Domain: 8th Grade Math

Cluster: The Number System

A. Know that there are numbers that are not rational, and approximate them by rational numbers.

1. Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.

2. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., $\pi 2$). For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.

Essential Questions	Enduring Understandings	Activities, Investigations and Student Experiences
1.) Can all rational numbers be put into a/b form? 2.) What are the differences between rational and irrational numbers? 3.) Can both rational and irrational numbers be placed on a number line? 4) Is it possible to determine rational approximations for irrational numbers?	- Understand that a rational number is anything that can be put into a/b form. - An irrational number cannot be expressed in a/b form. - Approximate the value of irrational numbers. - The differences between terminating and repeating decimals. - Estimate the value of non-perfect roots.	• 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>** **Identifying Rational/Irrational #'s**: Determine whether each number is rational or irrational. Write the number in the correct box. $\sqrt{6}$ 2.22 19/3 14.3729… 21/5 $7.09\overline{24}$ **Rational Number** | **Irrational Number** | **Estimating Irrational #'s**: Select true or false for each statement. a. $\sqrt{65}$is between 6 and 7 True False b. $2\sqrt{8}$is between 5 and 6 True False c. $5\sqrt{3}$is between 8 and 9 True False d. $\sqrt{3}$is between 1 and 2 True False e. $3\sqrt{15}$is between 12 and 13 True False **Repeating Decimals as fractions**: Matt claims that the decimal $6.\overline{25}$ is equivalent to the fraction 25/4. a. How would you show Matt that his claim is incorrect? Explain your reasoning. b. Show how to correctly write the decimal $6.\overline{25}$ **<u>Suggested Activities</u>**: **Irrational Numbers**: Students work in pairs. Students will be given a set of irrational numbers and a worksheet with blank number lines.

		Students will work together to estimate the values of irrational numbers and locate its value on a number line. **Terminating/Repeating Decimals**: Students will play a game with a partner. They will have a stack of cards with various fractions on it. They will flip over 1 card at a time and divide to see if the decimal is repeating or terminating. The students to finish first, and get it correct, will take the card. The student with the most cards at the end will win. **Squares and Square Roots:** Who Has, I Have?: Students will work as a class to correctly identify the squares and square roots from 1-15. Every student picks a card from the deck. The first students reads the clue on the card. The student whose card matches the clue goes next and so on. **Estimating Square Roots Maze:** Students will work through a maze and match a square root to its location on a number line. They will continue through the maze until they reach the end. **Rational/Irrational Number Card Sort:** Students will practice identifying and comparing rational and irrational values. They will categorize numbers into rational and irrational number categories. They will also categorize all of the rational numbers into more specific rational number categories, i.e. integers, whole numbers, natural numbers, etc. **Simplifying Radicals Task Cards (Square Roots and Cube Roots):** Students will practice simplifying radicals (including square roots, cube roots, and monomial square roots) by working through pre-made task cards.
Equipment Needed ● Dry Erase Boards/markers ● Chromebooks ● Workbooks ● Post it notes ● Index Cards ● Pre made worksheets with number lines ● Set of cards with irrational numbers ● Set of cards with fractions ● Pre-made games ● Calculators ● Mazes and puzzles ● Graph paper		**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: 8th Grade Math
Cluster: Expressions and Equations
A. Work with radicals and integer exponents. **1.** Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3–5 = 3–3 = 1/33 = 1/27.

2. Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.
3. Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3 × 108 and the population of the world as 7 × 109 , and determine that the world population is more than 20 times larger.
4. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

B. Understand the connections between proportional relationships, lines, and linear equations.
5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
6. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.

C. Analyze and solve linear equations and pairs of simultaneous linear equations.
7. Solve linear equations in one variable.

a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).

b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

8. Analyze and solve pairs of simultaneous linear equations.

a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.

b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.

c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.

Essential Questions	Enduring Understandings	Activities, Investigations and Student Experiences
1) When are negative exponents and zero exponents used? 2) How are exponents and radical expressions related? 3) What is the relationship between the square root of a number and the square of a number? 4) What does the number of solutions (one, none, or	- Use properties of exponents in order to simplify expressions containing exponents. - Understand and evaluate square and cube roots. - Understand and evaluate scientific notation. - Define and analyze direct proportions. - Find the slope of a 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>**

infinite) of a system of linear equations represent in the real world?

