Domain: 6th Grade Math

Cluster: Ratios and Proportional Relationships

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 receives, candidate C received nearly three votes.”

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

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.

Essential Questions	Enduring Understandings	Activities, Investigations and Student Experiences
1) How can you use ratios to compare two or more quantities? 2) How can you use rates to compare two or more quantities? 3) Where do you find rates/ratios in your everyday life? 4) How can you use percent to compare quantities expressed per hundred?	• Write, interpret, and compare ratios with two or more quantities. • Write equivalent ratios and ratios in simplest form. • Solve unit rate problems including unit pricing and constant speed. • Solve real-world problems involving rates and ratios. • Write equivalent fractions, decimals, and percents. • Find the percent of a number. • Solve problems involving percent increase and decrease.	• Multiplication fact practice • Respond to Essential Questions at start and end of unit • Use vocabulary in speaking and writing, as needed • Let’s Practice and Guided Practice problems from the textbook, workbook pages for homework • Khan Academy tutorials and assignments • Math Antics videos • Lesson task cards • Interactive notebook assignments • IXL assignments • Lesson foldables and flippables • Error analysis and critiquing the reasoning of others **<u>Activities</u>** **<u>Ratios</u>** • **Ratio Spinner Activity:** Students spin a spinner 30 times and tally the number of times they land on each letter. They will create ratios using the data they collected, such as ratio of A to D, ratio of B and C to F, etc. • **Fruit Loop Lab:** Students create ratios based upon the number of fruit loops they receive, such as ratio of red to blue, ratio of blue and green to yellow, etc. • **Equivalent Ratio Manipulatives:** Students will create equivalent ratios using red and yellow chips, such as 6 to 8 = 3 to 4.

		• **Equivalent Ratios Matching:** Students will match base ratios with their equivalent ratios and separate them into piles. • **Ratio Tape Diagrams:** Students will draw tape diagrams for equivalent ratios. They will find the missing terms in each tape diagram. They will create tape diagrams based upon the base ratio provided. • **Are These Ratios Equivalent:** Student will work with a partner and decide if the ratios given are equivalent or nonequivalent ratios, such as 6:8 = 3:4 or 6:8 = 2:3. They will place the ratios on a placemat. • **Equivalent Ratio Categories:** Students will categorize ratios into equivalent and not equivalent categories, such as 3:4 = 6:8, but 3:4≠6:10. • **Heart Rate Ratios Activity:** Students learn about heart rate and the importance of this number in sports medicine. They compute their own heart rate after various activities and graph the results. They calculate the target heart rate and answer critical thinking questions. • **Guess My Ratio Activity:** This activity will have the students trying to guess your ratio, using clues that involve equivalent ratios, converting ratios to decimals and other clues. • **Ratios/Coordinate Plane Matching:** Students will match ratios, ratio tables, and coordinate planes. Students must match each ratio, find all of the equivalent ratios, then match it to the plotted points on a coordinate grid. • **Ratios Connect Four**: Students will write ratios based upon word problems and place chips on a gameboard. The first person to connect four wins. • **Ratios Error Analysis:** Giving students opportunities to identify and correct errors in presented solutions allows them to show their understanding of the ratio and rates. • **Example Assessment Question:** **Hours 2 4 6 9 ?** **Cost 16 32 48 ? 88** ○ A) The table above shows the cost for renting a bicycle at Ike's Bikes. Based on the rate in the table, what is the cost for 9 hours? ○ B) Based on the rate in the table above, how many hours can you rent a bike if you pay $88 ○ C) Using the same rate, how many hours can you rent a bike for if you have $336? **<u>Rates</u>** • **Rate and Unit Rate Categories:** Students will categorize rate and unit rates into categories and be able to identify the differences between them.

