GOMath!

Grade 6

Curriculum

Lower Township Elementary Schools
2015

Course Description:

In Grade 6, instructional time should focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking.

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.

Students use the meaning of fractions, the meanings of multiplication and division, and 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 extend their previous understandings of number 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.

Students understand the use of variables in mathematical 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 construct and analyze tables, such as tables of quantities that are in equivalent ratios, and they use equations (such as $3x = y$) to describe relationships between quantities.

Building on and reinforcing their understanding of number, students begin to develop their ability to think statistically. Students recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. 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. Students recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different sets of data can have the same mean and median yet be distinguished by their variability.

Students learn to describe and summarize numerical data sets, identifying clusters, peaks, gaps, and symmetry, considering the context in which the data were collected. Students in Grade 6 also build on their work with area in elementary school 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 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 Grade 7 by drawing polygons in the coordinate plane.

Course Goals:

A. **Ratios and Proportional Relationships – 6.RP**
- Understand ratio concepts and use ratio reasoning to solve problems.

B. **The Number System – 6.NS**
- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Reason about and solve one-variable equations and inequalities.
- Represent and analyze quantitative relationships between dependent and independent variables.

C. **Expressions and Equations – 6.EE**
- Apply and extend previous understandings of arithmetic to algebraic expressions.

- Reason about and solve one-variable equations and inequalities.
- Represent and analyze quantitative relationships between dependent and independent variables.

D. **Geometry – 6.G**
- Solve real-world and mathematical problems involving area, surface area, and volume.

E. **Statistics and Probability – 6.SP**
- Develop understanding of statistical variability.
- Summarize and describe distributions.

Course Enduring Understandings:

Ideas that have lasting value beyond the classroom. Consider, "what do we want students to understand and be able to use several years from now, after they have forgotten the details?"

A. **Ratios and Proportional Relationships – 6.RP**
- Ratios and proportional relationships are used to express how quantities are related and how quantities change in relation to each other.

B. **The Number System – 6.NS**
- Rational numbers can be represented in multiple ways and are useful when examining situations involving numbers that are not whole.

C. **Expressions and Equations – 6.EE**
- Algebraic expressions and equations are used to model real-life problems and represent quantitative relationships, so that the numbers and symbols can be mindfully manipulated to reach a solution or make sense of the quantitative relationships.

D. **Geometry – 6.G**

- Geometric attribute (such as shapes, lines, angles, figures, and planes) provide descriptive information about an object's properties and position in space and support visualization and problem solving.

E. **Statistics and Probability – 6.SP**
- The rules of probability can lead to more valid and reliable predictions about the likelihood of an event occurring.

Common Core State Standards:

Grade 6 Overview

Ratios and Proportional Relationships

- Understand ratio concepts and use ratio reasoning to solve problems.

The Number System

- Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
- Compute fluently with multi-digit numbers and find common factors and multiples.
- Apply and extend previous understandings of numbers to the system of rational numbers.

Expressions and Equations

- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Reason about and solve one-variable equations and inequalities.
- Represent and analyze quantitative relationships between dependent and independent variables.

Geometry

- Solve real-world and mathematical problems involving area, surface area, and volume.

Statistics and Probability

- Develop understanding of statistical variability.
- Summarize and describe distributions.

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Understand ratio concepts and use ratio reasoning to solve problems.

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."*

2. Understand the concept of a unit rate a/b associated with a ratio $a{:}b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. *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]

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.

    a. 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.

    b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*

    c. 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.

    d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

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?*

Compute fluently with multi-digit numbers and find common factors and multiples.

2. Fluently divide multi-digit numbers using the standard algorithm.

3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

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).*

Apply and extend previous understandings of numbers to the system of rational numbers.

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.

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.

    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, e.g., –(–3) = 3, and that 0 is its own opposite.

    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.

    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.

7. Understand ordering and absolute value of rational numbers.

    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.*

    b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3 °C > –7 °C to express the fact that –3 °C is warmer than –7 °C.*

    c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.*

    d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.*

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.

Expressions and Equations	6.EE

Apply and extend previous understandings of arithmetic to algebraic expressions.

1. Write and evaluate numerical expressions involving whole-number exponents.

2. Write, read, and evaluate expressions in which letters stand for numbers.

    a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 – y.*

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.*

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). *For example, use the formulas $V = s^3$ and $A = 6 s^2$ to find the volume and surface area of a cube with sides of length s = 1/2.*

3. Apply the properties of operations to generate equivalent expressions. *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.*

4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*

Reason about and solve one-variable equations and inequalities.

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.

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.

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.

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.

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.*

Geometry	6.G

Solve real-world and mathematical problems involving area, surface area, and volume.

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.

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 $V = l\,w\,h$ and $V = b\,h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

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.

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.

Statistics and Probability   6.SP

Develop understanding of statistical variability.

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.*

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.

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.