5) What are the advantages and disadvantages of solving a system of linear equations graphically vs. algebraically?

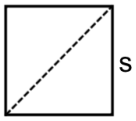
- Numerical expressions can be evaluated by applying the properties of integer exponents.
- Square and cube roots are inverse operations to squaring and cubing.
- Rates can be displayed in both symbolic and graphic form.
- Proportional and non-proportional relationships can be recognized, compared and represented in words, tables, symbols and graphs.
- The speed of an object can be displayed as the slope of a distance vs. time graph.
- The number of solutions of a system of linear equations is directly related to the number of intersection points.
- To find the number of solutions for a system of linear equations on a graph, the equations must be written in slope-intercept form.

Simplifying Expressions: Compare the value of each expression to 64. Write the expression in the correct box.

$2^3 \cdot 2^2$ $\frac{4^2}{4^3}$ $(8^2)^{-2}$ 64^0 $(2 \cdot 4)^3$

Less than 64	Greater than 64

Square/cube roots: Josh cut a square sheet of paper along a diagonal to make 2 congruent triangles. The area of one triangle is 60.5 in ^{2}. Find the length of one side, s, of the square. Show and explain your work.



Square/cube roots: For each equation in the table, indicate with an 'X' whether the equation has 1 solution or 2 solutions.

Equation	1 Solution	2 Solutions
$x^2 = \frac{49}{121}$		
$x^2 = 121$		
$x^3 = 512$		

Scientific Notation: The mass of a certain grain of rice is about 3 x 10^{-2} grams. The mass of a certain grain of salt is about 6 x 10^{-5} grams.

a. Which has a greater mass? Explain how you found your answer.
b. How many times greater is the mass of the larger grain than the smaller grain? Explain how you found your answer.

Direct Proportion: At Copper Hill Elementary School, each classroom has the same number of desks. The table below shows the total number of desks and classrooms. Select true or false for each statement.

Number of Classrooms	Total Number of Desks
3	90
4	120
6	180
9	270

a. Each classroom has 9 desks T or F
b. The unit rate is 30 desks per 1 classroom T or F
c. The relationship between classrooms and desks is a proportional relationship T or F
d. In 2 classrooms, there are 100 desks T or F

Relating Slope and y-intercept to Linear Equations: Michael wrote the equation y = 0.1x + 5 to find the total cost of his phone bill, y, based on the number of texts he sends per month. What is the slope and the y-intercept of the equation?

Solving Linear Equations in One Variable: Eight more than twice a number is equal to ten less than five times the number.

a. Let n represent the number. Write an equation that can be used to find n.
b. Solve your equation for n. Show all work.

Solving Systems of Two Linear Equations Graphically: For each system of equations, indicate whether the system has no solution, one solution, or infinitely many solutions by placing an 'x' in the correct column.

System of Equations	No Solution	One Solution	Infinitely Many Solutions
4x - 6y = 10 6x - 9y = 15			
Y = -3/2(x) + 3 3x + 2y = 3			
4x + 3y = 12 3x - 4y = -12			

Solving Systems of Two Linear Equations Algebraically: The perimeter of a rectangular garden is 100 feet. The length of the garden is 8 feet longer than twice the width.

a. Write a system of two linear equations that represents this situation. Let L represent the length of the garden, and let w represent the width.
b. Find the length and width of the garden. Show all work
The length is _____ feet, and the width is _____ feet.

<u>Suggested Activities</u>:

Scientific Notation Scavenger Hunt: Students will be solving about 30 task cards (all operations) that are set up around the room. They will have a recording sheet. Students must determine the answer to the math problem and search (scavenge) around the classroom to find it. Once the students find the answer, they are provided with the next problem to solve.

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.

Properties of Exponents Matching: Students will use the properties of exponents to cut and paste an expressions and its simplified expression when the properties of exponents are applied.

Population Scientific Notation: Create a map of the continents and have students research and write the population of each country and continent as a single digit times a power of 10.