		● **Rate and Unit Rate Conversions:** Students will convert rates into unit rates and unit rates into rates using division and multiplication. ● **Unit Rate Road Trip:** Students will plan a road trip starting in Guttenberg, NJ and ending in Hollywood, CA. They must make at least 5 stops along the way. They will calculate the amount of time it takes and the amount of gas needed between each stop. They will present their trip in a powerpoint presentation to the class. ● **The "Better Buy" Game:** Students will divide prices to find unit prices and decide which item, out of the two given, is the better buy. The student with more "better buys" at the end of the game is the winner. ● **Supermarket Circular Project:** Students will create supermarket circulars based upon real items from local supermarkets. They will choose 10 or more items and cut them out and paste them on a posterboard. They must take the original price and divide to find the unit price for each item in their supermarket. ● **Everyday Life Rates:** Students can be tasked to discover unit rates in everyday life (prices of gas, items at grocery store, price per cookie in a box of cookies). ● **Example Assessment Question:** ○ A) You can buy 5 cans of soda for $3.05, 3 cans of soda for $1.86, or 9 cans of soda for $5.76. Which deal is the best buy? Explain your reasoning. ○ B) Using the best buy rate, how much would it cost to buy 36 cans of soda? **<u>Percents</u>** ● **Fraction, Decimal, Percent Matching:** Students will match fractions with decimals and percents, decimals with fractions and percents, and percents with fractions and decimals on a large FDP table. ● **Percent of a Number Template:** Using the formula template p/w = %/100, students will find the part that is missing. They may also have to find the whole or the percent that is missing, depending on the problem. ● **Percent of a Number Memory Matching:** Students will match the part, whole, or percent with the correct problem while playing a memory matching game. ● **Percent Coupon Project:** Students will select 3 or 4 items. They will create/draw percentage coupons that could be used in a store for items on sale. For example, they would create a coupon for Nike sneakers that are originally priced at $85 with a 20% off coupon.

		• **Percent Circular Project:** Students will create a store and sell 4 or more items. They will create a circular on the computer with the regular price and the percentage off for each item. They will calculate the sale price of each item on the inside of the circular.
		• **Example Assessment Question:**
		  ○ A) The bakery makes a different amount of bagels each day. They always make 40% of the total amount of bagels, plain bagels. Today, they will make 48 plain bagels. What is the total number of bagels they will make today?
		  ○ B) The same bakery will make a total of 200 bagels tomorrow. How many of those bagels will be plain?
		  ○ C) If they made 500 plain bagels and sold 75 of them, what percentage of the plain bagels did they sell?

Equipment Needed • Art supplies • Pre-made games • Sheet protectors • Dry-erase markers • Templates • Paper strips • Foldables and flippables • Graph paper • Coordinate grids • Index cards • Calculator • Fruit Loops • Spinners • Supermarket Circulars		**Teacher Resources** • Math In Focus Textbook • Khan Academy website • Teachers Pay Teachers website • IXL website • Math Antics website • Performance Coach Workbook • Pinterest website • Engage NY website • PARCC website • Problem-Attic website

Domain: 6th Grade Math
Cluster: The Number System
A. 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? **B. 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).

C. 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 o C > –7 o C to express the fact that –3 o C is warmer than –7 o 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 realworld 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.

Essential Questions	Enduring Understandings	Activities, Investigations and Student Experiences
1) How can whole numbers, fractions, and decimals be represented on a number line and coordinate plane? 2) What are the differences between negative and positive rational numbers? 3) How can whole number concepts be extended to fractions and decimals when more precise calculations are needed? 4) How do mathematical operations relate to one another?	● Interpret, locate, compare, order, and write inequalities for negative and positive rational numbers. ● Calculate the GCF and LCM of two whole numbers. ● Use negative numbers to represent real-world quantities. ● Understand absolute value and interpret absolute value as the magnitude for a positive	● Multiplication fact practice ● Respond to Essential Questions at start and end of unit ● Use vocabulary in speaking and writing, as needed ● Let's Practice and Guided Practice problems from the textbook, workbook pages for homework ● Khan Academy tutorials and assignments ● Math Antics videos ● Lesson task cards ● Interactive notebook assignments ● IXL assignments ● Lesson foldables and flippables ● Error analysis and critiquing the reasoning of others **<u>Activities:</u>** **<u>Factors and Multiples</u>** ● **3-D Factor Rainbow:** Find all of the factors of a given number

