Grade 6 Curriculum Overview and Pacing Guide

Course Title: Grade 6 - Math		
School: Thomaston Center School	**Grade:** 6	**Curriculum Pacing:** 36 weeks
Unit One: Area and Surface Area	**Unit Two:** Introducing Ratios	
Unit Pacing: 4 weeks (optional lesson: 16)	**Unit Pacing:** 5 weeks (optional lessons: none)	
Unit Overview: In this unit, students learn to find areas of polygons by decomposing, rearranging, and composing shapes. They learn to understand and use the terms “base” and “height,” and find areas of parallelograms and triangles. Students approximate areas of non-polygonal regions by polygonal regions. They represent polyhedra with nets and find their surface areas.	**Unit Overview:** In this unit, students learn to understand and use the terms “ratio,” “rate,” “equivalent ratios,” “per,” “at this rate,” “constant speed,” and “constant rate,” and to recognize when two ratios are or are not equivalent. They represent ratios as expressions, and represent equivalent ratios with double number line diagrams, tape diagrams, and tables. They use these terms and representations in reasoning about situations involving color mixtures, recipes, unit pricing, and constant speed.	
Compelling Questions: • How do I use formulas to solve problems? • How do I determine the area of triangles, special quadrilaterals, and irregular or compound polygons? • How do I determine the volume of a rectangular prism?	**Compelling Questions:** • How can you represent a relationship between two quantities? • How can you write a ratio to represent a situation, and what does that ratio mean? • Does switching the numbers in the ratio change the description of the ratio relationship? • Can more than one ratio describe a situation? • How can you find two ratios that describe the same relationship? Is there more than one way to find another ratio?	

	• Do you see a pattern that will help generate equivalent ratios/proportions and/or other ratio concepts to solve ratio problems? • How can you use a table of different unit rates and an equation to solve ratio problems? • How is a ratio that is part to whole like a fraction? • How are fractions, decimals, and percentages related? • How do you convert between a fraction, decimal, and a percent? • What strategies can you use to solve problems using fractions, decimals, and percentages?
Priority Learning Targets: **I can solve real-world and mathematical problems involving area, surface area, and volume.** CCSS.MATH.CONTENT.6.G.A.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	**Priority Learning Targets:** **I can understand ratio concepts and use ratio reasoning to solve problems.** CCSS.MATH.CONTENT.6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. 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."
Unit Three: Unit Rates and Percentages	**Unit Four:** Dividing Fractions
Unit Pacing: 5 weeks (optional lesson: 2)	**Unit Pacing:** 3 weeks (optional lessons: none)
Unit Overview: In this unit, students learn to understand and use the terms “unit rate,” “speed,” “pace,” “percent,” and “percentage,” and recognize that equivalent ratios have equal	**Unit Overview**: In this unit, students examine how the relative sizes of numerator and denominator affect the size of their quotient when numerator or denominator (or both) is a fraction. They acquire the

unit rates. They represent percentages with tables, tape diagrams, and double number line diagrams, and as expressions. They use these terms and representations in reasoning about situations involving unit price, constant speed, and measurement conversion.	understanding that dividing by ab has the same outcome as multiplying by b, then by 1a. They compute quotients of fractions. They solve problems involving lengths and areas of figures with fractional side lengths and extend the formula for the volume of a right rectangular prism to prisms with fractional edge lengths and use it to solve problems. They use tape diagrams, equations, and expressions to represent situations involving partitive or quotitive interpretations of division with fractions. Given a multiplication or division equation or expression with fractions, they describe a situation that it could represent. They use tape diagrams and equations in reasoning about situations that involve multiplication and division of fractions.
Compelling Questions: ● How can ratios and rates be used to relate and compare numbers? ● What kinds of relationships can proportions represent? ● How can solving percentages be applied to real world situations?	**Compelling Questions:** ● How can understanding fractions make your life easier? ● Why is it important to identify fractions as a part of a whole? ● How can models help us understand the multiplication and division of fractions? ● How do I use concrete materials and drawings to understand and show understanding of multiplying and dividing fractions?