		Comparing Proportional Relationships: Compare proportional relationships side by side on a coordinate plane. y=mx, where m is the rate of change. The greater m is, the greater the rate of change. **Comparing Slopes:** Investigate slope using similar triangles. Graph a linear equation on a coordinate plane. Select two pairs of points on that line. Create two distinct triangles using the points. **Algebraic Tiles:** Use algebra tiles or other manipulatives to model algebraic expressions and assist with solving equations. **Evaluating Equations:** Use inverse operations to solve one-step equations. Sort equations into one-solution, infinite solution, and no-solution categories. **Rewriting Equations:** Using inverse operations to rewrite equations in slope-intercept form. Use the slope-intercept form to graph and compare equations. **Multi-Step Equations Scavenger Hunt:** For the scavenger hunt, there are 12 equations that just need to be printed and posted throughout the room. Students will use a numbered worksheet as they walk about and solve the equations. The answer they get to one equation leads them to the next equation.
Equipment Needed ● Dry Erase Boards/markers ● Chromebooks ● Workbooks ● Post it notes ● Index Cards ● Pre-made games ● Calculators ● Mazes and puzzles ● Graph paper ● Task 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: 8th Grade Math
Cluster: Functions
A. Define, evaluate, and compare functions. **1.** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.1 **2.** Compare properties (e.g. rate of change, intercepts, domain and range) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.

3. Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function A = s2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.

B. Use functions to model relationships between quantities.

4. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Essential Questions	Enduring Understandings	Activities, Investigations and Student Experiences
1) How do you know when a graph represents a function and when it does not represent a function? 2) How can you compare linear functions? 3) What does each variable in the equation written in slope intercept form represent? (y = mx + b) 4) How can an equation written in slope intercept form be used to create a function table and graph a solution the equation? 5) How are linear functions used to model a variety of real world relationships? 6) How can you use graphs to analyze situations, draw conclusions, or make predictions between two quantities?	- An input for a function results in one and only one output. - Given a set of ordered pairs, a table of values, or graph a function can be identified. - Functional relationships can be applied to the following: Function Tables, Vertical Line Test, Domain/ Input/Independent (x-coordinate), Range/ Output/Dependent (y-coordinate) - Linear relationships represent constant/consistent change. - The slope intercept form “y = mx + b” can be used to create a table and to graph a line. - The rate of change of a line is its slope: Rate of change = slope = vertical change /horizontal change - The direction of the slant of a line indicates a positive or a negative slope. - Direction and steepness of the graph of a function corresponds to the slope.	● 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>** **Analyze Functions**: Drew ears $9.50 an hour at his job. The equation y = 9.5x represents this situation. The number of hours Drew works is represented by x, and y represents the total amount of money Drew earns in dollars. Does the equation y = 9.5x represent a function? Use a table to explain your reasoning. **Comparing Functions**: Amy is running a marathon to raise money for a charity. Tom is sponsoring Amy and will pay $10 plus an additional $4 per mile. Leah is also sponsoring Amy and the amount she will pay is given by the linear function shown in the table. Who is paying more per mile? Explain. **Number of Miles, x** | 5 | 10 **Amount Paid (in dollars), y** | 30 | 55 **Comparing/Analyzing Functions**: Greg is buying a bike on a payment plan. The equation y = -20x + 600 models the amount he has left to pay, where x is the number of weeks and y is the amount of money owed in dollars. Lin is also buying a bike on a payment plan. The bike costs $500. She will pay $25 each week. a. What is the y-intercept of Greg’s equation? b. Explain what the y-intercept represents in the problem situation. c. Whose bike will be paid off first? Explain how you know. **Linear vs. Nonlinear**: Look at each function. Is it a linear function or

nonlinear function?

a. The number of minutes m to cook c cups of rice
b. The volume V of a cube with side length s
c. The distance walked after m minutes at r feet per minute
d. The cost C for t tickets to the museum
e. The value v of a car that depreciates at 15% annually

Using functions to model relationships: Shana is hiking down into a canyon. The table shows her elevation above the canyon floor at different hours during the course of the hike. A linear function represents the relationship between the number of hours Shana has hiked and her elevation.