4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

5. Summarize numerical data sets in relation to their context, such as by:

   a. Reporting the number of observations.

   b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

   c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

   d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Mathematical Practices
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

21ˢᵗ Century Career Ready Practices:

Career Ready Practices	
1. Act as a responsible and contributing citizen and employee.	**X**
2. Apply appropriate academic and technical skills	**X**
3. Attend to personal health and financial well-being.	**X**
4. Communicate clearly and effectively and with reason.	**X**
5. Consider the environmental, social and economic impacts of decisions	**X**
6. Demonstrate creativity and innovation.	**X**
7. Employ valid and reliable research strategies.	**X**
8. Utilize critical thinking to make sense of problems and persevere in solving them.	**X**
9. Model integrity, ethical leadership and effective management.	**X**
10. Plan education and career paths aligned to personal goals.	**X**

11. Use technology to enhance productivity.	**X**	
12. Work productively in teams while using cultural global competence.	**X**	

21st Century Life and Careers Standards Addressed/Taught in 6th Grade Math

9.1.8.B.1	Distinguish among cash, check, debit card, and credit card
9.1.8.B.2	Construct a simple personal savings and spending plan based on various sources of income
9.1.8.C.1	Compare and contrast credit cards and debit cards, and advantages/disadvantages of using each.
9.1.8.C.4	Demonstrate an understanding of the terminology associated with different types of credit (example: credit cards, installment loans, mortgages), and compare the interest rates associated with each
9.1.8.C.5	Calculate the cost of borrowing various amounts of money using different types of credit (example: credit cards, installment loans, mortgages)
9.1.8.E.4	Prioritize personal wants and needs when making purchases
9.1.8.E.5	Analyze interest rates and fees associated with financial services, credit cards, debit cards, and gift cards
9.1.8.E.6	Compare the value of goods or services from different sellers when purchasing large quantities and small quantities

Unit Names:

Ratios and Proportions
The Number System
Expressions and Equations
Geometry
Statistics & Probability

Materials:

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Infusion of Technology :

8.1.8.A.1   Demonstrate knowledge of a real world problem using digital tools.

8.1.8.A.2   Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.

8.1.8.A.3   Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

8.1.8.A.4   Graph and calculate data within a spreadsheet and present a summary of the results

8.1.8.A.5   Create a database query, sort and create a report and describe the process, and explain the report results.

8.1.8.E.1   Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

Course Assessments:

District Grading Policy:
- Tests
- Quizzes
- Homework/Classwork

Formative Assessments:
- Classwork
- Homework
- Personal Math Trainer

- Observation
- Questioning

<u>Summative Assessments:</u>
Chapter Tests
End-of-year Assessment
Performance Assessments

Content Area:	Grade 6 Mathematics	Grade(s)	Grade 6
Domain:	Number System		

Anchor Standard (ELA) or Domain (Math)

The Number System – 6.NS
- Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
- Multiply and divide multi-digit numbers and find common factors and multiples.
- Apply and extend previous understandings of numbers to the system of rational numbers.

Overview/Rationale

Students will apply the meaning of fractions, multiplication and division, and the connection between all three to understand and explain why the procedures for dividing fractions are reasonable. Students will use multiplication and division to solve problems. Students will further investigate through their previous knowledge, the full system of rational numbers, specifically negative rational numbers and negative integers. They reason about the order and absolute value of rational numbers, as well as the location of points in all four quadrants of the coordinate plane.

Standard(s)

- 6.NS.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.
- 6.NS.2 Fluently divide multi-digit numbers using the standard algorithm.
- 6.NS.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
- 6.NS.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.
- 6.NS.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.
- 6.NS.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.

- o 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, e.g., –(–3) = 3, and that 0 is its own opposite.
  - o 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.
  - o 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.
- Understand ordering and absolute value of rational numbers.
  - o Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.
  - o Write, interpret, and explain statements of order for rational numbers in real-world contexts.
  - o Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.
  - o Distinguish comparisons of absolute value from statements about order.
- 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.

Technology Standard(s)

8.1.8.A.1   Demonstrate knowledge of a real world problem using digital tools.

8.1.8.A.2   Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.

8.1.8.A.3   Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

8.1.8.A.4   Graph and calculate data within a spreadsheet and present a summary of the results

8.1.8.A.5   Create a database query, sort and create a report and describe the process, and explain the report results.

8.1.8.E.1   Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

Standards for Mathematical Practice(s) (MP#)
1. Make sense of problems and persevere in solving problems.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Critical Area/Domain

- Completing the understanding of division of rational numbers, which includes negative numbers.

Essential Question(s)

Chapter One
- How do you solve real-world problems involving whole number and decimals?
    - How do you divide multi-digit numbers?
    - How do you write the prime factorization of a number?
    - How can you find the least common multiple of two whole numbers?
    - How can you find the greatest common factor of two whole numbers?
    - How can you use the strategy, draw a diagram, to help you solve problems involving the GCF and the Distributive Property?
    - How do you add and subtract multi-digit decimals?
    - How do you multiply multi-digit decimals?
    - How do you divide decimals by whole numbers?
    - How do you divide whole numbers and decimals by decimals?
Chapter Two
- How can you use the relationship between multiplication and division to divide fractions?
    - How can you convert between fractions and decimals?
    - How can you compare and order fractions and decimals?
    - How do you multiply fractions?
    - How do you simplify fractional factors by using the greatest common factor?
    - How can you use a model to show division of fractions?
    - How can you use compatible numbers to estimate quotients of fractions and mixed numbers?
    - How do you divide fractions?
    - How can you use a model to show division of mixed numbers?
    - How do you divide mixed numbers?
    - How can you use the strategy use a model to help you solve a division problem?

