

# ROBERTSON COUNTY SCHOOLS

## State Standards – Mathematics

## Learning Progressions

Kindergarten	1	2	3	4	5	6	7	8	HS
<a href="#">Counting and Cardinality</a>									Number and Quantity
<a href="#">Number and Operations in Base Ten</a>					<a href="#">Ratios and Proportional Relationships</a>				
			<a href="#">Number and Operations - Fractions</a>		<a href="#">The Number System</a>				
<a href="#">Operations and Algebraic Thinking</a>					<a href="#">Expressions and Equations</a>				Algebra
								<a href="#">Functions</a>	Functions
<a href="#">Geometry</a>					<a href="#">Geometry</a>				Geometry
<a href="#">Measurement and Data</a>					<a href="#">Statistics and Probability</a>				Statistics and Probability

Revised 2023-2024

## SIXTH GRADE MATHEMATICS PACING GUIDE

# Tennessee Math Standards – Grade 6

## **Ratios and Proportional Relationships**

6th grade begins the formal study of ratios and proportions. Students use reasoning about multiplication and division to solve ratio and rate problems about quantities. By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table and by analyzing simple drawings that indicate the relative size of quantities, students connect their understanding of multiplication and division with ratios and rates. Thus students expand the scope of problems for which they can use multiplication and division to solve problems, and they connect ratios and fractions. Students solve a wide variety of problems involving ratios and rates. Proportional relationships are added and studied in the 7th grade.

## **The Number System**

Students use fractions, multiplication, and division along with an understanding of the relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Students use these operations to solve problems. Students also extend their previous understandings of numbers and the ordering of numbers to the full system of rational numbers, which includes negative rational numbers, and in particular negative integers. They reason about the order and absolute value of rational numbers and about the location of points in all four quadrants of the coordinate plane.

## **Expressions and Equations**

Students begin to use properties of arithmetic operations systematically to work with numerical expressions that contain whole-number exponents. Students come to understand more fully the use of variables and variable expressions. They write expressions and equations that correspond to given situations, evaluate expressions, and use expressions and formulas to solve problems. Students understand that expressions in different forms can be equivalent, and they use the properties of operations to rewrite expressions in equivalent forms. Students know that the solutions of an equation are the values of the variables that make the equation true. Students use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations. Students explore how algebraic expressions can represent written situations and generalize relationships from specific cases.

## **Geometry**

Students build on their work with area from earlier grades by reasoning about relationships among shapes to determine area, surface area, and volume. They find areas of right triangles, other triangles, and special quadrilaterals by decomposing these shapes, rearranging or removing pieces, and relating the shapes to rectangles. Using these methods, students discuss, develop, and justify formulas for areas of triangles and parallelograms. Students find areas of polygons and surface areas of prisms and pyramids by decomposing them into pieces whose area they can more easily determine. They reason about right rectangular prisms with fractional side lengths to extend formulas for the volume of a right rectangular prism to fractional side lengths. They prepare for work on scale drawings and constructions in the 7th grade by drawing polygons in the coordinate plane.

## **Statistics and Probability**

6th grade students begin to formally develop their ability to think statistically. They understand that a set of data (collected to answer a question) will have a distribution, which can be described by its center, spread, and shape. Students calculate the median, mean, and mode and relate these to the overall shape of the distribution. They recognize that the median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point. They understand that the mode refers to the most frequently occurring number found in a set of numbers and is found by collecting and organizing the data in order to count the frequency of each result. Students display, summarize, and describe numerical data sets, considering the context in which the data were collected. Students use number lines, dot plots, box plots, and pie charts to display numerical data.

## **Standards for Mathematical Practice**

Being successful in mathematics requires the development of approaches, practices, and habits of mind that need to be in place as one strives to develop mathematical fluency, procedural skills, and conceptual understanding. The Standards for Mathematical Practice are meant to address these areas of expertise that teachers should seek to develop in their students. These approaches, practices, and habits of mind can be summarized as “processes and proficiencies” that successful mathematicians have as a part of their work in mathematics. Additional explanations are included in the main introduction of these standards.

<b>Standards for Mathematical Practice</b>
<ol style="list-style-type: none"><li>1. Make sense of problems and persevere in solving them.</li><li>2. Reason abstractly and quantitatively.</li><li>3. Construct viable arguments and critique the reasoning of others.</li><li>4. Model with mathematics.</li><li>5. Use appropriate tools strategically.</li><li>6. Attend to precision.</li><li>7. Look for and make use of structure.</li><li>8. Look for and express regularity in repeated reasoning.</li></ol>

## **Literacy Standards for Mathematics**

Communication in mathematics employs literacy skills in reading, vocabulary, speaking and listening, and writing. Mathematically proficient students communicate using precise terminology and multiple representations including graphs, tables, charts, and diagrams. By describing and contextualizing mathematics, students create arguments and support conclusions. They evaluate and critique the reasoning of others, analyze, and reflect on their own thought processes. Mathematically proficient students have the capacity to engage fully with mathematics in context by posing questions, choosing appropriate problem-solving approaches, and justifying solutions.