Number of Hours	Elevation (feet)
1	3,500
3	2,100
4.5	1,050
5	700

a. What is the initial value of the function? Explain how you know.
b. What does the initial value of the function represent in terms of the situation?

Describing functional relationships from graphs: Graph a function that has the following characteristics on the grid below:

- It is decreasing for all the values of x between 0 and 4
- It is constant for all values of x between 4 and 7
- It is increasing for all values of x greater than 7
- Its graph contains the points (3, 5) and (5, 3)
- A piece of the graph is a curve

<u>Suggested Activities</u>:

Slope Rate of Change (He Said, She Said): Each card in this activity will have two statements from different students related to slope and rate of change. The students will have to decide whose is correct and explain why that students is correct. They will also have to correct the error in the other student's reasoning.

Graphing Linear Equations Scavenger Hunt: Students will start with graphs of linear relationships and will find their matching equations until they have looped through all of the cards.

Graphing Linear Equations Spinner Activity: Students use a pencil and paper clip to spin two spinners (one for slope and one for the y-intercept). They will have 6 blank graphs to practice creating graphs of different equations. Once they spin both spinners, they must graph the equation created using the spinners on a blank coordinate plane template.

Linear Equation Matching: Students will match an equation (in slope-intercept form) to its graph and the corresponding table.

Function Machine: Create a function machine from a cardboard box for groups of children. Cut out slits on opposite sides of the box for students to insert index cards through. Explain to student that

		they will be creating their own function machines. Discuss the definition of a function. Have students come up with possible rules that can be applied to a number. Split class into groups. Have group select a function for their machine. One student labels the inside bottom of the box with the function while the other members of the group write and label the input numbers on at least 12 index cards (include decimals, fractions, and negative numbers). Have students "input" each value into the machine, work together to solve, and write and label the output value on the back side of the index card output. Have students examine their output values to determine any patterns or identical results. **Vertical Line Test:** Provide student with individual coordinate grids. Ask students to plot points given an input(x-coordinate)/output (y-coordinate) table. Show them that no vertical line will ever cross through two points on the graph of a function. **Functions Card Sort:** Students will practice identifying functions from tables, mapping, graphs, equations and sets of ordered pairs. **Comparing Functions:** Students compare the rate of change for different functions and color a picture the appropriate color to correspond with the solution. For this activity, students should be able to find the rate of change from a table, graph, equation or verbal description. **Systems of Equations (Graphing vs. Substitution):** Partner A will solve the first system of equation by graphing while Partner B solves the same system by substitution. If their answers match they move on, if not, they swap papers and help to identify and correct any errors.
Equipment Needed ● Dry Erase Boards/markers ● Chromebooks ● Workbooks ● Post it notes ● Index Cards ● Pre-made games ● Calculators ● Mazes and puzzles ● Graph paper ● Functions ● Spinner		**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: 8th Grade Math
Cluster: Geometry
A. Understand congruence and similarity using physical models, transparencies, or geometry software. **1.** Verify experimentally the properties of rotations, reflections, and translations:

a. Lines are transformed to lines, and line segments to line segments of the same length.
b. Angles are transformed to angles of the same measure.
c. Parallel lines are transformed to parallel lines.

2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.

3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.

B. Understand and apply the Pythagorean Theorem.

6. Explain a proof of the Pythagorean Theorem and its converse.

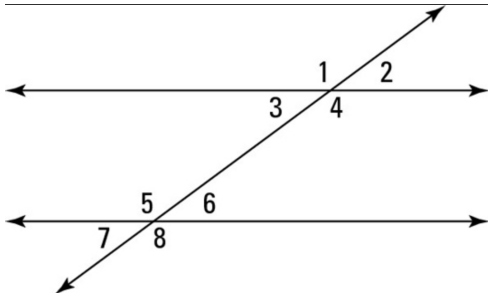
7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real world and mathematical problems in two and three dimensions.

