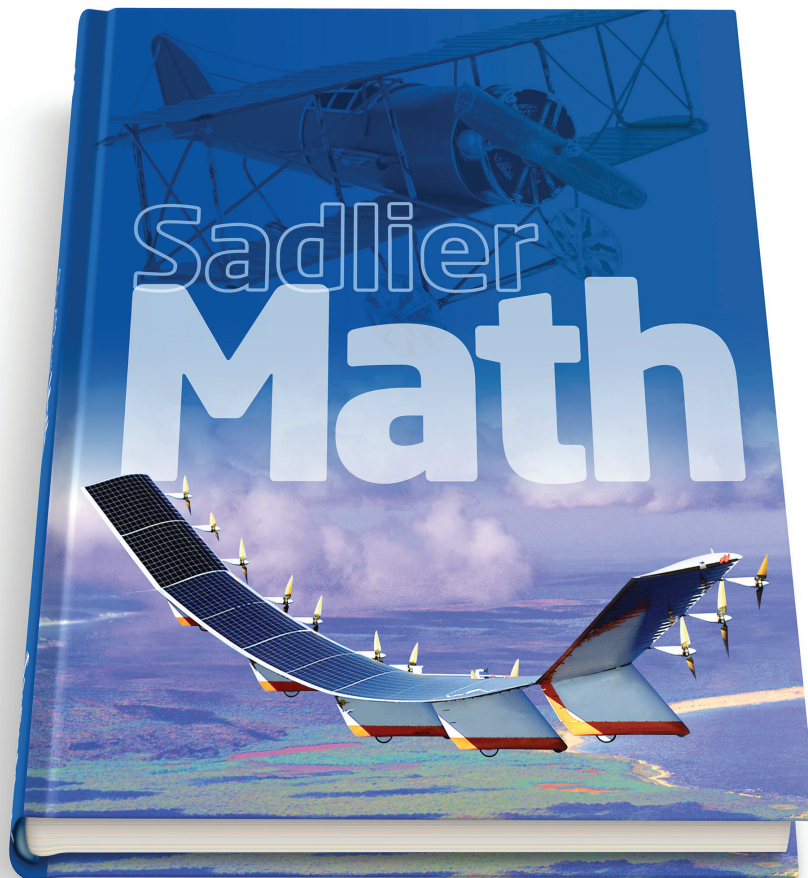# Sadlier Math™

Correlation to the Archdiocese of New York Mathematics Learning Standards

Grade 5

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OPERATIONS AND ALGEBRAIC THINKING — 5.OA

Grade 5 Content Standards	*Sadlier Math*, Grade 5

Write and interpret numerical expressions.

5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. This standard calls for students to evaluate expressions with parenthesis and brackets and braces. In upper levels evaluate means to substitute for a variable and simplify the expression. However, at this level, students are only to simplify the expressions because there is no variable (an unknown that is represented by a letter). Students need to solve what is in the parenthesis first, then the brackets, and then the braces.	**Chapter 2: 2-2** **Chapter 3: 3-1** **Chapter 4: 4-10 & 4-11** **Chapter 7: 7-2** **Chapter 12: 12-7 & 12-8**
5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. This standard refers to expressions. Expressions are a series of numbers and symbols (+, -, x) without any equals sign. 4(5 + 3) is an expression. 4(5 + 3) = 32 is an equation. Equations results when two expressions are set equal to each other. For example, (2 + 3 = 4 + 1). This standard calls for students to verbally describe the relationship between expressions without actually calculating them. This standard calls for students to apply their reasoning of the four operations as well as place value while describing the relationship between numbers. The standard does not include the use of variables, only numbers and signs for operations.	**Chapter 1: 1-5 through 1-7** **Chapter 3: 3-2 & 3-3** **Chapter 4: 4-10 & 4-11**

Analyze patterns and relationships.

5.OA.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence *continued*	**Chapter 17: 17-5 through 17-7**

OPERATIONS AND ALGEBRAIC THINKING 5.OA

Grade 5 Content Standards	*Sadlier Math*, Grade 5
are twice the corresponding terms in the other sequence. Explain informally why this is so. This standard extends work from fourth grade, where students generate numerical patterns when given a rule. In fifth grade, students are given two rules and generate two numerical patterns. The graphs that should be created should be line graphs to represent the pattern. This is a linear function, which is why we get straight lines.	

NUMBER AND OPERATIONS IN BASE TEN 5.NBT

Grade 5 Content Standards	*Sadlier Math*, Grade 5

Understand the place value system.