Chapter Three
- How do you write, interpret, and use rational numbers?
    - How can you use positive and negative numbers to represent real-world quantities?
    - How can you compare and order integers?
    - How can you plot rational numbers on a number line?
    - How can you compare and order rational numbers?
    - How can you find and interpret the absolute value of a rational numbers?
    - How can you interpret comparisons involving absolute values?
    - How can you ploy ordered pairs of rational numbers on a coordinate plane?
    - How can you identify the relationship between points on a coordinate plane?
    - How can you find the distance between two points that lie on a horizontal or vertical line on a coordinate plane?
    - How can you use the strategy, draw a diagram, to help you solve a problem on the coordinate plane?

In this unit plan, the following 21ˢᵗ Century Career Ready Practices are addressed.

Career Ready Practices	
1. Act as a responsible and contributing citizen and employee.	**X**
2. Apply appropriate academic and technical skills	**X**
3. Attend to personal health and financial well-being.	**X**
4. Communicate clearly and effectively and with reason.	**X**
5. Consider the environmental, social and economic impacts of decisions	**X**
6. Demonstrate creativity and innovation.	**X**
7. Employ valid and reliable research strategies.	**X**
8. Utilize critical thinking to make sense of problems and persevere in solving them.	**X**
9. Model integrity, ethical leadership and effective management.	**X**
10. Plan education and career paths aligned to personal goals.	**X**
11. Use technology to enhance productivity.	**X**
12. Work productively in teams while using cultural global competence.	**X**

Student Learning Targets/Objectives/ Mathematical Practices

Chapter One

- Fluently divide multi-digit numbers. (MP 1,2,6)
- Write the prime factorization of numbers. (MP 1, 3,6,7)
- Find the least common multiple of two whole numbers. (MP 2,3,4,6)
- Find the greatest common factor of two whole numbers. (MP 2,3,4,6)
- Solve problems involving greatest common factor by using the strategy draw a diagram. (MP 1,5,6)
- Fluently add and subtract multi-digit decimals. (MP 3,6,7)
- Fluently multiply multi-digit decimals. (MP 2,6, 8)
- Fluently divide decimals by whole numbers. (MP 1,5,6,8)
- Fluently divide whole numbers and decimals by decimals. (MP 1,6,8)

Chapter Two

- Convert between fractions and decimals. (MP4, 6,7)
- Compare and order fractions and decimals. (MP3,6,8)
- Multiply fractions. (MP 2,6,8)
- Simplify fractional factors by using the greatest common factor. (MP 3,6)
- Use a model to show division of fractions. (MP 1,3,4)
- Use compatible numbers to estimate quotients of fractions and mixed numbers. (MP 1,2,3,6)
- Divide fractions. (MP 2,5,6,8)
- Use a model to show division of mixed numbers. (MP 4, 5, 8)
- Divide mixed numbers. (MP 1,6,7)
- Solve problems with fractions and mixed numbers by applying the strategy use a model. (MP 1,2,4,6)

Chapter Three

- Understand positive and negative numbers, and use them to represent real-world quantities. (MP 5,6,7)
- Compare and order integers. (MP 5, 8)
- Plot rational numbers on a number line, and use a number line to identify opposites. (MP 2, 4,7)
- Compare and order rational numbers. (MP 1,5)
- Find and interpret the absolute value of rational numbers. (MP 2,3,4,8)
- Interpret comparisons involving absolute values. (MP 1,2)
- Plot ordered pairs of rational numbers on a coordinate plane. (MP 6,8)
- Identify the relationship between points on a coordinate plane. (MP 4,7)
- Find horizontal and verical distances on the coordinate plane. (MP 1,5,6)

- Solve problems on the coordinate plane by using the strategy draw a diagram. (MP 1,5,6)

Assessments

- **Pre and Formative** –
  - Classwork, Homework, Center Work
  - Think, Pair, and Share
  - Show What You Know
  - Math Talk
  - Try This!
  - Share and Show
  - On Your Own
  - Quick Check
  - Problem Solving – Applications
  - Practice and Homework
  - Mid-Chapter Checkpoint
  - Digital Personal Math Trainer
  - Prerequisite Skills Inventory

- **Summative - Other assessment measures**
  - Review/Test
  - Chapter Test
  - Critical Area Performance Assessment
  - Digital Personal Math Trainer

- **Other Assessment Measures**
  - Alternate Assessments
  - Oral Assessments
  - Slate Assessments
  - Teacher Created Assessments
  - Group Problem Solving

Digital Tools and Resources

- Student Resources
  - Personal Math Trainer
  - Math on the Spot Video
  - Animated Math Models
  - Interactive Tools
  - Interactive Student Edition
  - HMH Mega Math
  - Real World Videos