<b>Literacy Skills for Mathematical Proficiency</b>
<ol style="list-style-type: none"><li>1. Use multiple reading strategies.</li><li>2. Understand and use correct mathematical vocabulary.</li><li>3. Discuss and articulate mathematical ideas.</li><li>4. Write mathematical arguments.</li></ol>

# 6<sup>th</sup> Grade Mathematics

## A Year-at-a-Glance

**\*\*The suggested pacing for each lesson is 2 days for a 45 minute math class and 1 day for a 90 minute math class.\*\***

1 <sup>st</sup> Nine Weeks	2 <sup>nd</sup> Nine Weeks
<p><b>Topic 1: Use Positive Rational Numbers</b> (3 weeks) 6.NS.B.2, 6.NS.B.3, 6.NS.A.1</p> <p><b>Topic 2: Integers &amp; Rational Numbers</b> (3 weeks) 6.NS.C.5, 6.NS.C.6a-c, 6.NS.C.7a-d, 6.NS.C.8, 6.G.A.3</p> <p><b>Topic 3: Numeric &amp; Algebraic Expressions</b> (2 weeks) 6.EE.A.1, 6.EE.A.2.a-c, 6.EE.A.3, 6.EE.A.4, 6.EE.B.6, 6.NS.B.4</p>	<p><b>Topic 3: (Continued) Numeric &amp; Algebraic Expressions</b> (2 weeks) 6.EE.A.1, 6.EE.A.2.a-c, 6.EE.A.3, 6.EE.A.4, 6.EE.B.6, 6.NS.B.4</p> <p><b>Topic 4: Represent &amp; Solve Equations &amp; Inequalities</b> (4 weeks) 6.EE.B.5, 6.EE.A.4, 6.EE.B.7, 6.EE.B.6, 6.EE.B.8, 6.EE.C.9</p> <p><b>Topic 5: Understand and Use Ratios</b> (2 weeks) 6.RP.1, 6.RP.A.3a</p>
3 <sup>rd</sup> Nine Weeks	4 <sup>th</sup> Nine Weeks
<p><b>Topic 5: (Continued) Understand and Use Rates</b> (2 weeks) 6.RP.2, 6.RP.3a, 6.RP.3b, 6.RP.3d</p> <p><b>Topic 6: Understand and Use Percent</b> (3 weeks) 6.RP.A.3c, 6.RP.A.1</p> <p><b>Topic 7: Solve Area and Surface Area Problems</b> (3 weeks) 6.GA.1, 6.GA.2, 6.GA.3, 6.GA. 4, 6.EE.A.2a, 6.EE.A.2c, 6.EE.B.6</p>	<p><b>Topic 7: (Continued) Surface Area and Volume Problems</b> (1 week) 6.GA.4, 6.EE.A.2a, 6.EE.A.2c, 6.EE.B.6</p> <p><b>Topic 8: Statistics and Probability</b> (3 weeks) 6.SP.A.1, 6.SP.A.2, 6.SP.A.3, 6.SP.B.4, 6.SP.B.5a-d</p> <p><b>TNREADY BLITZ &amp; Testing Review during Extra Time and Support</b></p> <p><b>State Testing</b> (2 weeks)</p> <p><b>Culminating Projects</b> (3 weeks)</p>