Grade 5 Content Standards	*Sadlier Math*, Grade 5
5.NBT.1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. This standard calls for students to reason about the magnitude of numbers. Students should work with the idea that the tens place is ten times as much as the ones place and the ones place is 1/10th the size of the tens place.	**Chapter 1: 1-1, 1-2 & 1-4**
5.NBT.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of ten. Whole number exponents denote powers of ten. Multiplying by a power of ten shifts the digits of a whole number or decimal that many places to the left.	**Chapter 1: 1-3 & 1-4** **Chapter 12: 12-1** **Chapter 13: 13-1**

NUMBER AND OPERATIONS IN BASE TEN 5.NBT

Grade 5 Content Standards	*Sadlier Math*, Grade 5

5.NBT.3 Read, write, and compare decimals to thousandths.

This standard references expanded form of decimals with fractions included. Students read decimals using fractional language and write decimals in fractional form, as well as in expanded notation. This leads to understanding equivalence of decimals (0.8 = .80 = .800). Students should begin to understand the size of decimals and relate them to common benchmarks such as 0.5, .50, and .500.

5.NBT.3a Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.	**Chapter 2: 2-1**
5.NBT.3b Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	**Chapter 2: 2-3** **Chapter 13: 13-3 through 13-5**
5.NBT.4 Use place value understanding to round decimals to any place. This standard refers to rounding. The expectation is that students have a deep understanding of place value and number sense and can explain and reason about the answers they get when rounding.	**Chapter 2: 2-4 through 2-6** **Chapter 10: 10-3** **Chapter 11: 11-2**

Perform operations with multi-digit whole numbers and with decimals to hundredths.

5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm. This standard refers to fluency, which means accuracy (correct answers), efficiency (a reasonable amount of steps), and flexibility (using diverse strategies). This standard builds on students' understanding of multiplication in the lower grades and the use of alternative strategies	**Chapter 3: 3-4 through 3-8**
5.NBT.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/ or the relationship between multiplication and division. Illustrate and explain the calculation by *continued*	**Chapter 4: 4-1 through 4-9**

NUMBER AND OPERATIONS IN BASE TEN   5.NBT

Grade 5 Content Standards	*Sadlier Math*, Grade 5
using equations, rectangular arrays, and/or area models. This standard references various strategies for division that includes remainders. Make sure students are exposed to problems where the divisor is the number of groups and where the divisor is the size of the groups.	
5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. General methods applied to computing with whole numbers are applied to decimals. This work should concentrate on concrete models and pictorial representations. Before students give an exact answer they should estimate answers based on their understanding of place value and operations.	**Chapter 10: 10-1 through 10-7** **Chapter 11: 11-1 through 11-6** **Chapter 12: 12-2 through 12-9** **Chapter 13: 13-1, 13-2, 13-5 through 13-10**

NUMBER AND OPERATIONS — FRACTIONS   5.NF

Grade 5 Content Standards	*Sadlier Math*, Grade 5
Use equivalent fractions as a strategy to add and subtract fractions.	
5.NF.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. Students need to find a common denominator before they can add or subtract fractions with unlike denominators. For example: $2/3 + 5/4 = 8/12 + 15/12 = 23/12$.	**Chapter 6: 6-1 through 6-6** **Chapter 7: 7-1, 7-2, 7-4, 7-6 through 7-8**

NUMBER AND OPERATIONS — FRACTIONS   5.NF

Grade 5 Content Standards	*Sadlier Math*, Grade 5
5.NF.2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2. This standard refers to number sense, which means students' understanding of fractions as whole numbers that lie between whole numbers on a number line. Number sense in fractions also means moving between decimals and fractions to find equivalents, also being able to reason that 7/8 is greater than 3/4 because 7/8 is missing only 1/8 and 3/4 is missing 1/4 so 7/8 is closer to 1. Students should also use benchmark fractions to estimate and examine the reasonableness of their answers.	**Chapter 6: 6-1 through 6-6** **Chapter 7: 7-1 through 7-3, 7-5, 7-7 through 7-9** **Chapter 8: 8-11** **Chapter 9: 9-6**

Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	
5.NF.3 Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie? *continued*	**Chapter 5: 5-8** **Chapter 8: 8-6 & 8-7**

NUMBER AND OPERATIONS — FRACTIONS · 5.NF

Grade 5 Content Standards	*Sadlier Math*, Grade 5
Students should connect fractions with division, understanding that 5 divided by 3 = 5/3. They should explain this by working with their understanding of division as equal sharing. Students should also create story contexts to represent problems involving division of whole numbers. A numerator is the top number of a fraction; a denominator is the bottom number of a fraction.	

5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

Students develop an understanding that the multiplication of a fraction by a whole number could be represented as repeated addition of a unit fraction (e.g. 2 x 1/4 = 1/4 and 1/4). Students should also be able to create story problems that require multiplication of fractions using a whole number

5.NF.4a Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a × q ÷ b$.	**Chapter 8: 8-1 through 8-3, 8-5, 8-8 & 8-9**
5.NF.4b Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	**Chapter 8: 8-10**

5.NF.5 Interpret multiplication as scaling (resizing), by:

Students are really examining how a number changes when we multiply by fractions that are more than 1 and less than 1. This standard is typically taught in conjunction with 5.NF.4.

