

**6th Grade Standards**

**Mathematics 6B**

**Course Overview:** In this course, you will learn to use new models and methods to think about problems as well as solve them. You will be developing powerful mathematical tools and learning new ways of thinking about and investigating situations. You will be making connections, discovering relationships, figuring out what strategies can be used to solve problems, and explaining your thinking. Learning to think in these ways and communicate about your thinking is useful in mathematical contexts, other subjects in school, and situations outside the classroom. The mathematics you have learned in the past will be valuable for learning in this course. That work, and what you learn in this course, will prepare you for future courses.

**Bold standards are essential standards that all students will learn as they complete the course.**

**Unit 1 Introduction and Representation (16 days)**

**Description:** This unit is designed to introduce students to some of the mathematical ideas on which this course is based, establish class norms, provide an opportunity for the teacher to assess students’ skills, provide students an opportunity to review prerequisite material, and establish collaboration in pairs and teams.

**Standards**

1. The students will at the relationships between perimeter and area and experiment with changing area while keeping perimeter the same. (**6.G.1)**
2. The students will extend a pattern and generalize in order to make a prediction. (6.G.1)
3. The students will generate questions about data and explore ways to organize data to answer different questions. (6.SP.4)
4. The students will decompose quantities into sums of multiple parts and represent them with words, symbols and diagrams. (6.NS.4)
5. The students will decompose numbers in multiple ways and compare values of number expressions and quantities using appropriate symbol notation. (6.NS.4)
6. The students will represent whole numbers with rectangular arrays and categorize numbers as prime, composite, odd, and/or even. (6.NS.4)
7. The students will use an extended multiplication table to further develop their understanding of factors, factor pairs and properties of numbers. Students will write numbers as products of their prime factors using exponents. (6.EE.1)

**Unit 2 Arithmetic Strategies and Area (16 days)**

**Description:** In this unit, students will learn how to analyze the strengths and weaknesses of various graphical representations of data, define and measure the area of rectangles and shapes that can be broken into rectangles, use a generic rectangle to multiply, and find the greatest common factor of selected numbers.

**Standards**

1. The students will analyze the strengths and weaknesses of various graphical representations of data. (6.SP.4)
2. **The students will learn how to collect data and how to display the data in a stem-and-leaf plot and a histogram. (6. SP.4)**
3. The students will explore the concept of area and develop strategies for measuring the area of a closed two‑dimensional region. (6.G.1)
4. The students will extend their understanding of area with the introduction of standard units of measure. (6.G.1)
5. The students will define greatest common factor (GCF) and use it to find the dimensions of generic rectangles. (6.NS.4)
6. **The students will use generic rectangles and factoring to discover and then apply the Distributive Property to multi-digit products. (6.EE.3)**

**Unit 3 Portions and Integers (18 days)**

**Description:** In this unit, students will use a powerful new tool to find equivalent fractions, use percents, decimals, and fractions to describe a portion of a whole, connect ratios to portions, add negative and positive integers and rational numbers, find the absolute value of a number, and find the length of horizontal and vertical line segments on a coordinate graph.

**Standards**

1. The students will create equivalent fractions by using the multiplicative identity. (6.RP.3c)
2. The students will develop an understanding of percent as a way to express and compare portions of a whole. (6.RP.3c)
3. The students will be able to recognize the connections between fractions and percent as they relate to decimals and decimal language. (6.NS.3)
4. **The students continue to develop methods representing portions as percents, fractions, decimals, and descriptions with words.  Students will make sense of the standard algorithm for adding and subtracting decimals. (6.NS.3)**
5. The students develop efficient methods to move between equivalent forms of portions of wholes based on their earlier work with the 100%-block model, specifically from fractions to decimals and from percents to decimals. (6.RP.3c)
6. **The students will be introduced to the concept of a ratio and use ratio language to describe a relationship between two quantities.  They will use diagrams and ratio tables to represent ratios. (6.RP.1)**
7. **The students will consider absolute value as distance from zero and understand the meaning of zero within a context.  They will compare rational numbers using inequalities in contextual situations. (6.NS.7b-d)**
8. **The students will draw polygons on a coordinate plane given coordinates for the vertices and recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. (6.NS.6b-c, 6.NS.8, 6.G.3)**

**Unit 4 Variables and Ratios (15 days)**

**Description:** In this unit, students will use variables to generalize and to represent unknown quantities, write multiple expressions to describe a pattern, find the value of an algebraic expression, enlarge and reduce figures while maintaining their shapes, and use ratios to describe relationships between similar shapes.

