GRADE 8 MATH Curriculum Map

Unit/Time	CONTENT	SKILLS	ASSESSMENTS	CCMS	VOCABULARY
Unit #1 *(26 days)* *~5 weeks*	**Expressions and Equations**	*Students will be able to…* ● Simplify linear expressions utilizing the distributive property and collecting like terms. (8.EE.7) ● Create a multi-step linear equation to represent a real-life situation. (8.EE.7) ● Solve equations with linear expressions on either or both sides including equations with one solution, infinitely many solutions, and no solutions. (8.EE.7) ● Give examples of and identify equations as having one solution, infinitely many solutions, or no solutions. (8.EE.7) *Some students may be ready to…* ● Create and solve equation representations of more complex real-life situations. ● Create and solve inequality representations of real-life situations. *(i.e. The school band sells shirts for* $\$10$ *each. It costs them* $\$3$ *per shirt to buy each shirt and* $\$2$ *per shirt to have the logo printed. There was also a* $\$1000$ *printer set-up fee. If they want to have a profit of at least* $\$4$ *per shirt sold, how many shirts do they need to sell?)*	Observation Participation Manipulatives Guided Practice Independent Practice Worksheets Projects Quizzes Tests	**Analyze and solve linear equations.** ▪ 8.EE.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.	**Critical Terms:** Simplify Distributive property Like terms Solution Inverse operations **Supplemental Terms:** Expand Factor Variable Unknown

		- Solve simple quadratic equations of the form $ax^2 - c = p$. - Solve simple radical equations of the form $a\sqrt{x+b} = p$.			
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Unit #2 *(20 days)* *~ 4 weeks*	**Exponents & Scientific Notation**	*Students will be able to…* - Apply the properties of integer exponents to generate equivalent numerical expressions. (8.EE.1) - Estimate very large or very small quantities using a single digit times a power of ten. (8.EE.3) - Express how much larger one number expressed as a single digit times a power of ten is than another in the context of the situation. (8.EE.3) - Express numbers in scientific notation. (8.EE.4) - Perform operations with numbers expressed in scientific notation and a mix of scientific notation and decimal notation. (8.EE.4) - Choose appropriate units of measurements for a given number in scientific notation. (8.EE.4) - Interpret scientific notation that has been generated by technology. (8.EE.4)	Observation Participation Manipulatives Guided Practice Independent Practice Worksheets Projects Quizzes Tests	**Work with integer exponents.** 8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$. 8.EE.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* 3×10^8 *and the population of the world as* 7×10^9*, and determine that the world population is more than* 20 *times larger.* 8.EE.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.	**Critical Terms:** Exponent Scientific notation **Supplemental Terms:** Expression Variable Property Integer Order of Operations

		Some students may be ready to… ● Multiply and divide monomials. $((2x^{-3}y^5z)(3x^5y^{-3})$ *or* $(2x^{-3}y^5z)/(3x^5y^{-3}))$.			
Unit/Time	**CONTENT**	**SKILLS**	**ASSESSMENTS**	**CCMS**	**VOCABULARY**
Unit #3 *(12 days)* *~3 weeks*	**Real Numbers**	*Students will be able to…* ● Distinguish between rational and irrational numbers. (8.NS.1) ● Convert a decimal expansion which repeats eventually into a rational number. (8.NS.1) ● Find rational approximations of irrational numbers. (8.NS.2) ● Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions.(8.NS.2) ● Evaluate square roots of small perfect squares and cube roots of small perfect cubes. (8.EE.2) ● Use square root and cube root symbols to solve and represent solutions of equations. (8.EE.2) *Some students may be ready to…* ● Identify real and complex numbers through the introduction of $i = \sqrt{-1}$.	Observation Participation Manipulatives Guided Practice Independent Practice Worksheets Projects Quizzes Tests	**Know that there are numbers that are not rational, and approximate them by rational numbers.** ▪ 8.NS.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. ▪ 8.NS.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., π^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.* **Work with radical exponents.** ▪ 8.EE.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.	**Critical Terms:** Radical Irrational number Rational number Square root Cube root Perfect cube Perfect square