- Teacher Resources
  - Electronic Teacher Edition
  - Professional Development Videos

o Common Core Interactive White Board Lessons

Teaching and Learning Actions

	Instructional Strategies
Instructional Strategies *Differentiation* *Special Education (Sped)* **ELL* ****Both*	- Breaking down the task*** - Providing step-by-step prompts*** - Daily testing - Repeated practice* - Sequenced Review - Directed Questioning and Responses* - Sequence Tasks from Easy to Difficult - Individual/Small-Group/Whole Class Instruction*** - Think Aloud* - Active Participation* - Warm-Up Activities - Meaningful Real Life Connections - Model Concepts*** - Centers* - Manipulatives – Concrete Experiences* - Mental Math - Pencil & Paper Skills - Calculator Use/Technology - Graphic Organizers*** - Make Predictions/Estimation - Writing Explanations - Scaffolding*** - Find a Pattern*** - Draw a Diagram*** - Use a formula - Solve a simpler problem - Guess and Check - Working Backwards - Multistep* - Restate*** - Frontload*** - Use a model* - Elicit Prior Knowledge*** - Identify Common Errors* - Chunking* - Think/Pair/Share*** - Cooperative Grouping*** - Illustrate Understanding*** - Scaffold Language** - Rephrase*** - Understanding Context** - Identify Relationships** - Develop Meanings** - Model Language**

Resources	

6.NS.1

- Lessons: 2.5, 2.6, 2.7, 2.8, 2.9

6.NS.2

- Lessons: 1.1,

6.NS.3

- Lessons: 1.6, 1.7, 1.8, 1.9

6.NS.4

- Lessons: 1.2, 1.3, 1.4,1.5, 2.3, 2.4

6.NS.5

- Lessons: 3.1, 3.3,

6.NS.6

- Lessons: 2.1, 3.1, 3.7, 3.8

6.NS.7

- Lessons: 2.2, 3.2, 3.4, 3.5, 3.6

6.NS.8

- Lessons: 3.9, 3.10, 10.9

Suggested Time Frame:	By the end of Grade 6

Content Area:	Grade 6 Mathematics	Grade(s)	Grade 6
Domain:	Ratios and Proportional Relationships		

Anchor Standard (ELA) or Domain (Math)

Ratios and Proportional Relationships – 6.RP
- Understand ratio concepts and use ratio reasoning to solve problems.

Overview/Rationale

Students will use reasoning about multiplication and division to solve problems on ratio and rate. Students will view equivalent ratios and rates that come and extend from pairs of rows (or columns) found in a multiplication table. By analyzing drawings and diagrams which show the relative size of quantities, students will be able to relate their understanding of multiplication and division with rates and ratios. This will allow students to expand the variety of problems for which they can use multiplication and division to solve problems, and then connect to ratios and fractions. Students will be able to solve various problems involving ratios and rates.

Standard(s)

- 6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
- 6.RP.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.
- 6.RP.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.
    - o 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.
    - o Solve unit rate problems including those involving unit pricing and constant speed.
    - o 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.
    - o Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Technology Standard(s)
8.1.8.A.1   Demonstrate knowledge of a real world problem using digital tools.

8.1.8.A.2   Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.

8.1.8.A.3   Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

8.1.8.A.4   Graph and calculate data within a spreadsheet and present a summary of the results

8.1.8.A.5   Create a database query, sort and create a report and describe the process, and explain the report results.

8.1.8.E.1   Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

Standards for Mathematical Practice(s)

9. Make sense of problems and persevere in solving problems.
10. Reason abstractly and quantitatively.
11. Construct viable arguments and critique the reasoning of others.
12. Model with mathematics.
13. Use appropriate tools strategically.
14. Attend to precision.
15. Look for and make use of structure.
16. Look for and express regularity in repeated reasoning.

Critical Area/Domain

- Connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems

Essential Question(s)

Chapter Four
- How do you solve real-world problems involving whole number and decimals?
  - How can you model ratios?
  - How do you write ratios and rates?
  - How can you use a multiplication table to find equivalent ratios?
  - How can you us the strategy find a pattern to help you compare ratios?
  - How can you use tables to solve problems involving equivalent ratios?
  - How can you use unit rates to make comparisons?
  - How can you solve problems using unit rates?
  - How can you use a graph to represent equivalent ratios?

Chapter Five
- How can you use ratio reasoning to solve percent problems?

- How can you use a model to show a percent?
- How can you write percents as fractions and decimals?
- How can you write fractions and decimals as percents?
- How do you find a percent of a quantity?
- How can you use the strategy use a model to help you solve a percent problem?
- How can you find the whole given a part and the percent?

Chapter Six
- How can you use measurements to help you describe and compare objects?
  - How can you use ratio reasoning to convert from one unit of length to another?
  - How can you use ratio reasoning to convert from one unit of capacity to another?
  - How can you use ratio reasoning to convert from one unit of weight or mass to another?
  - How can you transform units to solve problems?
  - How can you use the strategy use a formula to solve problems involving distance, rate, and time?

In this unit plan, the following 21st Century Career Ready Practices are addressed.

