Department: Math
Course Title: 8th Grade Math
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Unit Title	Unit Length (weeks)	Dates of Unit (Month - Month)	Essential Questions	Topics to be Covered Texts Used	Skills to be Assessed	Standard Alignment	Formative Assessments	Summative Assessments
Rigid Transformations	4	September to October	1. What are rigid transformations 2. How do we perform a translation? Reflection? Rotation? 3. How can we use rigid transformations to prove two figures are congruent on the coordinate plane? 4. What is congruency? 5. What happens to the size and shape of a figure when you move it?		- Rigid Transformations are slides, flips, or turns that change the location or orientation of a figure, but not its size or shape. - You can use the coordinate plane to explore how transformations affect the coordinates of a figure's vertices. - You can use rigid transformations to make sense of congruence and understand why corresponding sides and angles of congruent figures have the same measure.	CCSS.MATH.CONTENT.8.G.A.1 Verify experimentally the properties of rotations, reflections, and translations CCSS.MATH.CONTENT.8.G.A.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. CCSS.MATH.CONTENT.8.G.A.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	Homework (approx. 2 days a week) from each lesson of the unit, typically the independent practice pages or online. Quizzes on each lesson posted online or can be done on paper (3 versions in total)	Unit test includes multi-step problems, multiple choice, matching, and drop down.
Transformations and Triangles	4	October - November	1. How are dilations different from rigid transformations? 2. How do we perform a dilation? 3. What values create an enlarged figure? A reduced figure? 4. What is similarity? 5. How is a figure and its image related when a dilation is performed? 6. What characteristics change when a dilation is performed? What characteristics stay the same? 7. What is the relationship between interior angles and exterior angles? 8. How do we determine if two triangles are congruent?		- A dilation is a transformation that can enlarge or reduce a figure. - You can use what you know about scale drawings to understand dilations and similar figures. - You will use what you know about transformations to discover relationships between angles formed by a pair of parallel lines and a line that intersects them. - Knowing about types of angle pair will help you explore angle relationships in triangles. - You will also learn how to use angle measures to show that two triangles are similar.	CCSS.MATH.CONTENT.8.G.A.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. CCSS.MATH.CONTENT.8.G.A.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. CCSS.MATH.CONTENT.8.G.A.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.	Homework (approx. 2 days a week) from each lesson of the unit, typically the independent practice pages or online. Quizzes on each lesson posted online or can be done on paper (3 versions in total)	Unit test includes multi-step problems, multiple choice, matching, and drop down.
Linear Relationships	6	December-February	1. What are the characteristics of a linear equation? 2. What is slope and how do you determine slope? 3. How many solutions does a one variable equation have? How do you know? 4. How can we determine the solution of system of linear equations graphically? 5. How can we solve a system of linear equations algebraically? 6. What do the coordinates of the solution signify? 7. Which real-world situations are solved by linear equations? Systems of linear equations?		- A linear equation in two variables has a graph that is a straight line. Knowing about proportional relationships can help you make sense of the slope and y-intercept of a line - Linear equations in one variable have one solution, no solution, or infinitely many solutions. - A system of linear equations is a group of related linear equations where a solution makes all the equations true at the same time. You can use what you know about solving equations to solve systems of equations.	CCSS.MATH.CONTENT.8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. CCSS.MATH.CONTENT.8.EE.B.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. CCSS.MATH.CONTENT.8.EE.C.7 Solve linear equations in one variable. CCSS.MATH.CONTENT.8.EE.C.7.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). CCSS.MATH.CONTENT.8.EE.C.7.B Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. CCSS.MATH.CONTENT.8.EE.C.8 Analyze and solve pairs of simultaneous linear equations. CCSS.MATH.CONTENT.8.EE.C.8.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. CCSS.MATH.CONTENT.8.EE.C.8.B Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.	Homework (approx. 2 days a week) from each lesson of the unit, typically the independent practice pages or online. Quizzes on each lesson posted online or can be done on paper (3 versions in total)	Unit test includes multi-step problems, multiple choice, matching, and drop down.

