Domain: 7th Grade Math

Cluster: Ratios and Proportional Relationships 7.RP

A. Analyze proportional relationships and use them to solve real-world and mathematical problems.

1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.

2. Recognize and represent proportional relationships between quantities.

a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

c. Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.

d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.

3. Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

Essential Questions	Enduring Understandings	Activities, Investigations and Student Experiences
1) Which real-world events describe proportional relationships. 2) How can you identify the constant of proportionality in an equation that represents a proportional relationship? 3) How can you distinguish relationships that are proportional from relationships that are not proportional? 4) How do percents help you compare, predict, and make decisions? 5) How can you use ratios and percentages to represent change?	- Understand and solve complex fractions - Identify direct proportions and use a graph to interpret it - Recognize that a constant of proportionality can be a constant rate/unit rate. - Solve real-world direct proportion problems -Use ratios and proportions to solve real-world percent problems	● 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>Sample Exit Tickets and/or Extended Response Questions:</u>** **Complex fractions**: Which speeds are equal to ½ mile per hour? Select all that apply. a. $\frac{\frac{5}{6}mi}{\frac{5}{12}h}$ b. $\frac{\frac{1}{4}mi}{\frac{1}{2}h}$ c. $\frac{\frac{1}{10}h}{\frac{1}{5}mi}$ d. $\frac{\frac{3}{8}mi}{\frac{3}{4}h}$ e. $\frac{\frac{2}{3}h}{\frac{1}{3}mi}$ **Direct Proportions**: A school dance committee purchased

identical party favors for a school dance. Five students bought different numbers of favors at different times. Each paid the same price per favor.

Number of items purchases (x)	10	20	12	16	8
Total cost in $ (y)	5	10	6	8	4

Identify and interpret the constant of proportionality based on the situation. Create an equation and graph the equation.

Equations/ordered pairs: Each ordered pair shown lies on a line that passes through the origin. Draw a line that connects the ordered pair with the equation of the line on which it lies.

a. (4, 34) •y = $\frac{15}{8}x$
b. (36, 10) •y = $\frac{8}{15}x$
c. (1, 2.6) •y = 2.6x
d. (24, 45) •y = 8.5x

Percents: Select the items for which the discount is greater than 15%. Circle all that apply.

a. $29.95 box set of CDs on sale for $19.95
b. $64.49 pair of shoes on sale for $55
c. $85 radio on sale for $74.49
d. $145 suitcase on sale for $114.99

<u>Suggested Activities</u>:

Direct Proportions: Students can create their own direct proportions for a real-world situation. Students will have to create a table, an equation, and graph to show their direct proportion. Students will also have to identify their constant of proportionality and explain what it represents in their situation.

Class Activity NYC Tour: Students will work with a pair take a tour of New York City landmarks while they solve problems that relate to percentages using proportions, equations, mental math, and other strategies that were taught.

Proportional/Non-proportional Relationship Card Sort: Students will practice identifying and comparing proportional and non-proportional relationships using tables, graphs, equations, and verbal descriptions.

Constant of Proportionality He Said She Said Activity: Each card in this activity will have two statements from different students regarding the constant of proportionality, and the students will have to decide whose is correct and why.

Proportion Multiple Representations Matching: Students will match equations, tables, graphs, and word problems that have proportional relationships.

Percent Proportions Cut and Paste: This cut and paste activity helps student practice setting up and solving percent

		proportions. Students read 8 word problems, then cut and paste the proportion set-up in the percent proportion formula. **Percent Application Word Problems:** Students will solve real-life word problems involving percent of a number, markup, discount, tax, and finding the whole. **Simple Interest Spinner Activity:** This spinner activity helps students practice solving simple interest problems (I=prt). Students use a pencil and paper clip to spin up to four spinners and complete the story. They will use the information in the story to solve the problem. **Calculating Percent of Change Class Store:** Students will visit the class store to determine percent of change. Price tags will attach to various household goods. Students will calculate the rate of increase for the items from the 1970's to the 2010's. **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.
Equipment Needed ● Dry Erase Boards/markers ● Chromebooks ● Workbooks ● Post it notes ● Index Cards ● Construction paper ● Task cards for activity ● Recording sheets ● Store Circulars ● Pre-made games and activities ● Household objects for class store		**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: 7th Grade Math
Cluster: The Number System 7.NS
A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. **1**. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

a. Describe situations in which opposite quantities combine to make 0. For example, in the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the second round?

b. Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

c. Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (–q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

d. Apply properties of operations as strategies to add and subtract rational numbers.