Priority Learning Targets: **I can understand ratio concepts and use ratio reasoning to solve problems.** CCSS.MATH.CONTENT.6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. 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." CCSS.MATH.CONTENT.6.RP.A.2 Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and 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." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."1 CCSS.MATH.CONTENT.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.	**Priority Learning Targets:** **I can apply and extend previous understandings of multiplication and division to divide fractions by fractions.** CCSS.MATH.CONTENT.6.NS.A.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. 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. (In general, (a/b) ÷ (c/d) = ad/bc.) 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?.
Unit 5: Arithmetic in Base Ten	**Unit 6:** Expressions and Equations
Unit Pacing: 5 weeks (optional lessons: 2, 15)	**Unit Pacing:** 5 weeks (optional lessons: 11, 18)
Unit Overview: In this unit, students compute sums, differences, products, and quotients of multi-digit whole numbers and decimals, using efficient	**Unit Overview:** In this unit, students learn to understand and use the terms “variable,” “coefficient,” “solution,” “equivalent expressions,” “exponent,”

algorithms. They use calculations with whole numbers and decimals to solve problems set in real-world contexts.	"independent variable," and "dependent variable." They begin to write coefficients next to variables without a multiplication symbol. They learn other situations in which the multiplication symbol can be omitted. They work with expressions that have positive whole-number exponents and whole-number, fraction, or variable bases, using properties of exponents strategically to evaluate these expressions, given a value for the variable. They find solutions for linear equations in one variable and simple equations that include exponents. They use these terms and representations (including expressions with two variables) in reasoning about real-world and geometrical situations, understanding that some values of variables may not make sense in a given context. They represent collections of equivalent ratios as equations and use and make connections between tables, graphs, and linear equations that represent the same relationships.
Compelling Questions: ● How does estimation make computation more accurate? ● What are some situations in everyday life where we use estimation?	**Compelling Questions:** ● How do you add, subtract, factor, and multiply algebraic expressions? ● How can you rewrite expressions to help you solve problems? ● How do you solve equations containing multiple operations?
Priority Learning Targets: **I can compute fluently with multi-digit numbers and find common factors and multiples.** CCSS.MATH.CONTENT.6.NS.B.2 Fluently divide multi-digit numbers using the standard algorithm. CCSS.MATH.CONTENT.6.NS.B.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. CCSS.MATH.CONTENT.6.NS.B.4	**Priority Learning Targets:** **I can apply and extend previous understandings of arithmetic to algebraic expressions.** CCSS.MATH.CONTENT.6.EE.A.1 Write and evaluate numerical expressions involving whole-number exponents. CCSS.MATH.CONTENT.6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers.