5) How can a number be broken down into its smaller factors? 6) How does using a number line help determine the relative values of rational numbers? 7) How can every point on the coordinate plane be represented? 8) Where do you see examples of the coordinate plane in everyday life?	or negative real-life quantity. ● Locate positive/negative rational number ordered pairs on a coordinate plane.	● **3-D Upside Down Birthday Cake:** Calculate the GCF and LCM of two numbers ● **GCF/LCM Connect Four:** Students will answer word problems based on GCF and LCM. They will place chips on game boards. The winner connects four answers in a row. ● **Example Assessment Question:** ○ Use the greatest common factor (GCF) to factor the following expression: 56 + 70. **<u>Fractions</u>** ● **Fraction Recipe Project:** Students will research recipes and create a poster board displaying the original recipe and the same recipe doubled, cut in half, tripled, etc. ● **Division of Fractions Matching Game:** Students will work in pairs and be given a set of fraction cards (half are division problems and half are the matching answers). Students will take turns trying to match the questions with the answers.The student who has more pairs at the end of the game is the winner. ● **Fraction Bar Models:** Students will model dividing fractions using paper strips and bar models. ● **Comparing Quotients to 1:** Students will categorizing dividing decimals problems in quotients that are less than 1 and quotients that are greater than 1. ● **Dividing Mixed Numbers Maze:** Students will solve fraction and mixed number examples and word problems on a maze. They will color in the maze as they answer each part of the question correctly. They must go from start to finish. ● **Example Assessment Question:** ○ The distance around Park A is 1 4/5 miles and there are 2 benches every 3/10 mile. The distance around Park B is 3 3/4 and there are 3 benches every 5/12 mile. How many total benches are in the parks? **<u>Decimals</u>** ● **Dividing Decimals Template:** Students will divide decimals on large boxed graph paper in order to keep the place values aligned. ● **Dividing Decimals War Game:** Each student will flip over a card from a dividing decimals deck. The students will solve his/her problem on a template. The student with the larger quotient wins both cards. ● **Add/Subtract Decimals Connect Four:** Students will answer adding and subtracting decimal word problems and place chips on a game board. The first student with four in a row is the winner. ● **Decimal Operations Connect Four:** Students will answer word problems with all four decimal operations while playing Connect Four. ● **Quotients with/without Remainders:** Students will categorize division problems into quotients with remainder and without remainder. They will solve word problems with remainders and decide if the remainder is needed or not.

		● **Plan a Celebration Project:** Students will plan a celebration to honor a local hero. They must decide how much it will cost and how much each student must raise in order to have the party. They must research a list of supplies, decide how much of each supply they will need and come up with a total cost. They must convince the teacher and the other students of the class that their celebration is affordable and well-planned. Students can create poster boards to display during their presentation. ● **Example Assessment Question:** ○ A) Jordan is creating a rectangular garden in his backyard. The length will measure 7.2 feet and the width will measure 14.85 feet. What is the perimeter of the garden? ○ B) Jordan will fence in the garden with fencing that costs $7.89 per foot. What is the total cost to fence in the garden? Round to the nearest cent. ○ C) Jordan has $500 in his bank account. He uses his debit card to pay for the fencing. What is his balance after he pays for the fence? **<u>Integers</u>** ● **Negative/Positive Integer War:** Students will play war with negative and positive integers. The rules for the game can change every few minutes: greatest value wins, lowest value wins, value closest to 0 wins, or value farthest from 0 wins. ● **Negative/Positive Integer Ordering Activity:** Students will order integer cards from least to greatest and greatest to least. ● **Negative/Positive Integer Comparisons:** Students will compare integers using the <,>, or = symbols. ● **Thermometer Readings** ● **Balancing the Checkbook Project:** Each student will be given a set amount of funds in their “checking account”. They will be given specific instructions for deposits and withdrawals for that month. Students must follow the specific directions and add and subtract the funds to come up with an ending balance. Deposits and withdrawals should vary for each student or group of students but project is completed individually over time. ● **Negative/Positive Real-Life Situation Categories:** Students will categorize real-world situations into negative and positive integer categories. ● **Example Assessment Question:** ○ Decide if each number is between -9 and -10 on a number line. A) -8.95 B) The opposite of 9 7/9 C) -19/2 D) The opposite of the opposite of 9.3 E) -10 ⅓ F) The opposite of -(-9.7) **<u>Rational Numbers</u>**