Career Ready Practices	
1. Act as a responsible and contributing citizen and employee.	**X**
2. Apply appropriate academic and technical skills	**X**
3. Attend to personal health and financial well-being.	**X**
4. Communicate clearly and effectively and with reason.	**X**
5. Consider the environmental, social and economic impacts of decisions	**X**
6. Demonstrate creativity and innovation.	**X**
7. Employ valid and reliable research strategies.	**X**
8. Utilize critical thinking to make sense of problems and persevere in solving them.	**X**
9. Model integrity, ethical leadership and effective management.	**X**
10. Plan education and career paths aligned to personal goals.	**X**
11. Use technology to enhance productivity.	**X**

12. Work productively in teams while using cultural global competence.	**X**	

Student Learning Targets/Objectives/ Mathematical Practices (MP)

Chapter Four
- Model Ratios. (MP 5,7)
- Write ratios and rates. (MP 1,2)
- Use a multiplication table to find equivalent ratios. (MP 1,4)
- Solve problems involving ratios by using the strategy find a pattern. (MP 1,7)
- Use tables to solve problems involving equivalent ratios. (MP 4,8)
- Use unit rates to make comparisons. (MP 2,6)
- Solve problems using rates. (MP 1,3,5)
- Use a graph to represent equivalent ratios. (MP 4,7)

Chapter Five
- Use a model to show a percent as a rate per 100. (MP 3,5)
- Write percents as fractions and decimals. (MP 2,5,7,8)
- Write fractions and decimals as percents. (MP 5,8)
- Find a percent of a quantity. (MP 1,2,5)
- Solve percent problems by applying the strategy use a model. (MP 1,4,5,6)
- Find the whole given a part and the percent. (MP 1,4)

Chapter Six
- Use ratio reasoning to convert from unit of length to another. (MP 1,2,6)
- Use ratio reasoning to convert from one unit of capacity to another. (MP 2,4,8)
- Use ratio reasoning to convert from one unit of weight or mass to another. (MP 1,2,3)
- Transform units to solve problems. (MP 1,3,5)
- Solve problems, involving distance, rate, and time by applying the strategy use a formula. (MP 1,7)

Assessments

- **Pre and Formative** –
  - Classwork, Homework, Center Work
  - Think, Pair, and Share
  - Show What You Know
  - Math Talk
  - Try This!
  - Share and Show
  - On Your Own
  - Quick Check
  - Problem Solving – Applications
  - Practice and Homework
  - Mid-Chapter Checkpoint
  - Digital Personal Math Trainer

- Prerequisite Skills Inventory

- **Summative - Other assessment measures**
  - Review/Test
  - Chapter Test
  - Critical Area Performance Assessment
  - Digital Personal Math Trainer

- **Other Assessment Measures**
  - Alternate Assessments
  - Oral Assessments
  - Slate Assessments
  - Teacher Created Assessments
  - Group Problem Solving

Digital Tools and Resources

- Student Resources
  - Personal Math Trainer
  - Math on the Spot Video
  - Animated Math Models
  - Interactive Tools
  - Interactive Student Edition
  - HMH Mega Math
  - Real World Videos

- Teacher Resources
  - Electronic Teacher Edition
  - Professional Development Videos
  - Common Core Interactive White Board Lessons

Teaching and Learning Actions

Instructional Strategies *Differentiation* *Special Education (Sped)* **ELL* ***Both*	**Instructional Strategies** - Breaking down the task*** - Providing step-by-step prompts*** - Daily testing - Repeated practice* - Sequenced Review - Directed Questioning and Responses* - Sequence Tasks from Easy to Difficult - Individual/Small-Group/Whole Class Instruction*** - Think Aloud* - Active Participation* - Warm-Up Activities - Meaningful Real Life Connections - Model Concepts*** - Centers*

	- Manipulatives – Concrete Experiences* - Mental Math - Pencil & Paper Skills - Calculator Use/Technology - Graphic Organizers*** - Make Predictions/Estimation - Writing Explanations - Scaffolding*** - Find a Pattern*** - Draw a Diagram*** - Use a formula - Solve a simpler problem - Guess and Check - Working Backwards - Multistep* - Restate*** - Frontload*** - Use a model* - Elicit Prior Knowledge*** - Identify Common Errors* - Chunking* - Think/Pair/Share*** - Cooperative Grouping*** - Illustrate Understanding*** - Scaffold Language** - Rephrase*** - Understanding Context** - Identify Relationships** - Develop Meanings** - Model Language**
Resources	

6.RP.1
- Lessons: 4.1, 4.2,

6.RP.2
- Lessons: 4.6

6.RP.3
- Lessons: 4.3, 4.4, 4.5, 4.7, 4.8, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 6.1, 6.2, 6.3, 6.4, 6.5

Suggested Time Frame:	By the end of Grade 6

Content Area:	Grade 6 Mathematics	Grade(s)	Grade 6
Domain:	**Expressions and Equations**		

Anchor Standard (ELA) or Domain (Math)

Expressions – 6.EE
- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Reason about and solve one-variable equations and inequalities.
- Represent and analyze quantitative relationships between dependent and independent variables.