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).. **I can apply and extend previous understandings of arithmetic to algebraic expressions.** CCSS.MATH.CONTENT.6.EE.A.1 Write and evaluate numerical expressions involving whole-number exponents. CCSS.MATH.CONTENT.6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers.	**Reason about and solve one-variable equations and inequalities.** CCSS.MATH.CONTENT.6.EE.B.5 Understand 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? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. CCSS.MATH.CONTENT.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. CCSS.MATH.CONTENT.6.EE.B.7 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.MATH.CONTENT.6.EE.B.8 Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams. **Represent and analyze quantitative relationships between dependent and independent variables.** CCSS.MATH.CONTENT.6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; 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. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. 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.
Unit 7: Rational Numbers	**Unit 8:** Data Sets and Distributions
Unit Pacing: 5 weeks (optional lessons: none)	**Unit Pacing:** 4 weeks (optional lessons: none)
Unit Overview: In this unit, students interpret signed numbers in contexts (e.g., temperature above or below zero, elevation above or below sea level). They understand and use the terms “positive number,” “negative number,” “rational number,” “opposite,” “sign,” “absolute value,” “a solution to an inequality,” “less than,” “greater than,” and the corresponding symbols. They plot points with signed rational number coordinates on the number line, and recognize and use the connection between relative position of two points on the number line and inequalities involving the coordinates of the points. They understand and use absolute value notation, understanding that the absolute value of a number as its distance from zero on the number line. Students graph inequalities in one variable on number line diagrams, using a circle or disk to indicate when a given point is, respectively, excluded or included. They solve simple inequalities, understanding that there may be infinitely many solutions, and show solutions symbolically and on the number line. They interpret solutions of inequalities in contexts, understanding that some solutions do not make sense in some contexts. Students plot pairs of signed number coordinates in the plane, understanding the relationship between the signs of a pair of coordinates and the quadrant of the corresponding point, and use coordinates to calculate horizontal and vertical distances between two points. Students understand and use the terms “common factor,” “greatest common factor,” “common multiple,” and “least common multiple,” and solve problems set in real-world contexts in which common factors or multiples occur.	**Unit Overview:** In this unit, students learn about populations and study variables associated with a population. They understand and use the terms “numerical data,” “categorical data,” “survey” (as noun and verb), “statistical question,” “variability,” “distribution,” and “frequency.” They make and interpret histograms, bar graphs, tables of frequencies, and box plots. They describe distributions (shown on graphical displays) using terms such as “symmetrical,” "peaks," “gaps,” and “clusters.” They work with measures of center—understanding and using the terms “mean,” “average,” and “median.” They work with measures of variability—understanding and using the terms “range,” ”mean absolute deviation” or MAD, “quartile,” and “interquartile range” or IQR. They interpret measurements of center and variability in contexts.

Compelling Questions: ● How are rational numbers useful in life? ● How does a number's relationship to zero affect its value? ● What does the sign of a rational number say about the direction from its initial position? ● How do we use the context to determine what approach we use to solve?	**Compelling Questions:** ● How can we analyze data? ● What information about a data set is gained from analyzing a visual representation for the data?
Priority Learning Targets: **Apply and extend previous understandings of numbers to the system of rational numbers.** CCSS.MATH.CONTENT.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. CCSS.MATH.CONTENT.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. CCSS.MATH.CONTENT.6.NS.C.7 Understand ordering and absolute value of rational numbers. **Apply and extend previous understandings of arithmetic to algebraic expressions.** CCSS.MATH.CONTENT.6.EE.A.1	**Priority Learning Targets:** **Develop understanding of statistical variability.** CCSS.MATH.CONTENT.6.SP.A.1 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. CCSS.MATH.CONTENT.6.SP.A.2 Understand 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.MATH.CONTENT.6.SP.A.3 Recognize 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. **Summarize and describe distributions.** CCSS.MATH.CONTENT.6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

Write and evaluate numerical expressions involving whole-number exponents. CCSS.MATH.CONTENT.6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers. **Reason about and solve one-variable equations and inequalities.** CCSS.MATH.CONTENT.6.EE.B.5 Understand 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? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. CCSS.MATH.CONTENT.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. CCSS.MATH.CONTENT.6.EE.B.7 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.MATH.CONTENT.6.EE.B.8 Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	CCSS.MATH.CONTENT.6.SP.B.5 Summarize numerical data sets in relation to their context.

Solve real-world and mathematical problems involving area, surface area, and volume. CCSS.MATH.CONTENT.6.G.A.3 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	

Unit 9: Putting it All Together

Unit Pacing: 0-18 days (OPTIONAL REVIEW UNIT)

Unit Overview:
In this optional unit, students use concepts and skills from previous units. In solving Fermi problems, they use measurement conversions together with their knowledge of volumes or surface areas of right rectangular prisms or the relationship of distance, rate, and time. In answering questions about ratios of two populations, they work with percentages that include numbers expressed in the form a/b or as decimals. In answering questions about diagrams of rectangles with whole-number dimensions, they connect arithmetic features of the dimensions such as remainder or greatest common factor with geometric features of the diagrams. In answering questions about votes, voting methods, and equitable distribution, they use their knowledge of equivalent ratios, part–part ratios, percentages, and unit rates.