		● **Rational Numbers Categories:** Categorize rational numbers located between two negative integers, such as -5 and -6 or -8 and -9. ● **Floor Number Lines:** Locate/estimate rational numbers or a large class-size number line. Identify which integer a rational number is closer to. ● **Rational Numbers Number Line Activity:** Locate fractions and decimals on pre-made number line with different intervals (½, ⅓, ¼, ⅕, ⅙, ⅛, 1/9, 1/10, 1/12, etc.). ● **Rational Number War and Ordering:** The rules can change as the game goes on: greatest value wins, lowest value wins, value closest to 0 wins, or value farthest from 0 wins. ● **Rational Numbers Number Lines:** Create number lines on sentence strips and plot rational numbers on the line based on different intervals (½, ⅓, ¼, ⅕, ⅙, ⅛, 1/9, 1/10, 1/12, etc.). ● **Rational Numbers Inequalities:** Create inequalities using rational numbers. ● **Absolute Value War and Ordering** ● **Example Assessment Question:** ○ A) Melody ordered 5 7/8, -6.7, and -3.2 in order from LEAST to GREATEST using inequality symbols. She ordered them as follows: -6.7 > 5 7/8 > -3.2 (also shown in the picture below). Melody made a few mistakes. 1) Explain and describe her errors. 2) Explain to Melody how to fix her mistakes. ○ B) Provide Melody with the correct way to write these rational numbers in order from least to greatest using an inequality. **<u>Coordinate Plane</u>** ● **Coordinate Plane Connect Five:** Students will plot ordered pairs on a coordinate plane with a partner. The first person to connect 5 points in a row wins. ● **Coordinate Plane Reflections Matching:** Students will match a reflection with the correct coordinate plane. The student that has the most matches wins. ● **City Metropolis:** Students will create a city with landmarks. They will plot the landmarks on a large coordinate grid. They must follow a set of instructions to plot each landmark. They will write their own set of instructions to plot additional landmarks. ● **Tablecloth Coordinate Grid:** Teacher will create a coordinate grid on a large tablecloth. Students will find the distance between two pre-plotted points that have the same x-axis or the same y-axis. Students can also create triangles and quadrilaterals by plotting points on the tablecloth grid. ● **Coordinate Plane Distance Project:** Students will be given a starting and ending point on the coordinate grid. Each pair of students must make 8 or more stops from the start to the finish. They must give sequential directions from point to point and must label each point with its ordered pair. They must calculate the total distance from start to finish. Teachers can provide a scale, such as 2 miles per unit.

		• **Battleship Game:** Teachers will create a template for a battleship board reflecting all four quadrants in the coordinate plane. Students will place battleships on coordinates of their choosing. They will take turns "firing" at the ships by selecting an ordered pair. They must keep track of the shots by plotting the points on their template. If they hit a battleship, they get a point and go again. If they miss a battleship, the other partner goes. This
		• **Example Assessment Question:**
		  ○ A) Rectangle ABCD is located at A(-5,3), B(6,3), and C(6,-4)? Where must Point D be located?
		  ○ B) What is the area of rectangle ABCD? Explain your reasoning.
		  ○ C) What is the perimeter of rectangle ABCD? Explain your reasoning.
		  ○ D) What are four possible locations of a different Rectangle EFGH that has the same area of Rectangle ABCD, but has a different perimeter?

Equipment Needed • Art supplies • Negative and positive rational number cards • Number lines • Sentence strips • Pre-made games • Sheet protectors • Dry-erase markers • Templates • Thermometers • Fraction recipes • Paper strips • Tablecloth • Foldables and flippables • Graph paper • Floor number lines • Coordinate grids • Calculators		**Teacher Resources** • Math In Focus Textbook • Khan Academy website • Teachers Pay Teachers website • IXL website • Math Antics website • Performance Coach Workbook • Pinterest website • Engage NY website • PARCC website • Problem-Attic website

Domain: 6th Grade Math
Cluster: Expressions and Equations
A. 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 = s3 and A = 6s2 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.