Functions	4	March	1. How can we determine if a relationship is a function? 2. How do we use tables, graphs, and verbal descriptions to evaluate and compare linear functions? 3. Which model is most helpful in which type of situation? Can there be more than one model? 4. How do we qualitatively describe a function for each type of model? 5. What real-world problems use functions to better understand the situation?		A function is a rule that assigns exactly one output for each input. You can use what you know about relationships between two variables to help you understand functions You can use tables, graphs, equations, and verbal descriptions to model, evaluate, and compare characteristics of linear functions You can describe a function qualitatively based on its graph, even when no scale values are shown.	CCSS.MATH.CONTENT.8.F.A.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 CCSS.MATH.CONTENT.8.F.A.2 Compare properties 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. CCSS.MATH.CONTENT.8.F.A.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. CCSS.MATH.CONTENT.8.F.B.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. CCSS.MATH.CONTENT.8.F.B.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.	Homework (approx. 2 days a week) from each lesson of the unit, typically the independent practice pages or online. Quizzes on each lesson posted online or can be done on paper (3 versions in total)	Unit test includes multi-step problems, multiple choice, matching, and drop down.
Integer Exponents and Scientific Notation	4	February-March	1. What patterns do you see when multiplying powers with the same base? When dividing? What about when you raise a power to another power? 2. Why do values raised to the power of 0 always equal 1? Can you think of one exception? 3. Why are numbers raised to a negative power fractions? 4. How can you use the properties of exponents to perform operations with numbers in scientific notation? 5. How can you determine if you are working with a very large or very small quantity by looking at the power?		You can explore operations with powers and discover patterns that help you understand and apply properties of exponents A very large or a very small quantity can be expressed as a product of a number and a power of 10. You can use what you know about the properties of exponents to operate with numbers in this form.	CCSS.MATH.CONTENT.8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. CCSS.MATH.CONTENT.8.EE.A.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. CCSS.MATH.CONTENT.8.EE.A.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	Homework (approx. 2 days a week) from each lesson of the unit, typically the independent practice pages or online. Quizzes on each lesson posted online or can be done on paper (3 versions in total)	Unit test includes multi-step problems, multiple choice, matching, and drop down.

Pythagorean Theorem	5	April	1. What is a terminating decimal? 2. What is a repeating decimal? 3. How do you know if you have calculated a terminating or repeating decimal? 4. What is a perfect square? A perfect cube? 5. What is the Pythagorean Theorem? 6. What is the converse of the Pythagorean theorem? 7. What real-world situations use the Pythagorean Theorem? 8. How do we use pi and the area formula to calculate the volume of cones, cylinders, and spheres?		- An irrational number cannot be written as a terminating or repeating decimal. You can use what you know about working with rational numbers to solve problems with irrational numbers. - The side lengths of a right triangle have a special relationship called the Pythagorean Theorem. You can use this relationship to find unknown side lengths - You can use what you know about pi and area of circles to solve real-world problems about the volume of cones, cylinders, and spheres.	CCSS.MATH.CONTENT.8.EE.A.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. CCSS.MATH.CONTENT.8.NS.A.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. CCSS.MATH.CONTENT.8.NS.A.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., π2). CCSS.MATH.CONTENT.8.G.B.6 Explain a proof of the Pythagorean Theorem and its converse. CCSS.MATH.CONTENT.8.G.B.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. CCSS.MATH.CONTENT.8.G.B.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. CCSS.MATH.CONTENT.8.G.C.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	Homework (approx. 2 days a week) from each lesson of the unit, typically the independent practice pages or online. Quizzes on each lesson posted online or can be done on paper (3 versions in total)	Unit test includes multi-step problems, multiple choice, matching, and drop down.
Two-Variable Data	4	May-June	1. How can we display and compare bivariate data? 2. What does it mean when we look for associations between data? 3. What is the difference between categorical and measurement data? 4. How do we informally determine a line as a good fit? 5. How do we use slope and y-intercept of a linear model to help understand the data? 6. How do we use two-way tables to analyze data?		- You will build on what you know about one-variable data displays by constructing and analyzing two-variable data displays - Knowing about linear equations you will model a linear pattern in a two-variable data set and use your model to make predictions - You will organize and interpret two-variable categorical data and describe possible associations between the variables using relative frequencies	CCSS.MATH.CONTENT.8.SP.A.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. CCSS.MATH.CONTENT.8.SP.A.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 by judging the closeness of the data points to the line. CCSS.MATH.CONTENT.8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. CCSS.MATH.CONTENT.8.SP.A.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.	Homework (approx. 2 days a week) from each lesson of the unit, typically the independent practice pages or online. Quizzes on each lesson posted online or can be done on paper (3 versions in total)	Unit test includes multi-step problems, multiple choice, matching, and drop down.