Overview/Rationale

Students will understand the meaning of variables in mathematical expressions. Based on given situations, they will create expressions and equations, evaluate the expression, and use that (along with formulas) to solve problems. Students will be able to identify equivalent expressions even if they are in different forms. They will be able to use the properties of operations to rewrite expressions in their equivalent form. By finding the solution of an equation, students will know that the value of the variable will make the equation true. Students will solve simple one step equations using the properties of operations and ensuring that both sides of the equation remain equal to one another. Students will create tables and assess the data within the table, as well as use equations to relate quantities.

Standard(s)

- 6.EE.1 – Write and evaluate numerical expressions involving whole-number exponents.
- 6.EE.2 – Write, read, and evaluate expressions in which letters stand for numbers.
    - Write expressions that record operations with numbers and with letters standing for numbers.
    - 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.
    - 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.3 – Apply the properties of operations to generate equivalent expressions.
- 6.EE.4 – Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).
- 6.EE.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.

- 6.EE.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.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.
- 6.EE.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.
- 6.EE.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.

Technology Standard(s)

8.1.8.A.1   Demonstrate knowledge of a real world problem using digital tools.

8.1.8.A.2   Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.

8.1.8.A.3   Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

8.1.8.A.4   Graph and calculate data within a spreadsheet and present a summary of the results

8.1.8.A.5   Create a database query, sort and create a report and describe the process, and explain the report results.

8.1.8.E.1   Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

Standards for Mathematical Practice(s)

17. Make sense of problems and persevere in solving problems.
18. Reason abstractly and quantitatively.
19. Construct viable arguments and critique the reasoning of others.
20. Model with mathematics.
21. Use appropriate tools strategically.

22. Attend to precision.
23. Look for and make use of structure.
24. Look for and express regularity in repeated reasoning.

Critical Area/Domain

- Writing, interpreting, and using expressions and equations

Essential Question(s)

Chapter Seven
- How do you write, interpret, and use algebraic expressions?
  - How do you write and find the value of expressions involving exponents?
  - How do you use the order of operations to evaluate expressions involving exponents?
  - How do you write an algebraic expression to represent a situation?
  - How can you describe the parts of an expression?
  - How do you evaluate an algebraic expression or a formula?
  - How can you use variables, and algebraic expressions to solve problems?
  - How can you use the strategy use a model to combine like terms?
  - How can you use properties of expressions to write equivalent algebraic expressions?
  - How can you identify equivalent algebraic expressions?

Chapter Eight
- How can you use equations and inequalities to represent situations and solve problems?
  - How do you determine whether a number is a solution of an equation?
  - How do you write an equation to represent a situation?
  - How can you use models to solve additions equations?
  - How can you use algebra to solve addition and subtraction equations?
  - How can you use models to solve multiplication equations?
  - How can you use algebra to solve multiplication and division equations?
  - How can you use the strategy solve a simpler problem to solve equations involving fractions?
  - How can you determine whether a number is a solution of an inequality?
  - How can you write an inequality to represent a situation?
  - How can you represent the solutions of an inequality on a number line?

Chapter Nine
- How can you show relationships between variables?
  - How can you write an equation to represent the relationship between an independent variable and a dependent variable?
  - How can you translate between equations and tables?
  - How can you use the strategy find a pattern to solve problems involving relationships between quantities?

o How can you graph the relationship between two quantities?

o How can you translate between equations and graphs?

In this unit plan, the following 21st Century Career Ready Practices are addressed.

Career Ready Practices	
13. Act as a responsible and contributing citizen and employee.	**X**
14. Apply appropriate academic and technical skills	**X**
15. Attend to personal health and financial well-being.	**X**
16. Communicate clearly and effectively and with reason.	**X**
17. Consider the environmental, social and economic impacts of decisions	**X**
18. Demonstrate creativity and innovation.	**X**
19. Employ valid and reliable research strategies.	**X**
20. Utilize critical thinking to make sense of problems and persevere in solving them.	**X**
21. Model integrity, ethical leadership and effective management.	**X**
22. Plan education and career paths aligned to personal goals.	**X**
23. Use technology to enhance productivity.	**X**
24. Work productively in teams while using cultural global competence.	**X**

Student Learning Targets/Objectives/ Mathematical Practices

Chapter Seven
- Write and evaluate expressions involving exponents. (MP 6,7,8)
- Use the order of operations to evaluate expressions involving exponents. (MP 4,6)
- Write algebraic expressions. (MP 2,4,6)
- Identify and describe parts of expressions. (MP 1,2,6)
- Evaluate algebraic expressions and formulas. (MP 4,5,6)
- Use algebraic expressions to solve problems. (MP 1,2,4)
- Combine like terms by applying the strategy use a model. (MP 1,4,5)
- Use the properties of operations to generate equivalent algebraic expressions. (MP 2,3,8)
- Identify equivalent algebraic expressions. (MP 2,6)