8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

C. Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems

Essential Questions	Enduring Understandings	Activities, Investigations and Student Experiences
1) What properties of a figure are preserved under a translation, reflection, or rotation? 2) What is the connection between transformations and figures that have the same shape and size? 3) What is the connection between transformations and similar figures? 4)What does a transversal line do to two parallel lines? 5) How can you determine when two triangles are similar? 6) How can you prove the Pythagorean	- Lines and line segments remain congruent when an object is translated, rotated or reflected on a coordinate plane. - A sequence of transformations can be used to map one figure to a second figure to show congruency. - Algebraic rules for transformations given an image and pre-image on coordinate plane, using multiple transformations can be written. - Similar figures maintain shape but alter size through dilation (scale factor). - Two parallel lines cut by a transversal create: 1. Corresponding angles 2. Vertical angles 3.	● 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>** **Understanding Translations**: The vertices of triangle WXY have the coordinates (2, -4), (9, 1), and (6, 5). Select the coordinates of the vertices of the image of triangle WXY by translating it 7 units left and 9 units down. Circle all that apply. a. (-1, 5) b. (2, -8) c. (9, -8) d. (16, 10) e. (-5, -13) f. (-1, -4) **Understanding Reflections**: The vertices of a quadrilateral on a coordinate plane are: A(3, -1), B(5, -1), C(5, -5), and D(3, -5). a. What are the coordinates of each vertex of the image formed is the original quadrilateral is reflected over the x-axis? (You

Theorem and its converse? 7) How do you find the volume of 3-D figures in the real world?	Alternate Interior angles 4. Adjacent angles 5. Supplementary angles 6. Alternate Exterior angles 7. Same Side Interior angles - The Pythagorean Theorem is used to find: 1. one of the missing lengths of any side of a right triangle. 2. a diagonal of a given shape containing at least one right angle. 3. the distance of any diagonal line. - Use a given formula for cylinders, cones and spheres to evaluate the volume of those figures.	may use a grid to help you. b. Verify that each side of the image is congruent to the corresponding side of the pre-image. Record the lengths of the corresponding sides. **Understanding Rotations**: The vertices of a triangle on the coordinate plane are (1, 1), (4, 4), and (3, 1). What are the coordinates of the image triangle produced by each of the following rotations: a. A 90 degree clockwise rotation about the origin. b. A 270 degree clockwise rotation about the origin. c. A 180 degree counterclockwise rotation about the origin. **Understanding Dilations**: Consider each transformation described below. Determine which boxt the description should be in. - Reflection over a horizontal line - Dilation with scale factor 3.5 - Rotation 90 degrees about the origin - Translation 4 units up - Dilation with scale factor 1 - Dilation with scale factor ⅞ **Reduction of Pre-image** | **Congruent to Pre-image** | **Enlargement of Pre-image** | | | **Using Translations, Reflections, Rotations, and Dilations**: Read each statement. Circle all correct statements. a. A rotation followed by a dilation maps a pre-image to a congruent image. b. A translation followed by a reflection maps a pre-image to a congruent image c. A dilation followed by a translation maps a pre-image to a similar image d. A rotation followed by a dilation maps a pre-image to a similar image e. If two figures are congruent, then there is a sequence of transformation that maps one figure to the other f. If two figures are similar, the sequence of transformations that maps one figure to the other must include a translation. **Parallel Lines Intersected by a Transversal**: Look at each pair of angles. Do the angles have the same measure?  a. Angle 3 and angle 2 b. Angle 5 and angle 1 c. Angle 4 and angle 6 d. Angle 4 and angle 8 e. Angle 3 and angle 6

