that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. (CCSS: 6.SP.2)	**Lesson 36** **Understand Statistical Questions and Describe Data**—pp. 314–321 **Lesson 37** **Find the Median and Interquartile Range**—pp. 322–329
c. Explain that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. (CCSS: 6.SP.3)	**Lesson 37** **Find the Median and Interquartile Range**—pp. 322–329 **Lesson 38** **Find the Mean and Mean Absolute Deviation**—pp. 330–337

Sixth Grade Evidence Outcomes	Sadlier Common Core Progress Mathematics, Grade 6
d. Summarize and describe distributions.(CCSS: 6.SP)	
i. Display numerical data in plots on a number line, including dot plots, histograms, and box plots. (CCSS: 6.SP.4)	**Lesson 39** **Display Numerical Data**—pp. 338–345
ii. Summarize numerical data sets in relation to their context. (CCSS: 6.SP.5)	
1. Report the number of observations. (CCSS: 6.SP.5a)	**Lesson 40** **Summarize Numerical Data**—pp. 346–353
2. Describe the nature of the attribute under investigation, including how it was measured and its units of measurement. (CCSS: 6.SP.5b)	**Lesson 40** **Summarize Numerical Data**—pp. 346–353
3. Give quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. (CCSS: 6.SP.5c)	**Lesson 40** **Summarize Numerical Data**—pp. 346–353
4. Relate the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. (CCSS: 6.SP.5d)	**Lesson 40** **Summarize Numerical Data**—pp. 346–353

Standard: 4. Shape, Dimension, and Geometric Relationships

Prepared Graduates:

- Make claims about relationships among numbers, shapes, symbols, and data and defend those claims by relying on the properties that are the structure of mathematics

Concepts and skills students master:

1. Objects in space and their parts and attributes can be measured and analyzed

Sixth Grade Evidence Outcomes	Sadlier Common Core Progress Mathematics, Grade 6
Students can:	
a. Develop and apply formulas and procedures for area of plane figures.	
i. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes. (CCSS: 6.G.1)	**Lesson 31** **Find Areas of Parallelograms and Triangles**—pp. 268–275 **Lesson 32** **Find Areas of Polygons**—pp. 276–283

Sixth Grade Evidence Outcomes	Sadlier Common Core Progress Mathematics, Grade 6
ii. Apply these techniques in the context of solving real-world and mathematical problems. (CCSS: 6.G.1)	**Lesson 31** **Find Areas of Parallelograms and Triangles**—pp. 268–275
	Lesson 32 **Find Areas of Polygons**—pp. 276–283
b. Develop and apply formulas and procedures for volume of regular prisms.	
i. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths. (CCSS: 6.G.2)	**Lesson 33** **Find Volumes of Rectangular Prisms**—pp. 284–291
ii. Show that volume is the same as multiplying the edge lengths of a rectangular prism. (CCSS: 6.G.2)	**Lesson 33** **Find Volumes of Rectangular Prisms**—pp. 284–291
iii. Apply the formulas $V = l\,w\,h$ and $V = b\,h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. (CCSS: 6.G.2)	**Lesson 33** **Find Volumes of Rectangular Prisms**—pp. 284–291
c. Draw polygons in the coordinate plan to solve real-world and mathematical problems. (CCSS: 6.G.3)	
i. Draw polygons in the coordinate plane given coordinates for the vertices.	**Lesson 34** **Plot and Analyze Polygons in the Coordinate Plane**—pp. 292–299
ii. Use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. (CCSS: 6.G.3)	**Lesson 34** **Plot and Analyze Polygons in the Coordinate Plane**—pp. 292–299
d. Develop and apply formulas and procedures for the surface area.	
i. Represent three-dimensional figures using nets made up of rectangles and triangles. (CCSS: 6.G.4)	**Lesson 35** **Use Nets to Find Surface Area**—pp. 300–307
ii. Use nets to find the surface area of figures. (CCSS: 6.G.4)	**Lesson 35** **Use Nets to Find Surface Area**—pp. 300–307
iii. Apply techniques for finding surface area in the context of solving real-world and mathematical problems. (CCSS: 6.G.4)	**Lesson 35** **Use Nets to Find Surface Area**—pp. 300–307