# 1<sup>st</sup> Quarter - Topic 1: Use Positive Rational Numbers (Suggested Time = 3 weeks)

Essential Question: How can you fluently add, subtract, multiply, and divide decimals? How can you multiply and divide fractions?		
<p><b>Standards</b></p> <p><b>6.NS.A.1</b> Interpret and compute quotients of fractions and solve real-world and mathematical problems involving division of fractions by fractions (e.g., connecting visual fraction models and equations to represent the problem is suggested). For example, create a story context for <math>(2/3) \div (3/4)</math> and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that <math>(2/3) \div (3/4) = 8/9</math> because <math>3/4</math> times <math>8/9</math> is <math>2/3</math> (<math>(a/b) \div (c/d) = ad/bc</math>). Further example: How much chocolate will each person get if 3 people share <math>1/2</math> lb of chocolate equally? How wide is a rectangular strip of land with length <math>3/4</math> mi and area <math>1/2</math> square mi?</p> <p><b>6.NS.B.2</b> Fluently add, subtract, multiply, and divide multi-digit decimals using a standard algorithm and making connections to previous conceptual work with each operation.</p> <p><b>6.NS.B.3</b> Fluently add, subtract, multiply, and divide multi-digit decimals using a standard algorithm for each operation.</p>		
Vocabulary	Mathematical Practices	Textbook Correlations
decimal, place value, sum, difference, annex, factor, product, dividend, divisor, quotient, remainder, compatible numbers, estimate, numerator, denominator, whole number, mixed number, reciprocal	<p><b>MP2:</b> Reason abstractly and quantitatively.</p> <p><b>MP4:</b> Model with mathematics.</p>	<p>Topic 1: Lessons 1 – 7</p> <p><b>3-Act Mathematical Modeling Lesson Stocking Up</b></p> <ul style="list-style-type: none"> <li>• Between lessons 1-3 and 1-4</li> <li>• Use mathematical modeling to represent a problem situation and to propose a solution</li> <li>• Test and verify the appropriateness of their math models</li> <li>• Explain why the results from their mathematical models may not align exactly to the problem situation</li> </ul>
Learning Targets		
<p>1-1: Add, subtract, and multiply decimals to solve real-world problems.</p> <p>1-2: Use place-value structure to divide whole numbers and decimals.</p> <p>1-2: Divide whole numbers and decimals to solve real-world problems.</p> <p>1-3: Use models to multiply fractions.</p> <p>1-3: Multiply the numerators and then the denominators to find the product of two fractions.</p> <p>1-3: Multiply mixed numbers.</p> <p>1-4: Use models to divide with fractions.</p> <p>1-4: Use equations to divide with fractions.</p> <p>1-5: Use models to divide fractions by fractions.</p> <p>1-5: Use algorithms to divide fractions by fractions.</p> <p>1-6: Divide with mixed numbers.</p> <p>1-6: Estimate the quotient of mixed numbers.</p> <p>1-7: Solve multi-step problems with fractions and decimals</p> <p><b>*Interpret the quotient and remainder in real-world division problems.</b></p>		

# 1<sup>st</sup> Quarter - Topic 2: Integers & Rational Numbers (Suggested Time = 3 weeks)

**Essential Question: What are integers and rational numbers? How are points graphed on a coordinate plane?**

## **Standards**

**6.NS.C.5** Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation as well as describing situations in which opposite quantities can combine to make 0.

**6.NS.C.6** Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.

**6.NS.C.6.a.** Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself. For example,  $-(-3) = 3$ , and that 0 is its own opposite.

**6.NS.C.6.b.** Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; 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.C.6.c.** Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

**6.NS.C.7** Understand ordering and absolute value of rational numbers.

**6.NS.C.7.a.** Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. 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.

**6.NS.C.7.b.** Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write  $-3\text{ }^{\circ}\text{C} > -7\text{ }^{\circ}\text{C}$  to express the fact that  $-3\text{ }^{\circ}\text{C}$  is warmer than  $-7\text{ }^{\circ}\text{C}$ .

**6.NS.C.7.c.** Understand the absolute value of a rational number as its distance from 0 on the number line and distinguish comparisons of absolute value from statements about order in a real-world context. For example, an account balance of  $-24$  dollars represents a greater debt than an account balance  $-14$  dollars because  $-24$  is located to the left of  $-14$  on the number line.

**6.NS.C.8** Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

**6.G.A.3** Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side that joins two vertices (vertical or horizontal segments only). Know and apply these techniques in the context of solving real-world and mathematical problems.