		Angles of Triangles: A triangle has angle measures in the ratio of 1:2:3. What is the measure of each angle of the triangle? Explain how you got your answer. **Pythagorean Theorem**: Two sides of a right triangle measure 11 inches and 15 inches. a. Use decimals rounded to the nearest tenth to complete the following statement: The length of the third side of the triangle could be _____ inches or ____inches. b. Write two equations that justify your answers to Part A. **Finding the distance between 2 points on a coordinate plane**: A coordinate grid is superimposed on a map of the county park. The grid shows a rectangular playground with vertices (1, 4), (5.5, 7), (3, 1), and (7.5, 4). Each unit on the grid represents 10 feet. a. Graph the rectangle that represents the playground. b. What is the area of the playground? Round your answer to the nearest square foot. Explain how you got your answer. **Understanding Volume of Cylinders, Cones, and Spheres**: Write True or False for each statement. a. If you know the diameter of a sphere, you can find its radius. b. A volume formula for a sphere, cone, or cylinder must include the irrational number π. c. If you know the radius of a cone, you can find its volume. d. If a cone and a sphere have the same radius, the volume of the sphere must be greater. e. To find an exact volume for a sphere, use the fraction 22/7 for π. **<u>Suggested Activities</u>**: **Reflections Card Sort:** Students will practice comparing and identifying reflections over the x-axis and y-axis. Students will categorize the graph of a point and its reflection as an x-axis reflection, y-axis reflection, or an x and y-axis reflection. **Dilations (He Said, She Said):** Each card in this activity will have two statements from different students about a dilation, and the students will have to decide whose is correct. This activity focuses on dilations with the origin as the center of dilation, and specifically their effects on the coordinates in a figure. Students will have to explain why one student in correct and why the other students is incorrect. **Guess My Transformation:** Students will will use clue cards to investigate and correctly identify 12 different transformations on the coordinate plane. **Angles and Similar Triangles Sort:** Students use the angle-angle criterion to identify and sort pairs of triangles as “Similar” or “Not Similar”. **Parallel Lines and Transversals (Find It, Fix It):** Students will use the angle relationships created by parallel lines and transversals to set up equations, solve for x, and find the value of the angle measures. Students will also have to identify corresponding angles,

		alternate interior angles, alternate exterior angles and vertical angles. **Exterior Angles Domino Train:** Students will use the exterior angle theorem to solve for unknown measures in triangles. There are 12 total dominos. The object is for students to create a domino train by matching a problem with its solution found on the next domino. **Volume of Spheres Connect Four:** Student will be given a game board with 16 circles on it. Each game board will have the circles placed in different locations. The students will flip over a card and work on finding the volume of the sphere together. ONce they agree on an answer, each student will place a chip on their gameboard. The student to connect four in a row wins the game. **Volume of a Cylinder War Game:** Students will split the deck of cards in half. They will each flip over a card. They will find the volume of the cylinder on their card. The student who have the greater volume wins both cards. The student who has the most cards at the end of the game is the winner.
Equipment Needed ● Dry Erase Boards/markers ● Chromebooks ● Workbooks ● Post it notes ● Index Cards ● Pre-made games ● Calculators ● Mazes and puzzles ● 3-D shapes ● Dominoes ● Triangles ● Graph paper		**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: 8th Grade Math
Cluster: Statistics and Probability
A. Investigate patterns of association in bivariate data. **1.** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. **2.** Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit (e.g. line of best fit) by judging the closeness of the data points to the line.

3. Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.
4. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?

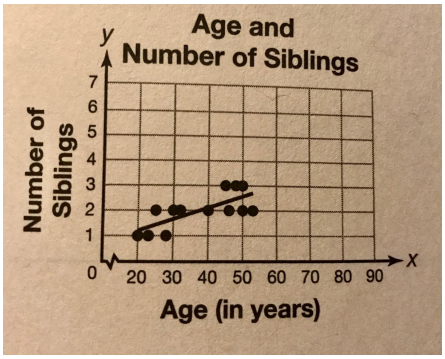
Essential Questions	Enduring Understandings	Activities, Investigations and Student Experiences
1) When is a scatter plot appropriate for displaying data? 2) How do we find the relationship of a scatter plot? 3) How can I use a scatter plot to predict the correlation between two variables? 4) How can you make a prediction from a line of best fit? 5) Why are two-way graphs helpful?	- A scatter plot is the graph of the ordered pairs that describe a relationship between two sets of data. - When the plotted points appear to lie approximately along the line of best fit (trend line), there is a strong correlation with the bivariate data. - Clustering helps identify relationships between data. An outlier can determine a false prediction. - A two-way table displays two-variable data by organizing it into rows and columns	• 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>** **Understanding Scatter Plots**:

x	8.8	4.6	9.2	8.3	0.8	1.5	9.5	2.3
y	11.4	8.5	12.2	11.6	13.1	11.6	11.8	11.3

x	2.8	5.8	4.1	1.2	6.2	6.8	3.1	7.8
y	10.5	9.3	9.6	12.4	9.5	10.2	9.3	10.6

a. Use the bivariate data in these tables to construct a scatter plot.
b. Describe the association between the variables.