		• Reduce irrational numbers to simplest radical form. $(\sqrt{24} = 2\sqrt{6})$. • Rationalizing fractions with a square root in the denominator.			
Unit/Time	**CONTENT**	**SKILLS**	**ASSESSMENTS**	**CCMS**	**VOCABULARY**
Unit #4 *(28 days)* *~ 6 weeks*	**Congruence and Similarity**	*Students will be able to…* • Describe a series of transformations that exhibits congruence between two congruent figures. (8.G.2) • Describe transformations (dilations, translations, rotations, and reflections) with words and with coordinates. (8.G.3) • Describe a series of transformations that exhibits similarity between two similar figures. (8.G.4) • Find the measures of angles using transversals, the sum of angles in a triangle, the exterior angles of triangles. (8.G.5) • Determine if triangles are similar using the angle-angle criterion. (8.G.5) • Justify congruence or similarity of figures using a series of transformations. (8.G.2 and 8.G.4) *Some students may be ready to…* • Find angle measures and patterns created by transversals with non-parallel lines. • Find the vertices of the original per-image given an image and a series	Observation Participation Manipulatives Guided Practice Independent Practice Worksheets Projects Quizzes Test	**Understand congruence and similarity using physical models, transparencies, or geometry software.** ▪ 8.G.1 Verify experimentally the properties of rotations, reflections, and translations: a) Lines are taken to lines, and line segments to line segments of the same length. b) Angles are taken to angles of the same measure. c) Parallel lines are taken to parallel lines. ▪ 8.G.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. ▪ 8. G.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. ▪ 8.G.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	**Critical Terms:** Transformations Translation Rotation Reflection Line of reflection Dilations Transversal Exterior angles Interior angles Angle of rotation **Supplemental Terms:** Line segments Parallel lines Congruent (congruency) Symmetry Similarity Corresponding Scale factor

		of transformations that had been performed. ● Use transformation notation including scale factor, k, for a dilation yielding points (kx, ky), translation vectors $\binom{a}{b}$, rotation angles, and lines of reflection. ● Perform dilations with centers of dilation other than $(0,0)$, rotations with centers of rotations other than $(0,0)$, and reflections across lines other than the axes.		dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. ▪ 8.G.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.*	
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Unit #5 *(13 days)* *~3 weeks*	**Functions**	*Students will be able to …* ● Verify that a relationship is a function or not. (8.F.1) ● Reason from a context, graph, or table after knowing which quantity is the input and which is the output. (8.F.1) ● Represent and compare functions numerically, graphically, verbally and algebraically. (8.F.2) ● Describe the qualities of a function using a graph (e.g., where the function is increasing or decreasing). (8.F.5) ● Sketch a graph when given a verbal description of a situation. (8.F.5) *Some students may be ready to…* ● Explain when an equation is not a function for all real values of given certain equations.	Observation Participation Manipulatives Guided Practice Independent Practice Worksheets Projects Quizzes Tests	**Define, evaluate, and compare functions.** ▪ 8.F.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. ▪ 8.F.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. ▪ 8.F.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or	**Critical Terms:** Function Graph of a function **Supplemental Terms:** Input/output Ordered pairs Coordinate plane Linear/non-linear Domain Range