# 1<sup>st</sup> Quarter - Topic 2: Integers & Rational Numbers (Suggested Time = 3 weeks)

Vocabulary	Mathematical Practices	Textbook Correlations
integers, opposites, rational number, absolute value, coordinate plane, ordered pair, origin, quadrant, x- and y-axes	<p><b>MP3:</b> Construct viable arguments and critique the reasoning of others.</p> <p><b>MP7:</b> Look for and make use of structure.</p>	Topic 2: Lessons 1 – 6
Learning Targets		<p style="text-align: center;"><b>3-Act Mathematical Modeling Lesson The Ultimate Throw</b></p>
<p>2-1: Identify opposites of integers.</p> <p>2-1: Compare and order integers.</p> <p>2-1: Use integers to represent real-world quantities and explain the meaning of 0 in each context.</p> <p><b>2-1: Describe situations in which opposite quantities can combine to make 0.</b></p> <p><b>2-1: Describe positive and negative numbers as indicating opposite directions related to 0 on the number line.</b></p> <p><b>2-1: Recognize the opposite of the opposite as the number itself.</b></p> <p>2-2: Plot rational numbers on a number line.</p> <p>2-2: Compare and order rational numbers.</p> <p>2-2: Use rational numbers to represent real-world quantities.</p> <p>2-3: Use absolute value to represent a number’s distance from 0.</p> <p>2-3: Interpret absolute value in real-world situations.</p> <p><b>2-3: Distinguish comparisons of absolute value from statements about order in a real-world context.</b></p> <p>2-4: Identify and graph points with rational coordinates on the coordinate plane.</p> <p>2-4: Reflect points with rational coordinates across both axes.</p> <p>2-5: Use absolute value to find the distance between two points that lie on the same horizontal or vertical line on a coordinate plane.</p> <p>2-5: Solve real-world and mathematical problems involving distance on the coordinate plane.</p> <p>2-6: Find side lengths of polygons on the coordinate plane.</p> <p>2-6: Find the perimeter of polygons on the coordinate plane.</p> <p><b>2-6: Draw a polygon in the coordinate plane given a set of coordinates for the vertices.</b></p>		<ul style="list-style-type: none"> <li>• Between lessons 2-4 and 2-5</li> <li>• Use mathematical modeling to represent a problem situation and to propose a solution</li> <li>• Test and verify the appropriateness of their math models</li> <li>• Explain why the results from their mathematical models may not align exactly to the problem situation</li> </ul>

# 1<sup>st</sup> / 2<sup>nd</sup> Quarter - Topic 3: Numeric & Algebraic Expressions (Suggested Time = 4 weeks)

**Essential Question: What are expressions and how can they be written and evaluated?**

## **Standards**

**6.EE.A.1** Write and evaluate numerical expressions involving whole-number exponents.

**6.EE.A.2** Write, read, and evaluate expressions in which variables stand for numbers.

**6.EE.A.2.a.** Write expressions that record operations with numbers and with variables. *For example, express the calculation "Subtract  $y$  from 5" as  $5 - y$ .*

**6.EE.A.2.b.** Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *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.*

**6.EE.A.2.c.** Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. 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).

**6.EE.A.3** Apply the properties of operations (including, but not limited to, commutative, associative, and distributive properties) to generate equivalent expressions. The distributive property multiplication over addition is prominent here. Negative coefficients are not an expectation at this grade level.). *For example, apply the distributive property to the expression  $3(2 + x)$  to produce the equivalent expression  $6 + 3x$ ; apply the distributive property to the expression  $24x + 18y$  to produce the equivalent expression  $6(4x + 3y)$ ; apply properties of operations to  $y + y + y$  to produce the equivalent expression  $3y$ .*

**6.EE.A.4** Identify when expressions are equivalent (i.e., when the expressions name the same number regardless of which value is substituted into them). *For example, the expression  $5b + 3b$  is equivalent to  $(5 + 3)b$ , which is equivalent to  $8b$ .*

**6.EE.B.6** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

**6.NS.B.4** Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. 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. *For example, express  $36 + 8$  as  $4(9 + 2)$ .*



# 1<sup>st</sup>/2<sup>nd</sup> Quarter - Topic 3: Numeric & Algebraic Expressions (Suggested Time = 4 weeks)

Vocabulary	Mathematical Practices	Textbook Correlations
base, evaluate, exponent, power, composite number, factor tree, greatest common factor (GCF), least common multiple (LCM), prime factorization, prime number, numerical expression, algebraic expression, coefficient, term, variable, substitution, equivalent expressions, like terms, simplify	<b>MP4:</b> Model with mathematics.  <b>MP7:</b> Look for and make use of structure	Topic 3: Lessons 1 – 7  <p style="text-align: center;"><b>3-Act Mathematical Modeling Lesson The Field Trip</b></p>
Learning Targets		
3-1: Write expressions using whole-number exponents to represent real-world and mathematical problems. 3-1: Evaluate expressions with whole-number exponents. 3-2: Find the prime factorization of a whole number. 3-2: Find the greatest common factor (GCF) and the least common multiple (LCM) of two whole numbers. 3-2: Use the GCF and the Distributive Property to add. 3-2: Use the GCF and the LCM to solve problems. 3-3: Evaluate expressions using the order of operations. 3-3: Insert grouping symbols in a numerical expression to affect the value of the expression. 3-4: Write an algebraic expression to model a pattern, 3-4: Write an algebraic expression from a word phrase. 3-4: Use precise mathematical language when identifying parts of an expression. <b>3-4: Use variables to write expressions and solve real-world problems.</b> <b>3-4: Explain the meaning of a variable in an expression using precise mathematical vocabulary.</b> 3-5: Evaluate algebraic expressions, including those with whole numbers, decimals, and fractions. 3-6: Write equivalent algebraic expressions. 3-6: Identify equivalent algebraic expressions. 3-6: Justify whether two expressions are equivalent. 3-7: Use properties of operations to simplify algebraic expressions by combining like terms.		<ul style="list-style-type: none"> <li>• Between lessons 3-5 and 3-6</li> <li>• Use mathematical modeling to represent a problem situation and to propose a solution</li> <li>• Test and verify the appropriateness of their math models</li> <li>• Explain why the results from their mathematical models may not align exactly to the problem situation</li> </ul>