2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (–p)/q = p/(–q). Interpret quotients of rational numbers by describing real world contexts.

c. Apply properties of operations as strategies to multiply and divide rational numbers.

d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

3. Solve real-world and mathematical problems involving the four operations with rational numbers.

Essential Questions	Enduring Understandings	Activities, Investigations and Student Experiences
1) How do the properties of operations help you add and subtract rational numbers? 2) How are numbers classified as rational or irrational numbers? 3) What are the categories of rational numbers? 4) How does the opposite of a number differ from the absolute value of it? 5) How do properties of addition and multiplication help you multiply positive and negative integers? 6) How and why can fractions be represented as repeating or terminating decimals?	- Find the absolute values of rational numbers - Express numbers in (m/n) form - Locate rational numbers on the number line - Write rational numbers as terminating or repeating decimals using long division - Use addition, subtraction, multiplication, and division with integers, decimals, and fractions - Find the distance between 2 integers on a number line	● 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>Sample Exit Tickets and/or Extended Response Questions:</u>** **Properties of operations**: Each operation demonstrates a property of operations. Draw a line from each problem to the property it shows. a. -613 + 0 = -613 — additive identity property b. -4 + 10 + (-2) = 10 + (-4) + (-2) — additive inverse property c. 13 + 25 + (-25) = 13 + 0 — associative property d. (23 + 14) + 32 = 23 + (14 + 32) — commutative property **Adding/Subtracting Positive/Negative Rational Numbers**: Select true or false for eac equation. a. 9 - (-5) = 4 — True False b. -11 - (-11) = 0 — True False

7) How do we use rational numbers to explain events in our world?		c. ½ - 2 ⅝ = -2 3/10 True False d. -6 ¾ + (-1 3/10) = -8 1/20 True False **Add/Subtract Decimals**: On Tuesday the temperature at 6 AM was -5.5˚F. After 6 hours it rose 10.7˚F. After another 6 hours the temperature fell 2.9˚F. What was the final temperature? Explain how you solved it. **Multiplying/Dividing Rational Numbers**: What is the sign of the product or quotient? Circle positive or negative. a. 518 ÷(-45) positive negative b. -16.92 x (-3.98) positive negative c. -3 1/9 ÷6 ⅕ positive negative d. 375 x 561 positive negative e. -28.9 ÷(-84) positive negative **<u>Suggested Activities</u>**: **Rational Numbers**: Working in groups, students are given a set of index cards that have several examples of rational numbers in various forms. Students will need to determine the cards' absolute value and and locate each of the numbers on a number line (each group will be provided with several number lines). Students will also have to order the numbers from least to greatest. **Converting rational numbers to decimals**: Terminating or repeating? Students will work in pairs and flip over a card with a given fractions on it. Students will compete with one another to see if the fraction has a terminating or repeating decimal. Student with the most amount of cards at the end wins. **Adding/Subtracting Positive/Negative Integers**: Students will work in groups of 2-3. Students are given a set of counters. (Yellow = positive; red = negative). Students will take turns modelling different expressions using positive and negative numbers in order to get the answer. **Operations with positive/negative integers (mini project)**: Students will have the option to create a brochure or a google slide presentation that goes over the rules for adding, subtracting, multiplying, and dividing positive and negative numbers. For each set of rules, students must provide 3 different examples that show how to use the rules. **Real-World Application**: Students will work in groups of 2 or 3 and "Manage a Checking Account". Students will be given task cards with a list of transactions that they must record on a spreadsheet. Students must determine how much money is left. Then they will be given a real-world situation that they must calculate to see if he works for x amount of hours, pays for x amount of items, will he have enough to plan a vacation? **Marching Band Cookie Fundraiser:** Students will add, subtract, multiply, and divide rational numbers to determine expenses and profit in the real-world context of a fundraiser.

		Integer Operations War: Students will split a deck of all four integer operations cards in half. They will each flip over a card and perform the operation on their card. The student with the greatest value is the winner of both cards. The students will continue to play until one of them runs out of cards. **Integer Operations with Counters:** Students will use red/yellow counter chips to show addition and subtraction of negative/positive integers.
Equipment Needed ● Dry Erase Boards/markers ● Chromebooks ● Workbooks ● Post it notes ● Index Cards pre made for activities ● Task cards pre made for activities ● Positive/negative counters ● Construction paper ● Art Supplies		**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: 7th Grade Math

Cluster: Expressions and Equations 7.EE

A. Use properties of operations to generate equivalent expressions.

1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, a + 0.05a = 1.05a means that “increase by 5%” is the same as “multiply by 1.05.”