Chapter Eight

- Determine whether a number is a solution of an equation. (MP 2,4,6)
- Translate between words and equations. (MP 2,3,4,6)
- Use models to solve addition equations. (MP 3,4,5)
- Use algebra to solve addition and subtraction equations. (MP 2,8)
- Use models to solve multiplication equations. (MP 1,4,5,6)
- Use algebra to solve multiplication and division equations. (MP 2,7,8)
- Solve equations involving fractions by using the strategy solve a simpler problem. (MP 2,6,7,8)
- Determine whether a number is a solution of an inequality. (MP 2,3,6)
- Write algebraic inequalities. (MP 2,4)
- Represent solutions of algebraic inequalities on number line diagrams. (MP 4,5,6)

Chapter Nine

- Write an equation to represent the relationship between an independent variable and a dependent variable. (MP 1,4,6,7)
- Translate between equations and tables. (MP 2,3,4,7)
- Solve problems involving relationships between quantities by using the strategy find a pattern. (MP 1,4,8)
- Graph the relationship between two quantities. (MP 3,4,6)
- Translate between equations and graphs. (MP 3,4,5)

Assessments

- **Pre and Formative** –
  - Classwork, Homework, Center Work
  - Think, Pair, and Share
  - Show What You Know
  - Math Talk
  - Try This!
  - Share and Show
  - On Your Own
  - Quick Check
  - Problem Solving – Applications
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  - Mid-Chapter Checkpoint
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- **Other Assessment Measures**
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  - Oral Assessments
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  - Teacher Created Assessments
  - Group Problem Solving

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  - Math on the Spot Video
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	- Find a Pattern*** - Draw a Diagram*** - Use a formula - Solve a simpler problem - Guess and Check - Working Backwards - Multistep* - Restate*** - Frontload*** - Use a model* - Elicit Prior Knowledge*** - Identify Common Errors* - Chunking* - Think/Pair/Share*** - Cooperative Grouping*** - Illustrate Understanding*** - Scaffold Language** - Rephrase*** - Understanding Context** - Identify Relationships** - Develop Meanings** - Model Language**
Resources	

6.EE.1

- Lessons: 7.1, 7.2,

6.EE.2

- Lessons: 7.3, 7.4, 7.5, 10.1, 10.3, 10.5, 10.6, 10.7, 11.3, 11.4, 11.6

6.EE.3

- Lessons: 7.7, 7.8

6.EE.4

- Lessons: 7.9

6.EE.5

- Lessons: 8.1, 8.8

6.EE.6

- Lessons: 7.6

6.EE.7

- Lessons: 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 10.1

6.EE.8

- Lessons: 8.9, 8.10

6.EE.9
- Lessons: 9.1, 9.2, 9.3, 9.4, 9.5

Suggested Time Frame:	By the end of Grade 6

Content Area:	Grade 6 Mathematics	Grade(s)	Grade 6
Domain:	Geometry		

Anchor Standard (ELA) or Domain (Math)

Expressions – 6.G
  Solve real-world and mathematical problems involving area, surface area, and volume.

Overview/Rationale

Students will use previous knowledge to reason about relationships among shapes to calculate area, surface area, and volume. Students will decompose various types of shapes, including right triangles, other triangles, and special quadrilaterals, as well as relate these shapes to rectangles. Using those methods, students will carry out discussions, and create justifications for the area formulas of triangles and parallelograms. Students will calculate the surface areas of three dimensional figures, such as prisms and pyramids, by breaking them into sections for which they can find the area. Students will reason with right rectangular prisms, whose side lengths are fractions, to further investigate the volume formula for these types of prims. To prepare for Grade 7, students will begin to draw and construct polygons in the coordinate plane.

Standard(s)

- 6.G.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.
- 6.G.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 $V = l\,w\,h$ and $V = b\,h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
- 6.G.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.
- 6.G.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.

Technology Standards

8.1.8.A.1   Demonstrate knowledge of a real world problem using digital tools.

8.1.8.A.2   Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.

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Standards for Mathematical Practice(s)

25. Make sense of problems and persevere in solving problems.
26. Reason abstractly and quantitatively.
27. Construct viable arguments and critique the reasoning of others.
28. Model with mathematics.
29. Use appropriate tools strategically.
30. Attend to precision.
31. Look for and make use of structure.
32. Look for and express regularity in repeated reasoning.

Critical Area/Domain

- Solve real-world and mathematical problems involving area, surface area, and volume.

Essential Question(s)

Chapter Ten

- How can you use measurements to describe two-dimensional figures?
    - How can you find the area of parallelograms?
    - What is the relationship among the areas of triangles, rectangles, and parallelograms?
    - How can you find the area of triangles?
    - What is the relationship between the areas of trapezoids and parallelograms?
    - How can you find the area of trapezoids?
    - How can you find the area of regular polygons?
    - How can you find the area of composite figures?
    - How can you use the strategy find a pattern to show how changing dimensions affects area?

- How can you play polygons on a coordinate plane and find their side lengths?