## 2<sup>nd</sup> Quarter - Topic 4: Represent & Solve Equations & Inequalities (Suggested Time = 4 weeks)

**Essential Question: What procedures can be used to write and solve equations and inequalities?**

### Standards

**6.EE.A.4** Identify when expressions are equivalent (i.e., when the expressions name the same number regardless of which value is substituted into them). *For example, the expression  $5b + 3b$  is equivalent to  $(5 + 3)b$ , which is equivalent to  $8b$ .*

**6.EE.B.5** Understand that a solution to an equation or inequality is the value(s) that makes that statement true. Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

**6.EE.B.6** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

**6.EE.B.7** Solve real-world and mathematical problems by writing and solving one- step equations of the form  $x + p = q$ ,  $px = q$ ,  $x - p = q$ , and  $x/p = q$  for cases in which  $p$ ,  $q$ , and  $x$  are all nonnegative rational numbers and  $p \neq 0$ . (Complex fractions are not an expectation at this grade level.)

**6.EE.B.8** Interpret and write an inequality of the form  $x > c$ ,  $x < c$ ,  $x \leq c$ , or  $x \geq c$  which represents a condition or constraint in a real-world or mathematical problem. Recognize that inequalities have infinitely many solutions; represent solutions of inequalities on number line diagrams.

**6.EE.C.9** Use variables to represent two quantities in a real-world problem that change in relationship to one another. *For example, Susan is putting money in her savings account by depositing a set amount each week (\$50). Represent her savings account balance with respect to the number of weekly deposits ( $s = 50w$ , illustrating the relationship between balance amount  $s$  and number of weeks  $w$ ).*

**6.EE.C.9.a.** Write an equation in the form of  $y = px$  where  $y$ ,  $p$ , and  $x$  are all non-negative and  $p \neq 0$ , to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable.

**6.EE.C.9.b.** Analyze the relationship between the dependent and independent variables using graphs and tables and relate these to the equation.

## 2<sup>nd</sup> Quarter - Topic 4: Represent & Solve Equations & Inequalities (Suggested Time = 4 weeks)

Vocabulary	Mathematical Practices	Textbook Correlations
equation, solution of an equation, Addition Property of Equality, Subtraction Property of Equality, Multiplication Property of Equality, Division Property of Equality, inverse relationship, inequality, solution of an inequality, dependent variable, independent variable	<b>MP2:</b> Reason abstractly and quantitatively.  <b>MP4:</b> Model with mathematics.	Topic 4: Lessons 1-10  <b>3-Act Mathematical Modeling Lesson Checking a Bag</b>
Learning Targets		
4-1: Identify equations and variables. 4-1: Use substitution to find solutions to equations. 4-2: Use the properties of equality to keep both sides of an equation equal. 4-2: Identify which properties of equality are used to write equivalent expressions. 4-3: Write one-variable addition and subtraction equations. 4-3: Use inverse relationships and properties of equality to solve one-step addition and subtraction equations. 4-4: Write one-variable multiplication and division equations. 4-4: Use inverse relationships and properties of equality to solve one-step multiplication and division equations. 4-5: Write and solve equations that involve fractions, decimals, and mixed numbers. <b>4-5: Explain the meaning of a variable in an equation using precise mathematical vocabulary.</b> 4-6: Understand the symbols required to write an inequality. 4-6: Write inequalities to describe mathematical or real-world situations. <b>4-6: Write an inequality given an inequality graphed on a number line.</b> 4-7: Describe solutions to an inequality. 4-7: Represent solutions to an inequality on a number line. 4-8: Identify dependent variables. 4-8: Identify independent variables. 4-9: Analyze the relationships between variables by using tables. 4-9: Write equations to represent the relationships between variables. 4-10: Analyze the relationship between dependent and independent variables using tables, graphs, and equations.		<ul style="list-style-type: none"> <li>• Between lessons 4-7 and 4-8</li> <li>• Use mathematical modeling to represent a problem situation and to propose a solution</li> <li>• Test and verify the appropriateness of their math models</li> <li>• Explain why the results from their mathematical models may not align exactly to the problem situation</li> </ul>