**Standards**

1. The students will represent unknown quantities with a variable. (6.EE.2a, 6.EE.6)
2. The students will generate and compare multiple counting strategies. (6.EE.4, 6.EE.6)
3. The students will generalize methods for finding the number of small squares in a square frame pattern using words and algebraic expressions, use a variable to represent a set of solutions, and identify that two expressions are equivalent by evaluating them for specific values. (6.EE.2a, 6.EE.2c, 6.EE.4, 6.EE.6)
4. The students will enlarge an image and examine the relationships between the original image and its enlargement. (6.RP.1)
5. The students will determine that to make a correct enlargement or reduction of a shape, all sides of the shape must be multiplied by the same number. (6.RP.1)
6. The students will use ratios to compare similar figures. (6.RP.1)
7. The students will work with ratios in non-geometric contexts and use them to solve problems. (6.RP.1)

**Unit 5 Multiplying Fractions and Area (18 days)**

**Description:** In this unit, students will learn how to calculate a part of another part, discover how to multiply fractions, mixed numbers, and decimals, find the areas of shapes, and break a complex shape into smaller pieces to find area.

**Standards**

1. The students will extend their understanding of the multiplication operation with fractions and use area models to solve multiplication problems in context. (6.NS.1)
2. The students use models to multiply with fractions, and develop the standard algorithm for multiplication of fractions. (6.NS.1)
3. The students understand and apply the standard strategy for fraction multiplication. (6.NS.1)
4. The students compare multiplication strategies for mixed numbers, fractions, and decimals and compare the appropriateness of estimations versus exact answers in various contexts. (6.NS.1)
5. **The students will multiply fractions, decimals, and percents and assess the reasonableness of answers.  (6.RP.3c, 6.NS.3)**
6. The students understand that multiplication can increase a quantity or decrease it depending on the multiplier. (6.NS.1)
7. The students divide a complicated figure into pieces and convert the pieces to a rectangle so that its area can be calculated more easily. Students will develop the idea of a subproblem and see that problems have multiple solution paths. (6.G.1)
8. The students work with composite shapes and a technology tool to decompose shapes into smaller rectangles and, when possible, to recompose them as single rectangles in order to find their area.  Students will also develop the area formula for a parallelogram. (6.G.1)
9. **The students recognize that a triangle can be duplicated to create a rectangle or parallelogram and will use that relationship to develop a formula for the area of a triangle.  (6.G.1)**
10. **The students will develop strategies for finding the area of trapezoids and will apply their strategies to find the area of a complex shape. (6.G.1)**

**Unit 6 Dividing and Building Expressions (20 days)**

**Description:** In this unit, students will represent division of fractions using diagrams, divide whole and mixed numbers by fractions, use the order of operations to find the correct value of a numerical expression, combine like terms and simplify algebraic expressions, and use a variable to represent any number.

**Standards**

1. The students will divide quantities and represent the result in multiple ways.  Students will use visual fraction models and equations to represent division. (6.NS.1)
2. The students will determine that a fraction can be seen as one number formed by division and construct various visual models to represent division problems.  Students will make sense of the long division algorithm. (6.NS.1, 6.NS.2)
3. The students will identify problems that can be solved using division and use multiplication to check division. (6.NS.1)
4. The students will extend their understanding of division to include division of fractions by fractions and represent division problems in multiple ways. (6.NS.1)
5. The students will review the order of operations as they evaluate real-world formulas for given values and evaluate expressions with whole-number exponents. (6.EE.1, 6.EE2b-c)
6. The students will use variables to represent unknown lengths.  (6.EE.6)
7. The students will understand that combining like terms is a form of sorting and find the lengths of the sides of algebra tiles and combine like terms as they find perimeters. (6.EE.3, 6.EE.4)
8. **The students will continue combining like terms to generate equivalent expressions by finding the perimeter of complex figures composed of algebra tiles. (6.EE.3)**
9. The students will visually demonstrate that x can represent any number. (6.EE.1, 6.EE.2c)

**Unit 7 Rates and Operations (18 days)**

**Description:** In this unit, students will calculate rates, compare ratios and rates with different units, divide more efficiently with fractions, mixed numbers, and decimals, and rewrite expressions by combing like terms and using the Distributive Property.