B. 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.

C. 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.

Essential Questions	Enduring Understandings	Activities, Investigations and Student Experiences
1) What are algebraic expressions and equations and how can they be evaluated? 2) How can you write expressions to describe patterns? 3) How can algebraic expressions be used to describe situations and solve real-world problems? 4) How can equations and inequalities be used to describe situations and solve real-world problems?	• Use variables to write algebraic expressions. • Simplify and evaluate algebraic expressions. • Expand and factor algebraic expressions. • Solve algebraic equations with one variable. • Write linear equations from word problems. • Solving simple inequalities and evaluating solutions to inequalities. • Represent the solutions of an	• Multiplication fact practice • Respond to Essential Questions at start and end of unit • Use vocabulary in speaking and writing, as needed • Let's Practice and Guided Practice problems from the textbook, workbook pages for homework • Khan Academy tutorials and assignments • Math Antics videos • Lesson task cards • Interactive notebook assignments • IXL assignments • Lesson foldables and flippables • Error analysis and critiquing the reasoning of others **<u>Algebraic Expressions</u>** • **PEMDA'S Pizzeria**: Using the order of operations and PEMDAS, students will evaluate numerical expressions and create an upside down triangle. They will make a 3-D representation (pizza slice) from the problem and triangle.

	inequality on a number line. ● Use a table or graph to represent a linear function. ● Identify the independent and dependent variables in a table or graph. ● Solve real-world problems by writing equations and inequalities.	● **Parts of an Algebraic Expression:** Students will identify and categorize the parts on an algebraic expression (coefficient, variable, terms, etc.). ● **Evaluating Algebraic Expression Matching:** Students will match algebraic expression strips to the index cards with the final answer. The winner will have the most matches. ● **Algebra Tiles:** Model and draw expressions using algebra tiles. Example: Model 5x +3 = x x x x x + 1 1 1 using algebra tiles ● **Distributive Property Manipulatives:** Use blocks in two different colors, such as red and blue. To illustrate what 5(2+3) means, lay out two red blocks and three blue blocks. Then lay out an addition four rows of blocks – made of two red blocks and three blue blocks each – and show how there are five rows of two blocks, and five rows of three blocks. ● **Distributive Property and Factoring Cards and Placemat:** Students will place two algebraic cards on the placemat. They will apply the distributive property or factor the expression on the placemat using dry-erase markers. ● **Writing Expressions Memory Matching:** Students will match the written expression to the algebraic expressions while playing the memory match game. ● **Combining Like Terms:** Students will use highlighters to color code like terms in an algebraic expression. Students will combine the like terms based upon the color code. ● **Simplifying Expressions Connect Four:** Students will combine like terms to simplify algebraic expressions. They will place counters on the connect four placemat. The student who connects four answers in a row first is the winner. ● **Example Assessment Question:** ○ Select all of the expressions that represent the verbal expression "the quotient of 8 and y increased by 4". ○ A) 8/y + 4 B) 8 + (y/4) C) (8/y) + 4 D) 4 + (8/y) E) 8+y / 4 F) 8 / (y+4) **<u>Equations</u>** ● **Algebra Tiles and Scale:** Solve equations by using a scale. Students should be able to determine the appropriate value that would keep the scale balanced. Students will also balance equations using algebra tiles. ● **Equation Solutions:** One student can hold up an equation while three others each have an index card with a value. Whichever student has correct value gets 2 points. If a student recognizes that they don't have a correct value they get 1 point. Do this with multiple equations and rotate through the group. First one to 20 points wins. ● **Equation War:** Students will place an equation on the desk. They will flip over numbered cards. Student who has the correct solution to the equation is the winner for that round. ● **Example Assessment Question:**

		○ 1A) Zack did 102 sit-ups at the end of the month. This was 6 times as many sit-ups as he did in the beginning of the month. Which equation would you use to determine "x", the amount of sit-ups he did at the beginning of the month. ○ 1B) How many sit-ups did Zack do a the beginning of the month? **<u>Inequalities</u>** ● **Inequality Word Problems:** Students will write inequalities based upon real-life situations. They will also solve the inequalities to find solutions. ● **Inequality Solution Sorting:** Students will sort numbered cards into solution and not solution categories based on the given inequality. ● **Inequality War:** Students will place an inequality on the desk. They will flip over a numbered card. Whichever number is a solution for that inequality is the winner of that round. ● **Inequality Graphing:** Students will draw and graph the solutions to an inequality on a sentence strip. ● **Example Assessment Question:** ○ Determine if each value is a solution to the inequality 5x - 4 < 31 ○ A) x = 2 B) x = 7 C) x = 9 D) x = 0 E) x = 12 F) x = 15.5 **<u>Independent/Dependent Variables</u>** ● **IV and DV Matching**: Students will match an equation, equation table, and coordinate plane. Students must determine the IV and DV in the word problem. ● **IV and DV Sorting:** Students will sort variables into independent and dependent variable categories. ● **Example Assessment Question:** ○ Which equation represents the data in the table provided: ○ A) y = x + 1 B) y = 2x - 1 C) y = 3x - 2 D) y = x/2 **<u>x</u>** **<u>y</u>** 2 3 5 9 4 7 10 19
Equipment Needed ● Art supplies ● Sentence strips ● Pre-made games ● Sheet protectors ● Dry-erase markers ● Templates ● Foldables and flippables ● Graph paper ● Algebra tiles ● Scale		**Teacher Resources** ● Math In Focus Textbook ● Khan Academy website ● Teachers Pay Teachers website ● IXL website ● Math Antics website ● Performance Coach Workbook ● Pinterest website ● Engage NY website ● PARCC website ● Problem-Attic website