Chapter Eleven

- How can you use measurements to describe three-dimensional figures?
  - How do you use nets to represent three-dimensional figures?
  - What is the relationship between a net and the surface area of a prism?
  - How can you find the surface area of prisms?
  - How can you find the surface area of a pyramid?
  - What is the relationship between the volume and the edge lengths of a prism with fractional edge lengths?
  - How can you find volumes of rectangular prisms with fractional edge lengths?
  - How can you use the strategy use a formula to solve problems involving area, surface area, and volume?

In this unit plan, the following 21st Century themes and skills are addressed.

Career Ready Practices	
1. Act as a responsible and contributing citizen and employee.	**X**
2. Apply appropriate academic and technical skills	**X**
3. Attend to personal health and financial well-being.	**X**
4. Communicate clearly and effectively and with reason.	**X**
5. Consider the environmental, social and economic impacts of decisions	**X**
6. Demonstrate creativity and innovation.	**X**
7. Employ valid and reliable research strategies.	**X**
8. Utilize critical thinking to make sense of problems and persevere in solving them.	**X**
9. Model integrity, ethical leadership and effective management.	**X**
10. Plan education and career paths aligned to personal goals.	**X**
11. Use technology to enhance productivity.	**X**
12. Work productively in teams while using cultural global competence.	**X**

Student Learning Targets/Objectives/ Mathematical Practices (MP)

Chapter Ten

- Find the area of parallelograms. (MP 4,5,6,8)
- Investigate the relationship among the areas of triangles, rectangles, and parallelograms. (MP 1,7,8)
- Find the area of triangles. (MP 1,5,8)
- Investigate the relationship between the areas of trapezoids and parallelograms. (MP 4,7,8)
- Find the area of trapezoids. (MP 1,3,7)
- Find the area of regular polygons. (MP 7,8)
- Find the area of composite figures. (MP 1,2,5)
- Determine the effect of changing dimensions on the area of a polygon by using the strategy find a pattern. (MP 1,3,8)
- Plot polygons on a coordinate plane, and use coordinates to find side lengths. (MP 4,6,7)

Chapter Eight

- Use nets to represent three-dimensional figures. (MP 1,6)
- Use nets to recognize that the surface area of a prism is equal to the sum of the areas of its faces. (MP 1, 2, 3,4)
- Find the surface area of prisms. (MP 2,4,8)
- Find the surface area of pyramids. (MP 4,5,6)
- Investigate the volume of rectangular prisms with fractional edge lengths. (MP 5,6,7,8)
- Use formulas to find the volume of rectangular prisms with fractional edge lengths. (MP 2,5,6)
- Solve problems involving area, surface area, and volume by applying the strategy use a formula. (MP 1,2)

Assessments

- **Pre and Formative** –
  - Classwork, Homework, Center Work
  - Think, Pair, and Share
  - Show What You Know
  - Math Talk
  - Try This!
  - Share and Show
  - On Your Own
  - Quick Check
  - Problem Solving – Applications
  - Practice and Homework
  - Mid-Chapter Checkpoint
  - Digital Personal Math Trainer
  - Prerequisite Skills Inventory

- **Summative - Other assessment measures**
  - Review/Test

- Chapter Test
- Critical Area Performance Assessment
- Digital Personal Math Trainer

- **Other Assessment Measures**
- Alternate Assessments
- Oral Assessments
- Slate Assessments
- Teacher Created Assessments
- Group Problem Solving

Digital Tools and Resources

- Student Resources
    - Personal Math Trainer
    - Math on the Spot Video
    - Animated Math Models
    - Interactive Tools
    - Interactive Student Edition
    - HMH Mega Math
    - Real World Videos

- Teacher Resources
    - Electronic Teacher Edition
    - Professional Development Videos
    - Common Core Interactive White Board Lessons

Teaching and Learning Actions

Instructional Strategies *Differentiation* *Special Education (Sped)* **ELL* ***Both*	**Instructional Strategies** - Breaking down the task*** - Providing step-by-step prompts*** - Daily testing - Repeated practice* - Sequenced Review - Directed Questioning and Responses* - Sequence Tasks from Easy to Difficult - Individual/Small-Group/Whole Class Instruction*** - Think Aloud* - Active Participation* - Warm-Up Activities - Meaningful Real Life Connections - Model Concepts*** - Centers* - Manipulatives – Concrete Experiences* - Mental Math - Pencil & Paper Skills - Calculator Use/Technology - Graphic Organizers***

	- Make Predictions/Estimation - Writing Explanations - Scaffolding*** - Find a Pattern*** - Draw a Diagram*** - Use a formula - Solve a simpler problem - Guess and Check - Working Backwards - Multistep* - Restate*** - Frontload*** - Use a model* - Elicit Prior Knowledge*** - Identify Common Errors* - Chunking* - Think/Pair/Share*** - Cooperative Grouping*** - Illustrate Understanding*** - Scaffold Language** - Rephrase*** - Understanding Context** - Identify Relationships** - Develop Meanings** - Model Language**
Resources	

6.G.1
- Lessons: 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 11.7

6.G.2
- Lessons: 11.5, 11.6, 11.7

6.G.3
- Lessons: 10.9

6.G.4
- Lessons: 11.1, 11.2, 11.3, 11.4, 11.7

Suggested Time Frame:	By the end of Grade 6