## 2<sup>nd</sup>/3<sup>rd</sup> Quarter - Topic 5: Understand and Use Ratios (Suggested Time = 2 weeks)

<b>Essential Question: What are ratios? How can you use ratios to describe quantities and solve problems?</b>		
<p><b>Standards</b></p> <p><b>6.RP.A.1</b> Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. Make a distinction between ratios and fractions. For example, the ratio of wings to beaks in a bird house at the zoo was 2:1, because for every 2 wings there was 1 beak. Another example could be for every vote candidate A received, candidate C received nearly three votes.</p> <p><b>6.RP.A.3</b> Use ratio and rate reasoning to solve real-world and mathematical problems (e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations).</p> <p style="padding-left: 20px;"><b>6.RP.A.3a</b> 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. Use tables to compare ratios.</p>		
Vocabulary	Mathematical Practices	Textbook Correlations
ratio, terms, circumference, diameter, equivalent ratio, pi	<p><b>MP2:</b> Reason abstractly and quantitatively.</p> <p><b>MP4:</b> Model with mathematics.</p>	<p>Topic 5: Lessons 1 - 4</p> <p style="text-align: center;"><b>3-Act Mathematical Modeling Lesson</b> <b>The Field Trip</b></p> <ul style="list-style-type: none"> <li>Between lessons 5-7 and 5-8</li> <li>Use mathematical modeling to represent a problem situation and to propose a solution</li> <li>Test and verify the appropriateness of their math models</li> <li>Explain why the results from their mathematical models may not align exactly to the problem situation</li> </ul>
Learning Targets		
<p>5-1: Use ratios to describe the relationship between two quantities.</p> <p><b>5-1: Express ratios in various forms including fraction notation, using a colon, using the word “to”, or as a verbal expression.</b></p> <p><b>5-1: Explain how ratios and fractions are different.</b></p> <p>5-1: Use bar diagrams and double number line diagrams to model ratio relationships.</p> <p>5-2: Use multiplication and division to find equivalent ratios.</p> <p>5-2: Solve problems by finding equivalent ratios.</p> <p>5-3: Use ratio tables to compare ratios.</p> <p>5-3: Compare ratios to solve problems.</p> <p>5-4: Represent equivalent ratios on graphs.</p> <p>5-4: Use ratio tables and graphs to solve problems.</p>		

## 3<sup>rd</sup> Quarter - Topic 5: Understand and Use Rates (Suggested Time = 2 weeks)

**Essential Question: What are rates? How can you use rates to describe quantities and solve problems?**

### Standards

**6.RP.A.2** Understand the concept of a unit rate  $a/b$  associated with a ratio  $a:b$  with  $b \neq 0$ . Use rate language in the context of a ratio relationship. 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. Also, we paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger. (Expectations for unit rates in 6th grade are limited to non-complex fractions).

**6.RP.A.3** Use ratio and rate reasoning to solve real-world and mathematical problems (e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations).

**6.RP.A.3a** 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. Use tables to compare ratios.

**6.RP.A.3b** Solve unit rate problems including those involving unit pricing and constant speed. For example, if a runner ran 10 miles in 90 minutes, running at that speed, how long will it take him to run 6 miles? How fast is he running in miles per hour?

**6.RP.A.3d** Use ratio reasoning to convert customary and metric measurement units (within the same system); manipulate and transform units appropriately when multiplying or dividing quantities.

Vocabulary	Mathematical Practices	Textbook Correlations
rate, unit rate, unit price, constant speed, conversion factor, dimensional analysis, customary units, metric units	<p><b>MP2:</b> Reason abstractly and quantitatively.</p> <p><b>MP4:</b> Model with mathematics.</p>	<p>Topic 5: Lessons 5 - 10</p>
<b>Learning Targets</b>		<b>3-Act Mathematical Modeling Lesson The Field Trip</b>
<p>5-5: Use rates to describe ratios in which the terms have different units.</p> <p>5-5: Use rates and unit rates to solve problems.</p> <p>5-6: Use ratio reasoning to compare rates and solve problems.</p> <p>5-7: Use unit rates to solve problems involving constant speed.</p> <p>5-7: Use unit rates to solve problems involving unit price.</p> <p>5-7: Solve unit rate problems using an equation.</p> <p>5-8: Use ratio reasoning and conversion factors to convert customary units of measure.</p> <p>5-9: Use ratio reasoning and conversion factors to convert metric units of measure.</p> <p>5-10: Use ratio reasoning and conversion factors to convert between customary and metric units of measure.</p>		<ul style="list-style-type: none"> <li>• Between lessons 5-7 and 5-8</li> <li>• Use mathematical modeling to represent a problem situation and to propose a solution</li> <li>• Test and verify the appropriateness of their math models</li> <li>• Explain why the results from their mathematical models may not align exactly to the problem situation</li> </ul>