B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?

b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.

Essential Questions	Enduring Understandings	Activities, Investigations and Student Experiences
1.) How can you use properties of operations to generate equivalent expressions? 2.) Can you rewrite expression in other forms to help you solve a problem? 3.) Can you solve real world problems involving positive and negative rational numbers algebraically? 4.) How can you use variables to help set up an equation or inequality for a real world situation?	- Represent algebraic expressions using bar models - Simplify algebraic expressions with decimal and fractional coefficients by adding or subtracting like terms - Simplify algebraic expressions with more than 1 variable - Expand and factor algebraic expressions - Translate verbal descriptions into algebraic expressions with one or more variables and with parentheses - Solve real-world problems by algebraic reasoning - Solve algebraic equations with variables on the same side of the equation - Graph the solution set of an inequality on a number line	● 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>Sample Exit Tickets and/or Extended Response Questions:</u>** **Simplifying algebraic expressions**:Select true or false for each equation. a. $\frac{n}{2}$ + 3 x 4 = $\frac{n}{2}$ + 12 True False b. ⅓ z + ⅔ z x 9 = 9z True False c. -8y + 4.3y + 3.7 = 0 True False d. 12 - 1.8b + 1.8b = 1.8b True False e. $\frac{m}{8}$ + 7($\frac{m}{8}$) = m True False **Interpreting algebraic expressions**: When you "subtract x from y" will you write it as x - y or y - x? **Writing algebraic expressions**: - You made x bagels and gave a quarter of the bagels to your neighbor. How would you write an expression to represent your neighbors share of the bagels? - A game system set costs $300. Its controller costs $40 and each game costs $60. Write an algebraic expression to show how much money you will spend if you buy a game, 2 controllers, and x games. **Expanding/Factoring**: Which expressions are equivalent to 6xy + 9xy - 18y? Circle all that apply. a. 3(2xy + 3xy - 6y) b. 3x(2y + 3y - 6) c. 3y(2x + 3x - 6) d. xy(5 - 6y) e. 3y(5x - 6) f. y(15x - 18) **Solving Equations**: Hayden's checking account balance was $145.95. After 2 checks were cashed, each for the same amount, his balance was -$4.05. This problem can be represented by this equation: 145.95 - 2x = -4.05. Solve the equation for x. Show your work. Then explain what x represents in the problem. **Inequalities**: Determine whether each number is or is not a solution of the inequality $\frac{4}{3}$x - 5 > 2/3 . Write the value in the correct box.

X = 0 x = -3 x = 9 x = 4 ¼ x = 5 x = 4 ⅔

Is a solution	Is not a solution

<u>Suggested Activities</u>:

Like Terms: Play a matching game with matching like terms. Can go up to 3 variables.

Solving equations/inequalities: Students are given an equation to solve and an inequality to solve. Depending on their level they will get a beginner, intermediate, or advanced problems. Students will then have to solve their problems and create a poster with step by step directions as to what they did. They must incorporate vocabulary and properties they have learned.

Expanding Expressions with Distributive Property Card Match: Students will practice expanding expressions by distributing both positive and negative numbers. They will match the simplified expression to the expanded expression.

Writing and Solving Equations Dominoes: The students will create a domino train matching a real-world math problem with the solution to an equation created from a real-world word problem.

Solving Two Step Equations He Said She Said Activity: Each card in this activity will have two statements from different students regarding a two-step equation. Students will look for errors and communicate their mathematical arguments.

Parts of an Algebraic Expression: Students will identify and categorize the parts on an algebraic expression (coefficient, variable, terms, etc.).

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.

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.

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.

Solving Inequality Cut and Paste: Students will match a word problem to its inequality. They will solve the inequality to match to

		its solution. They will also match the inequality to is graph on a horizontal number line.
Equipment Needed ● Dry Erase Boards/markers ● Art supplies ● Chromebooks ● Workbooks ● Post it notes ● Index Cards ● Pre made equations and inequalities (leveled) ● Task cards for matching game ● Number lines		**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

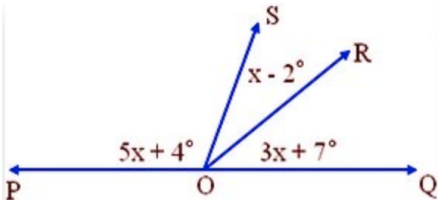
Domain: 7th Grade Math

Cluster: Geometry 7.G

A. Draw, construct, and describe geometrical figures and describe the relationships between them.
1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
2. Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
3. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

B. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
4. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
6. Solve real-world and mathematical problems involving area, volume and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Essential Questions	Enduring Understandings	Activities, Investigations and Student Experiences
1.) How can you draw or construct geometric figures? 2.) What are the relationships between geometric figures? 3.) How can you calculate the area or circumference of a circle?	- Understand how to draw and construct geometric figures if given certain pieces of information - Understand radius, diameter, and pi in order to calculate area and circumference of a circle. - Explore the properties of complementary, supplementary, vertical, and adjacent angles - Explore and apply the	● 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

4.) Can you solve for missing angle measurements using angle properties? 5.) Can you apply area, surface area, and volume in order to solve real-world problems? 6.) How can you use scale drawings in real world situations?	properties of angles at a point - Identify the types of angles formed by parallel lines and a transversal - Write and solve equations to find unknown angle measures in figures. - Explore and apply properties of interior and exterior angles of a triangle - Understand that scale drawings are used when the object is too large or too small to represent its actual size. - Find the area of two dimensional figures. - Find the surface area and volume of three dimensional figures.	**<u>Sample Exit Tickets and/or Extended Response Questions:</u>** **Angles**: Use what you know about properties of angles in order to solve for the variable, x.  **Scale Drawings**: Chloe made the scale drawing of the gym floor using a scale of 1 cm = 4 m.  a. What are the actual dimensions of the gym floor? b. If Chloe makes a new scale drawing of the gym floor using a scale of 5 cm = 8 m, what will be the width and length of her new drawing? **Constructing Quadrilaterals**: Can a quadrilateral be drawn that meets the conditions described? Select yes or no. a. Two pairs of parallel sides and two right angles Yes No b. One pair of parallel sides and no right angles Yes No c. One pair of parallel sides and three right angles Yes No d. No parallel sides and four right angles Yes No **Drawing Polygons**: Kaia draws a polygon with the following conditions: ● It has exactly two pairs of parallel sides ● It has at least two right angles ● The length of the longest side is twice the length of the shortest side ● The length of the shortest side is 3cm a. Kaia draws a _____ b. Draw Kaia's shape using the given conditions c. Label the measurements of the given sides and angles **Circles**: Mr. McCoy is planning to install a circular pool. The circumference of the pool is 25 feet. Use $\pi = 3.14$. a. What is the approximate diameter of the pool? Show or explain how you got your answer. b. What is the approximate area of the pool? Show or explain how you got your answer.

		Area of two dimensional figures: Draw a line to match each figure with the number of meters in its height. a. Parallelogram: A = 100 m^2, b = 2 m •2 m b. Trapezoid: A = 24 m^2, b1 = 9m b2 = 3m •4 m c. Parallelogram: A = 8 m^2, b = 4 m •8 m d. Triangle: A = 20 m^2, b = 5 m •50 m **<u>Suggested Activities</u>**: **Transversal angles**: Pass out copies of angles that are formed by 2 parallel lines and a transversal. Have students measure these angles with a protractor and draw conclusions about what they notice. **Drawing/Constructing Triangles**: Students will be paired up and given a set of task cards that give 3 pieces of information needed to draw the triangle. The pair will then work together to draw these triangles using a protractor and ruler. **Circles**: Students can bring in various sized circular based objects. Students will work in groups of 2 or 3 to measure the diameter and radius of each circle suing a tape ruler. They will then use that information to calculate the area and circumference of each of the objects they brought in. They will then use a tape measure to measure the circumference to see if they were accurate. **Surface area/Volume of 3 dimensional figures**: Students will work in groups of 3. They will get a set of task cards that either as them to solve for the surface area or the volume of the figure. Students will compete with each other to be the first one to solve it first and correctly. They will take the card if they are correct. Students with the most cards at the end will win. **Angle Relations Card Sort:** Students will practice identifying and comparing complementary, supplementary, vertical, and adjacent angles by sorting angle diagrams into categories. **Conditions of a Triangle He Said She Said Activity:** Each card in this activity will have two statements from different students regarding triangles. Students will determine if the question results in one unique triangle, more than one triangle, or no triangle. **Vertical and Adjacent Angles Mazes:** The mazes will allow students to practice writing and solving equations for an unknown angle. **Area of Composite Figures Round Table:** Students are grouped in 3's, and each person starts with a different problem. Students work one step of the problem before passing their paper to the next person in their group. Each time they get a new paper, they check the step before theirs, giving them a great opportunity to help check and teach one another. This continues until the problem is complete.