**Standards**

1. The students will compare rates that are not expressed as unit rates and convert ratios into different units in order to compare rates. (6.RP.3a)
2. The students will use tables and graphs to compare rates when numerical comparisons are cumbersome. (6.RP.3a)
3. **The students will calculate and compare unit rates by reading tables and graphs. (6.RP.2, 6.RP.3a-b)**
4. The students will analyze and apply the common denominator method of fraction division. (6.NS.1)
5. The students will make sense of multiplying by the reciprocal of the divisor ("invert and multiply") strategy for fraction division. (6.NS.1)
6. The students will divide fractions using a Giant One strategy and connect fraction division to decimal division. (6.NS.1, 6.NS.3)\
7. The students will connect ratios with fraction division. (6.NS.1)
8. The students will apply inverse operations to numbers and algebraic expressions in order to represent the steps in a math “magic trick.” (6.EE.3)
9. The students will translate math steps into algebraic expressions and begin to explore the **Distributive Property** to create equivalent pictures and expressions. (6.EE.2a, 6.EE.3)
10. The students will continue to translate math steps into the **Distributive Property** and use mathematics terminology from previous lessons to identify parts of expressions. (6.EE.2a, 6.EE.3)
11. **The students will create equations and inequalities of the form x + a = b and x + a > b to represent real-world situations in which a value is unknown and informally solve equations and inequalities intuitively, representing solutions on a number line. (6.EE.2a, 6.EE.5-8)**

**Unit 8 Statistics and Multiplication Equations (18 days)**

**Description:** In this unit, students will use measures of central tendency, histograms, stem-and-leaf plots, and box plots to represent and compare data, decide is a question is a statistical question, solve problems involving distance, rate, and time, and convert units so that they are the same and then use them to compare rates.

**Standards**

1. **The students will be introduced to measures of central tendency and will develop methods to find the mean, median, and range of a set of data. (6. SP.2, 6. SP.3, 6. SP.5c)**
2. The students will compare two data sets using mean, median, and range and choose between median and mean to describe the “typical” middle value in a distribution of data. (6.SP.2, 6.SP.3, 6.SP5c-d)
3. The students will develop the formula for the average distance from the mean in a set of data – the mean absolute deviation. (6.SP.2, 6.SP.3, 6.SP5c-d)
4. **The students will construct and interpret box plots and compare sets of data. (6. SP.3, 6. SP.4, 6. SP.5a-d)**
5. The students will construct three different representations of a single set of data. (6.SP.4)
6. The students will identify statistical questions. (6.SP.1, 6.SP.5b)
7. The students will use variables to write and solve equations of the form ax = b. (6.EE.7, 6.EE.9)
8. **The students will identify the relationship between distance, rate, and time and will use d = rt to solve word problems. (6.RP.3b, 6.EE.9)**
9. The students will develop an understanding of the importance of units when comparing rates and when using rates to compute. (6.RP.3b, 6.RP.3d)

**Unit 9 Volume and Percents (18 days)**

**Description:** In this unit, students will find the volume of three-dimensional solids, find the surface area and volume of a rectangular prism, and calculate percents using pencil and paper as well as mental math strategies.

**Standards**

1. **The students will calculate the volume of right rectangular prisms as area of the base multiplied by the height. (6.G.2)**
2. The students will create nets for three‑dimensional shapes and will predict the appearance of three‑dimensional shapes starting from nets.  (6.G.4)
3. The students will represent ratios as percents and apply them in multiplicative growth situations. (6.RP.3c)
4. The students will determine parts, wholes, and percentages given different information.   (6.RP.3c)
5. **The students will calculate percent discounts and sale prices. (6.RP.3c)**
6. The students will continue to develop strategies for calculating percents without a calculator. (6.RP.3c)