• Coordinate grids • Calculators • Counters	

Domain: 6th Grade Math

Cluster: Geometry

A. 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. New Jersey Student Learning Standards for Mathematics 8

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.

Essential Questions	Enduring Understandings	Activities, Investigations and Student Experiences
1) How can every point on the coordinate plane be represented? 2) Where do you see examples of the coordinate plane in everyday life? 3) How can you find the area of a polygon without using a formula? 4) How can you find the area and volume of shapes using the mathematical formula? 5) What type of units are used to calculate area, volume, and surface area? 6) How can you use the net of a 3-D figure to find the surface area of that figure?	• Use a formula to find the area of a triangle and a parallelogram. • Decompose a trapezoid by dividing it into smaller polygons and then adding the areas of those shapes. • Calculate the area of composite figures by dividing it into smaller polygons and then adding the areas of those shapes. • Identify the nets of 3-D prisms and pyramids. • Identify the solid formed by a given net. • Using the net, find the surface area of a prism or pyramid. • Find the volume of a rectangular prism with whole numbers and	• Multiplication fact practice • Respond to Essential Questions at start and end of unit • Use vocabulary in speaking and writing, as needed • Let's Practice and Guided Practice problems from the textbook, workbook pages for homework • Khan Academy tutorials and assignments • Math Antics videos • Lesson task cards • Interactive notebook assignments • IXL assignments • Lesson foldables and flippables • Error analysis and critiquing the reasoning of others **<u>Area</u>** • **Geoboards:** Using geoboards to make a rectangle. Make two triangles in the rectangle by stretching a rubber band from one corner to the other corner of the rectangle. Check to be sure your two triangles are the same insize. Compare the size of the two triangles to the size of the rectangle? • **Missing Dimensions:** Find the missing dimension for each rectangle: 1) l = ?; w = 44.1in; A = 551.25 square inches 2) l = 4.2m; w = ?; A = 73.92 square meters • **Polygons on the Coordinate Plane:** Students will be given vertices to plot on the coordinate grid. They must find the missing vertex. They will also find the area and perimeter of the polygon created. Students

	fractional side lengths, i.e. ½, ¼, ⅓, ⅛, etc. ● Polygons can be plotted on the coordinate plane, ● The area of polygons can be calculated when plotted on the coordinate plane.	will also plot triangles on the coordinate grid and the find area of the triangles. ● **Area War:** Students will separate the deck into two even piles. Each student will flip over a card displaying either a square, rectangle, parallelogram, triangle, or trapezoid. They will calculate the area of their own shape using the area formulas. The student with the greater area wins that round. ● **Composite Figures:** Students will break up trapezoids and other composite figures into smaller shapes and then add their areas together to find the total area of the original shape. ● **Example Assessment Question:** ○ Plot Point A at (-2, 5). Plot Point B at (3, -3). Plot Point C at (-6, -3). Find the area of the shape created when you connect Points A, B, and C. **<u>Volume</u>** ● **Missing Dimensions:** Find the missing measurement for each rectangular prism: 1) l = ?; w = 34m; h = 5m; V= 340m3 2) l = 4.5ft.; w = ?; h = 6 ft; V= 265.5ft3 3) l = 14 yd; w = 8yd; h = ?; V= 1,344yd3 4) l = ?; w = 1 ½ in; h = 3 ½ in.; V= 52 ½ in.3 ● **Volume War:** Students will separate the deck into two even piles. Each student will flip over a card and find the volume of the rectangular prism with fractional side lengths (½, ⅓, ¼, ⅕, ⅛, etc.). The student with the greater volume wins that round. ● **Volume Connect Four:** Students will play Connect Four using the volume formulas for rectangular prisms. The student who connects four volume answers in a row wins the game. ● **Rectangular Prism Volume Activity:** Students will bring in their own rectangular prisms. They will measure the length, width, and height of the 3-D shape to the nearest ¼ inch. They will find the volume of that shape with fractional side lengths. ● **Example Assessment Question:** ○ Find the volume of a rectangular prism filled with cubes measuring ¼ inches. The length of the rectangular prism is 4 ½ in, the width is 7 ¾ in, and the height is 3 in. **<u>Surface Area</u>** ● **Nets Matching:** Students will match the net of a 3-D figure with its shape based upon the faces within the net drawing. ● **Nets Illustrations:** Students will draw the net of a 3-D figure. ● **Nets for Everyday Objects**: Students will compile a list of everyday items such as, cereal boxes, tissue box, etc, they will encounter. Students will “dissect” the items they chose and draw out nets for each on graph paper. A table will be given to each student to document the number of vertices, faces, and points. Students will document their findings on graph paper and tables. ● **Surface Area of Everyday Objects:** Students will bring in their own rectangular prisms. They will