		Net Surface Area: Students match the 3D object, the net, and the surface area. Students will be given multiple answers, so some cards will not be used. **Surface Area Dominoes:** There are 12 total dominos. The students 2ill create a domino train matching the real-world or math problem to the surface area. **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 three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. The student with the greater volume wins that round.
Equipment Needed ● Dry Erase Boards/markers ● Chromebooks ● Workbooks ● Post it notes ● Index Cards ● Pre made task cards ● Protractors ● Rulers ● 3-D shapes ● Pre-made game cards		**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: 7th Grade Math
Cluster: Statistics and Probability 7.SP
A. Use random sampling to draw inferences about a population. **1.** Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. **2.** Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be. **B. Draw informal comparative inferences about two populations.** **3.** Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.

4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.

C. Investigate chance processes and develop, use, and evaluate probability models.

5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.

7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.

a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.

b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?

8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.

b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event.

c. Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?

Essential Questions	Enduring Understandings	Activities, Investigations and Student Experiences
1.) How can you use random sampling to draw inferences about a population? 2.) Given sets of data, how can you make comparative inferences about the populations?	- Understand the concept of measures of variation - Understand and solve problems involving quartiles and interquartile range - Understand the concept of a population and samples - Understand and apply different random sampling methods - Draw and interpret box plots - Understand mean absolute deviation - Solve problems involving box plots and mean absolute deviation - Make inferences about a population using statistics from a sample - Use an inference to	● 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>Sample Exit Tickets and/or Extended Response Questions:</u>** **IQR**: Find the range and interquartile range of a set of data. Interpret what the interquartile range means. **Population and Sampling**: Two students are taking surveys to find out if people will vote to fund the building of a new city park on election day.

	estimate a population mean - Make comparative inferences about 2 populations using 2 sets of sample statistics	- Levonia asks 20 parents of her friends - Quenton asks every other person leaving the library until he has asked 20 people - Ruth calls 20 randomly-selected registered voters. - Vince sends emails to 20 friends. Which sample will be the most representative? Give reasons why. Give reasons why the others may be biased. **Mean Absolute Deviation**: These data show the heights of two groups of children. **Group 1 (cm)**: 103, 112, 108, 120, 114, 125, 109, 121 **Group 2 (cm)**: 120, 85, 138, 126, 92, 133, 128, 90 Select a statement that describes the height data. Circle all that apply. a. Group 2 has a greater mean height. b. There are more children in group 2 than group 1. c. Both groups have the same mean weight d. The heights of children in group 1 are more variable e. The MAD for group 2 is more than 3 times that for group 1 **Comparative Inferences**: Josh's neighborhood started two clubs--one for movies and one for books. The ages of the book club members are 48, 27, 32, 56, 59, 43, 39, 28, 28, 42, 71, and 55 years. The ages of the movie club members are 24, 27, 18, 26, 34, 32, 42, 45, 16, 23, 19, and 30 years. Find the overlap in the two sets of ages. What can you infer from the data? **Probability/Random Sampling**: If you randomly select a red counter from a bag of counters about 4 out of 5 times, what conclusions do you think would be reasonable to make about the bag of counters? **<u>Suggested Activities</u>**: **Random Sampling**: Explore how a random sampling process affects data collection. Examples of random sampling: 1.) Using a sampling frame 2.) lottery method 3.) Using a random number table 4.) Using a computer Compare the strengths and weaknesses of random sampling methods given different scenarios **Project: Data Collection**: Students will be in groups and they must decide what data they are going to collect (ex: 7th grade shoe sizes, 6th grade heights, hours of sleep at night… etc) Students will have to collect a random sample, that makes sense for their information, record their data, display their data, interpret their data, find the mean absolute deviation and explain what that means. **Populations and Sample Card Match:** Students will sort cards

		into population and same categories based upon the definitions of both terms. **Comparing Dot Plot Graphs:** Students will analyze and interpret data from two dot plot graphs. They will cut and place true statements about the data with their matching dot plot graph. **Comparing Box Plot Graphs:** Students will analyze and interpret data from two box plot graphs. They will cut and place true statements about the data with their matching box plot graph. **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.
Equipment Needed ● Dry Erase Boards/markers ● Chromebooks ● Workbooks ● Post it notes ● Index Cards ● Graphs ● Graph paper ● Pre-made data		**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