Solving Problems using Scatter Plots: The data on the scatter plot show the number of siblings each person has.



a. Find the equation for the line of best fit. Use the points (20, 1.2) and (53, 2.6).
Slope of line: _____

Equation of line:_____

b. Based on these data, how many siblings does a 35-year-old person have? Explain why only whole number answers make sense in the context of this problem.

Understanding Two-Way Frequency Tables: The table shows the votes in the last mayoral election and whether people voted for or against having concerts in the town park.

Votes in the Election for Mayor

	Kwon	**Cogorno**	**Liebowitz**	**Total**
Yes	318	578	217	
No	472	165	423	
Total				

a. Complete the table.
b. Who won the election for mayor?
Was having concerts in the park approved?
c. Did the people who voted for the winning candidates also vote for having concerts in the park? Explain your answer.

<u>Suggested Activities</u>:

Drive Thru Scatter Plot Activity: Students will compare the fat and calories in items from a fictional fast food restaurant by creating a scatter plot. They will also draw a line of best fit, approximate the slope of that line, and make predictions based on the line.

U.S. President Data Analysis & Statistics Project: "Do US Presidents with the most children live longer after they have been inaugurated?" Students will research former presidents and the lengths of their terms, the number of children, the year of their deaths, etc. to answer the statistical question provided.

- In "He Entered a Young Man", students will make a parallel box-and-whisker plot by hand of the ages of the US Presidents at the time of their inauguration. They will use the box-and-whisker plot to answer the following questions.
- In "Oval Office Analysis", students will use the data of the presidents to complete a variety of data displays including: stem and leaf plot, histograms, frequency distribution, mean, median, mode, range, box and whisker plots.
- In "Presidential Inquiry", students will explore correlation of bivariate data to determine if a relationship exists between the number of children of a president has and their longevity after inauguration.

Scatter Plot and Association Card Sort: Students will sort pre-made scatter plot graphs into positive, negative, and no association categories. Students will also place the real-world situation into these categories.

Two-Way Tables Station Activities: 1. Two Way Tables Logic Puzzles: Puzzles where students must use the clues to work out the missing data in the tables. 2. Two Way Tables True or False Cards: A set of statements are given about a table of data. Students must work out which are true and false. Include basic fractions and percentages. 3. Two Way Tables Probability: Students must first complete the two way table and then work out the probability of different events occurring by using the information.

		8th Grade Statistics Jeopardy Show: Jeopardy style game with questions related to statistics and probability. The questions are organized into 8 different categories. Each category consists of 5 questions, increasing in difficulty, worth 10-50 points. **Mean Absolute Deviation Maze**: Students will find the MAD for a set of numbers and move throughout the maze until they successfully navigate to the end. Not all boxes are used to prevent students from guessing the route through the maze. **Predicting the Future Activities (Scatter Plots, Trend Lines, Regression Equations and Data Analysis):** 1. Introduction to scatter plots and trend lines through an analysis of Olympic swimming results. Students first learn to work with scatter plots by hand plotting and drawing trend lines. Equations are used to explore and interpret the scenario. 2. Student Activity exploring an epidemic of West Nile Virus. Use a calculator to review the cases of WNV over a 10-day period. 3. Performance Task Assessment: two fictional families travel the frontier in search of the American dream. Students must use their regression skills to analyze data taken from found journals in order to determine if either family makes it before running out of water. **Two-Way Tables Guess My Table:** Students will the clues provided on a task card to find the correlating two-way table. They will fill in the missing data on the table and analyze the tables for any additional information requested.
Equipment Needed ● Dry Erase Boards/markers ● Chromebooks ● Workbooks ● Post it notes ● Index Cards ● Pre-made games ● Pre-made graphs ● Two-way tables ● Calculators ● Mazes and puzzles		**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