5.NF.5a Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.	**Chapter 8: 8-4**
5.NF.5b Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining *continued*	**Chapter 8: 8-4**

NUMBER AND OPERATIONS — FRACTIONS　　　　5.NF

Grade 5 Content Standards	*Sadlier Math*, Grade 5
why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.	
5.NF.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem. This standard builds on all the work done in this cluster of standards. Students should have ample opportunity to use various strategies to solve word problems involving multiplication of a fraction by a mixed number. This standard could also include fraction by a fraction, fraction by a mixed number, or mixed numbers by a mixed numbers.	**Chapter 8: 8-2, 8-3 & 8-11** **Chapter 9: 9-6**
5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. This standard introduces students to division with fractions. The concept of a unit fraction is a fraction that has one in the numerator (the top number of a fraction; the bottom number is the denominator). For example, the fraction ⅗ is 3 copies of the unit fraction ⅕.	
5.NF.7a Interpret division of a unit fraction by a non-zero whole number, and compute such quotients.	**Chapter 9: 9-4 & 9-5**
5.NF.7b Interpret division of a whole number by a unit fraction, and compute such quotients.	**Chapter 9: 9-1 through 9-3**
5.NF.7c Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem.	**Chapter 9: 9-6 & 9-7**

MEASUREMENT AND DATA   5.MD

Grade 5 Content Standards	*Sadlier Math*, Grade 5

Convert like measurement units within a given measurement system.

5.MD.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. This standard calls for students to know how to convert measurements within the same system of measurements, both metric and customary units. They should see how the base ten system supports conversions within the metric system.	**Chapter 14: 14-1 through 14-9**

Represent and interpret data.

5.MD.2 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. This standard provides a context for students to work with fractions by measuring objects to one-eighth of a unit. This includes length, mass, and liquid volume. Students are making a line plot of their data and adding and subtracting fractions based on the data in the line plot.	**Chapter 17: 17-1 & 17-2**

Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

5.MD.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement. This is the first time students begin to explore the notion of volume. The concept should extend from the concept of area with the idea that students are covering an area with a layer of unit cubes. They begin to understand that a 1 unit by 1 unit by 1 unit is the standard unit for measuring volume.	
5.MD.3a A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.	**Chapter 16: 16-1 through 16-3**
5.MD.3b A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.	**Chapter 16: 16-2 & 16-3**

MEASUREMENT AND DATA 5.MD

Grade 5 Content Standards	*Sadlier Math*, Grade 5
5.MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. Volume in traduces a third dimension and thus a significant challenge to some students. Solid units are packed, whereas a liquid fills a three dimensional space. Students should have an opportunity to build models of cubic inches, centimeters, and feet.	**Chapter 16: 16-2 & 16-3**
5.MD.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. Volume not only introduces a third dimension, but a significant challenge to students' spatial structuring . the emphasis here is that solid units are packed such as cubes in a three-dimensional array, whereas a liquid fills three-dimensional space, taking the shape of the container. Students then learn to determine the volumes of several right rectangular prisms, using centimeters, cubic inches, and cubic feet. With guidance, they learn to apply multiplicative reasoning to determine volumes, looking for and making use of structure.	
5.MD.5a Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.	**Chapter 16: 16-3 & 16-6**
5.MD.5b Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.	**Chapter 16: 16-4**
5.MD.5c Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	**Chapter 16: 16-5**

GEOMETRY	5.G

Grade 5 Content Standards	*Sadlier Math*, Grade 5

Graph points on the coordinate plane to solve real-world and mathematical problems.

5.G.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate). These standards deal only with the first quadrant (positive numbers only) in the coordinate plane. When locating points, the first number is associated with movement along the *x*-axis, while the second number is associated with the *y*-axis. They are referred to as coordinates. The x-axis is the line that is left to right, or horizontal. The *y*-axis is positioned up and down.	**Chapter 17: 17-3**
5.G.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. This standard references real world mathematical problems, including the traveling from one point to another and identifying the coordinates of missing points in geometric figures such as squares, rectangles, and parallelograms.	**Chapter 17: 17-4**

Classify two-dimensional figures into categories based on their properties.

5.G.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right *continued*	**Chapter 15: 15-1 through 15-5**

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GEOMETRY   5.G

Grade 5 Content Standards	*Sadlier Math*, Grade 5
angles and squares are rectangles, so all squares have four right angles. This standard calls for students to reason about the attributes (properties) of shapes and reasoning about them. An example of this might be to examine whether all quadrilaterals have right angles, giving examples and non-examples of this.	
5.G.4 Classify two-dimensional figures in a hierarchy based on properties. This standard builds on what was done in the 4th grade where students can classify polygons (multi-sided figures) For example, that a rectangle and a rhombus are both quadrilaterals (but are not squares).	**Chapter 15: 15-2, 15-4 & 15-5**