		measure the side lengths of the rectangular prisms to the nearest ¼ inch. They will draw the net of the rectangular prism and use the net to find the surface area. • **Toilet Paper Geometry:** Students unwind the roll of toilet paper, place it into the form of one or more rectangles, and calculate the total surface area of the roll. Then they determine how many rolls of toilet paper it would take to cover a basketball court, a football field, and a baseball diamond. Students also calculate the volume of the toilet paper in two different ways (by finding the volume of a cylinder and a rectangular prism) and compare their results. • **Example Assessment Question:** ○ Each side of the base of the actual Great Pyramid of Giza measure about 756 ft long. The height of the pyramid is about 450 ft, which makes the height of each triangular face about 588 ft.What is the surface area of the Great Pyramid? Explain your reasoning.
Equipment Needed • Art supplies • Pre-made games • Sheet protectors • Dry-erase markers • Templates • Foldables and flippables • Graph paper • Coordinate grids • Calculators • Counters • Nets • Everyday items (rectangular prisms) • 3-D solid figures • Rulers		**Teacher Resources** • Math In Focus Textbook • Khan Academy website • Teachers Pay Teachers website • IXL website • Math Antics website • Performance Coach Workbook • Pinterest website • Engage NY website • PARCC website • Problem-Attic website

Domain: 6th Grade Math
Cluster: Statistics and Probability
A. 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.

B. 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.

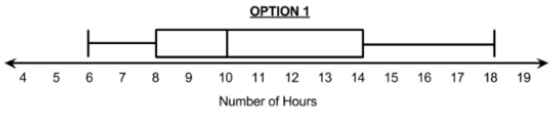
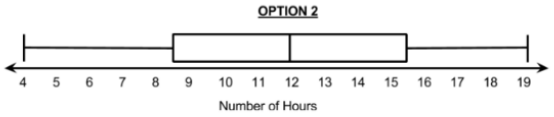
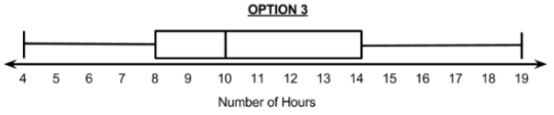
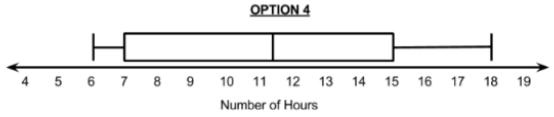
b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

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.