## 3<sup>rd</sup> Quarter - Topic 6: Understand & Use Percent (Suggested Time = 3 weeks)

<b>Essential Question: What is the meaning of percent? How can percent be estimated and found?</b>		
<p><b>Standards</b></p> <p><b>6.RP.A.1</b> Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. Make a distinction between ratios and fractions. For example, the ratio of wings to beaks in a bird house at the zoo was 2:1, because for every 2 wings there was 1 beak. Another example could be for every vote candidate A received, candidate C received nearly three votes.</p> <p><b>6.RP.A.3c</b>. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.</p>		
Vocabulary	Mathematical Practices	Textbook Correlations
percent, equivalent values, estimate, compatible numbers	<p><b>MP2:</b> Reason abstractly and quantitatively.</p> <p><b>MP4:</b> Model with mathematics.</p>	<p>Topic 6: Lessons 1 - 6</p> <p style="text-align: center;"><b>3-Act Mathematical Modeling Lesson</b> <b>The Field Trip</b></p> <ul style="list-style-type: none"> <li>After lesson 6-6</li> <li>Use mathematical modeling to represent a problem situation and to propose a solution</li> <li>Test and verify the appropriateness of their math models</li> <li>Explain why the results from their mathematical models may not align exactly to the problem situation</li> </ul>
Learning Targets		
<p>6-1: Represent the percent of a whole.</p> <p>6-1: Find the percent of a whole.</p> <p>6-2: Write equivalent values as fractions, decimals, and percents.</p> <p>6-2: Write fractions as decimals and percents when the denominator of the fraction is not 100.</p> <p>6-3: Write percents that are greater than 100.</p> <p>6-3: Write percents that are less than 1.</p> <p>6-4: Estimate the percent of a number.</p> <p>6-5: Use the decimal form of a percent to find the percent of a number.</p> <p>6-5: Write an equation to solve a percent problem.</p> <p>6-6: Find the whole amount when given a part and the percent.</p>		

## 3<sup>rd</sup> Quarter - Topic 7: Solve Area & Surface Area (Suggested Time = 3 weeks)

<b>Essential Question: How can areas of certain shapes be found? What is the meaning of surface area and how can it be found?</b>		
<p><b>Standards</b></p> <p><b>6.G.A.1</b> Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; know and apply these techniques in the context of solving real-world and mathematical problems.</p> <p><b>6.G.A.3</b> Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side that joins two vertices (vertical or horizontal segments only). Apply these techniques in the context of solving real-world and mathematical problems.</p> <p><b>6.G.A.4</b> Represent three-dimensional figures using nets made up of rectangles and triangles and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.</p> <p><b>6.EE.A.2c</b> Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. 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).</p> <p><b>6.NS.C.6c</b> Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.</p> <p><b>6.NS.C.8</b> Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.</p>		
Vocabulary	Mathematical Practices	Textbook Correlations
area, formula, parallelogram, rhombus, triangle, trapezoid, kite, polygon, net, base, height, edge, face, polyhedron, vertex, surface area, prism	<p><b>MP2:</b> Reason abstractly and quantitatively.</p> <p><b>MP4:</b> Model with mathematics.</p>	Topic 7: Lessons 1 – 6  <p style="text-align: center;"><b>3-Act Mathematical Modeling Lesson The Field Trip</b></p> <ul style="list-style-type: none"> <li>Between lessons 7-5 and 7-6</li> <li>Use mathematical modeling to represent a problem situation and to propose a solution</li> <li>Test and verify the appropriateness of their math models</li> <li>Explain why the results from their mathematical models may not align exactly to the problem situation</li> </ul>
Learning Targets		
<p>7-1: Use a formula to find the areas of parallelograms and rhombuses.</p> <p>7-1: Find the base or height of a parallelogram or rhombus when the area and the height or base are known.</p> <p>7-2: Find the area of triangles, including right triangles.</p> <p>7-2: Find the corresponding base or height of a triangle.</p> <p>7-3: Find the area of trapezoids and kites.</p> <p>7-4: Find the areas of polygons by composing and decomposing shapes, including polygons on the coordinate plane.</p> <p>7-5: Classify solid figures.</p> <p>7-5: Identify solid figures from nets and draw nets of solid figures.</p> <p>7-6: Find the surface area of rectangular prisms including cubes and triangular prisms.</p>		

# 4<sup>th</sup> Quarter - Topic 7: Continue Solve Surface Area & Volume (Suggested Time = 1 week)

**Essential Question: How can areas of certain shapes be found? What is the meaning of volume and how can it be found?**

**Standards**

**6.G.A.2** 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, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas  $V = lwh$  and  $V = Bh$  where  $B$  is the area of the base to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems

**6.G.A.4** Represent three-dimensional figures using nets made up of rectangles and triangles and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

**6.EE.A.2a** Write expressions that record operations with numbers and with variables. For example, express the calculation "Subtract  $y$  from 5" as  $5 - y$ .