Essential Questions	Enduring Understandings	Activities, Investigations and Student Experiences
1) How are statistics used to summarize data? 2) What information or decisions can be gathered from statistical data? 3) How are measures central tendency be used to summarize data distributions? 4) How can measures of central tendency be used to help you make decisions in real-world problems?	• Statistical questions account for variability in the answer in order to gather useful data that can be organized, analyzed and presented. • Collect, organize, and tabulate data. • Display and analyze data using bar graphs, dot plots, histogram, box plots, line plots, etc. • Find the mean, median, mode, and range of a set of data. • Calculate the IQR and MAD of a set of data. • The distribution of data can be examined to find its center, spread, and shape. • Measures of center (mean/median) are single numbers that reflect the combination of a large set of numbers. • The measure of variability (range) is a single number that reflects the spread of a large set of numbers.	• Multiplication fact practice • Respond to Essential Questions at start and end of unit • Use vocabulary in speaking and writing, as needed • Let's Practice and Guided Practice problems from the textbook, workbook pages for homework • Khan Academy tutorials and assignments • Math Antics videos • Lesson task cards • Interactive notebook assignments • IXL assignments • Lesson foldables and flippables • Error analysis and critiquing the reasoning of others **<u>Statistics</u>** • **Compare/Contrast Statistical Questions:** Students will be given a set of 10 questions that include both statistical and non-statistical examples. Students will be asked to discuss, compare and contrast the questions in order to discover the definition of a statistical question. • **Converting Non-Statistical Questions:** Students will be challenged to create statistical questions. Students will then evaluate each other's questions to determine if they are in fact statistical questions. Students will be expected to explain why or why not each question is statistical or not. • **Categorizing Statistical and Non-Statistical Questions:** Students will place pre-made questions into statistical and non-statistical categories. • **Statistical Data Survey Project:** In pairs, students must develop a statistical question that is approved by the teacher and survey at least 20-25 people. After collecting the data, students will calculate the center, spread, and create graphs to show the shape of the data. They must represent the data in three of the following graphs: line plot, dot plot, histogram, bar graph, line graph, pie graph, frequency table, etc. They will present the results on a poster board and be able to discuss their findings with the class.

		● **Counters and Statistics:** Use counters to represent a data set. Rearrange the counters to find the mean of the data. Describe the overall shape and spread of the initial data. ● **Measures of Center:** Students will calculate the mean, median, and mode of a set of data cards. Students will choose the best measure of center based upon the data provided. ● **Outliers and Trends:** Groups of students can be given various sets of data in groups and are responsible to describe the distribution and identify any outliers or trends. Rotate the data sets from one group to the next until all groups have had the chance to review and describe the data. ● **Interquartile Range (IQR):** Ask students to hold up large index cards in the front of the room and arrange the numbers in ascending order. They will identify the median by splitting the data set into two halves and moving the papers away from each other. Now, ask them to split the two groups of students into halves. Students sitting at their desks should help find Q1 and Q3. Finally, they should find IQR by Q3 -Q1. ● **Mean Absolute Deviation Puzzle:** There are 16 smaller triangles that when put together create one large triangle. Students will correctly match up a set of numbers with the M.A.D. and put them together. ● **Example Assessment Question:** ○ 1A) At the college bookstore, your brother buys 6 textbooks at the following prices: $21, $58, $68, $125, $36, and $140. Find mean, median, mode. ○ 1B) Your brother signs up for an additional class, and the textbook costs $225. Recalculate the mean including the extra book. ○ 1C) Which measure of center would be the best representation of the data collected. Explain your reasoning. **<u>Graphing</u>** ● **Histograms:** Students will collect data from the class based upon a statistical question. Students will create number intervals for the data. They will draw a histogram based on the data collected. They will also answer questions about the data. ● **Box Plot Matching:** Students will collect data from the class and match a set of data to its box plot graph. ● **Dot Plot Matching:** Students will match a set of data to its dot plot graph. ● **Analyzing Graphs:** Students will answer questions and analyze data based on a given graph (dot plot, box plot, histogram, bar graph, etc.). ● **Measures of Center:** Students will find the mean, median, mode, and range of the set of data using the graph provided. ● **Example Assessment Question:**

		○ Which box plot graph matches the data provided in the dot plot graph provided? ○  ○     ○

Equipment Needed

- Art supplies
- Pre-made games
- Sheet protectors
- Dry-erase markers
- Templates
- Foldables and flippables
- Graph paper
- Coordinate grids
- Calculators
- Counters
- Survey questions
- Statistics number cards
- Index cards
- Premade graphs

Teacher Resources

- Math In Focus Textbook
- Khan Academy website
- Teachers Pay Teachers website
- IXL website
- Math Antics website
- Performance Coach Workbook
- Pinterest website
- Engage NY website
- PARCC website
- Problem-Attic website