**6.EE.A.2c** Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. 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).

**6.EE.B.6** Use variables to represent numbers and write expressions when solving real-world and mathematical problems; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set

Vocabulary	Mathematical Practices	Textbook Correlations
formula, parallelogram, rhombus, triangle, trapezoid, kite, polygon, net, base, height, edge, face, polyhedron, vertex, surface area, prism, pyramid, volume	<p><b>MP4:</b> Model with mathematics.</p> <p><b>MP7:</b> Look for and make use of structure</p>	<p>Topic 7: Lessons 7 - 8</p> <p><b>3-Act Mathematical Modeling Lesson</b> <b>The Field Trip</b></p> <ul style="list-style-type: none"> <li>• Between lessons 7-5 and 7-6</li> <li>• Use mathematical modeling to represent a problem situation and to propose a solution</li> <li>• Test and verify the appropriateness of their math models</li> <li>• Explain why the results from their mathematical models may not align exactly to the problem situation</li> </ul>
Learning Targets		
<p>7-7: Find the surface area of square and triangular pyramids</p> <p>7-8: Use cubes and a formula to find the volume of a rectangular prism or cube with fractional edge lengths.</p> <p><b>7-8: Explain the relationship between the formulas for calculating volume <math>V=lwh</math> and <math>V=Bh</math>.</b></p>		



## 4<sup>th</sup> Quarter - Topic 8: Numeric and Algebraic Expressions (Suggested Time = 4 weeks)

Essential Question: How can data be described by a single number? How can tables and graphs be used to represent data and answer questions?		
<p><b>Standards</b></p> <p><b>6.SP.A.1</b> Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. 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.</p> <p><b>6.SP.A.2</b> Understand that a set of data collected to answer a statistical question has a distribution which can be described by its measures of center (mean, median, mode), measures of variation (range only), and overall shape.</p> <p><b>6.SP.A.3</b> Recognize that a measure of center (mean, median, mode) 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.</p> <p><b>6.SP.B.4</b> Display a single set of numerical data using dot plots (line plots), box plots, pie charts and stem plots</p> <p><b>6.SP.B.5</b> Summarize numerical data sets in relation to their context.</p> <p><b>6.SP.B.5a</b> Report the number of observations.</p> <p><b>6.SP.B.5b</b> Describe the nature of the attribute under investigation, including how it was measured and its units of measurement</p> <p><b>6.SP.B.5c</b> Give quantitative measures of center (median and/or mean) and variability (range) as well as describing any overall pattern with reference to the context in which the data were gathered</p> <p><b>6.SP.B.5d</b> Relate the choice of measures of center to the shape of the data distribution and the context in which the data were gathered</p>		
Vocabulary	Mathematical Practices	Textbook Correlations
statistical question, mean, median, mode, range, box plot, quartiles, frequency table, histogram, absolute deviation, mean absolute deviation (MAD), interquartile range (IQR), categorical data, stem plot, outlier, data distribution, pie chart	<p><b>MP4:</b> Model with mathematics.</p> <p><b>MP7:</b> Look for and make use of structure</p>	<p><b>Tennessee Extra Lessons</b></p> <p><b>TN – 1: Display Data Using Pie Charts</b></p> <p><b>TN – 2: Display Data Using Stem Plots</b></p>
Learning Targets		Topic 8: Lessons 1 - 8
8-1: Identify statistical questions. Write statistical questions and display the collected data. 8-2: Determine the mean, median, mode, and range of a data set. 8-3: Display data in box plot. Interpret and analyze a box plot. 8-4: Organize data into equal intervals and display data in a frequency table and histogram. 8-4: Interpret and analyze a histogram. 8-5: Calculate the mean absolute deviation (MAD) and interquartile range (IQR) of a data set. 8-5: Summarize data using measures of variability.		<p><b>3-Act Mathematical Modeling Lesson</b>  <b>The Field Trip</b></p> <ul style="list-style-type: none"> <li>Between lessons 3-5 and 3-6</li> </ul>

8-6: Select the most appropriate measure of center and variability for a data set. Use measures to describe data sets.

8-7: Describe the center, spread, and overall shape of a data set.

8-7: Summarize numerical data sets using measures of center related measures of variability.

\* **Interpret data that represented by a dot plot, and stem plot.**

\* **Create a dot plot and stem plot using a numerical data set.**

\* **Interpret data that is represented in a pie chart by relating each section to the whole circle.**

\* **Create a pie chart using a numerical data set.**

- Use mathematical modeling to represent a problem situation and to propose a solution
- Test and verify the appropriateness of their math models
- Explain why the results from their mathematical models may not align exactly to the problem situation