		• Restrict the domain of those same equations so that each equation becomes a function. • Use function notation. • Discuss max/min and local max/min of a function.		decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	
Unit/Time	**CONTENT**	**SKILLS**	**ASSESSMENTS**	**CCMS**	**VOCABULARY**
Unit #6 *(18 days)* *~4 weeks*	**Linear Functions**	*Students will be able to …* • Interpret equations in form as a linear function. (8.F.3) • Determine whether a function is linear or non-linear. (8.F.3) • Identify and contextualize the rate of change and the initial value from tables, graphs, equations, or verbal descriptions. (8.F.4) • Construct a model for a linear function. (8.F.4) • Compare graphs, tables, and equations of proportional relationships. (8.EE.5) • Graph proportional relationships and interpret the unit rate as the slope. (8.EE.5) • Use similar triangles to explain why the slope is the same between any two distinct points on a non-vertical line in the coordinate plane. (8.EE.6) • Derive the equation for a line through the origin and for a line intercepting the vertical axis at (0, b) . (8.EE.6)	Observation Participation Manipulatives Guided Practice Independent Practice Worksheets Projects Quizzes Tests	**Understand the connections between proportional relationships, lines, and linear equations.** ▪ 8.EE.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. ▪ 8.EE.6 Use similar triangles to explain why the slope is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation for a line through the origin and the equation for a line intercepting the vertical axis at . **Define, evaluate, and compare functions.** ▪ 8.F.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	**Critical Terms:** Linear/Non-linear Function Graph of a function Slope Rate of change Unit rate **Supplemental Terms:** Input/output Ordered pairs Coordinate plane Domain Range

				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. ▪ 8.F.3 Interpret the equation as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function giving the area of a square as a function of its side length is not linear because its graph contains the points , and , which are not on a straight line. ▪ 8.F.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 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.	
Unit/Time	**CONTENT**	**SKILLS**	**ASSESSMENTS**	**CCMS**	**VOCABULARY**
Unit #7 *(19 days)* *~ 4 weeks*	**Linear Systems**	*Students will be able to …* ● Determine whether a relationship is linear. (8.EE.8) ● Compare graphs, tables, and equations of proportional relationships. (8.EE.5) ● Graph proportional relationships and interpret the unit rate as the slope. (8.EE.5) ● Estimate solutions by graphing equations. (8.EE.8)	Observation Participation Manipulatives Guided Practice Independent Practice Worksheets Projects	**Understand the connections between proportional relationships, lines, and linear equations.** ▪ 8.EE.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*	

		● Solve systems by graphing, substitution, or elimination (combination). (8.EE.8) ● Determine if a system has one solution, no solutions, or many solutions. (8.EE.8) ● Interpret the solution to a system of equations in context. (8.EE.8) *Some students may be ready to…* ● Parameterize a system. ● Solve systems of linear inequalities.	Quizzes Tests	*determine which of two moving objects has greater speed.* **Analyze and solve linear equations and pairs of simulations linear equations.** ▪ 8.EE.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.*	

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Unit #8 *(18 days)* *~4 weeks*	**Pythagorean Theorem & Volume**	*Students will be able to…* ● Explain a proof of the Pythagorean Theorem and its converse. (8.G.6) ● Use the Pythagorean Theorem to solve for a missing side of a right triangle given the other 2 sides in both 2-D and 3-D problems. (8.G.7) ● Apply the Pythagorean Theorem to solve problems in real-world contexts. (8.G.7) ● Apply the Pythagorean Theorem to find the distance between two points in the coordinate system. (8.G.8) ● Find the volume of rounded objects in real-world contexts. (8.G.9) ● Give volume in terms of π and using $\pi \approx 3.14$ or $\frac{22}{7}$. (8.G.9) ● Find a missing dimension given the volume of rounded object. (8.G.9) *Some students may be ready to…* ● Derive (and use) the distance formula from the Pythagorean Theorem using the hypotenuse of a triangle. ● Explore trigonometric ratios. ● Determine the surface area of a cylinder, cone or sphere. ● Determine the volume of composite figures such as determining how much rubber is needed to make a tennis ball by taking the outer sphere volume	Observation Participation Manipulatives Guided Practice Independent Practice Worksheets Projects Quizzes Tests	**Understand and apply the Pythagorean Theorem** ▪ 8.G.6 Explain a proof of the Pythagorean Theorem and its converse. ▪ 8.G.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.G.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. **Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.** 8.G.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	**Critical Terms:** Legs of a triangle Hypotenuse Right triangle Pythagorean theorem Pythagorean triple Converse of Pythagorean theorem Square root **Supplemental Terms:** Distance formula Irrational Perfect squares Radical

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		minus the inner sphere volume or determining how much grain will fit in a cylindrical silo with a conical top.			
Unit #9 *(11 days)* *~2 weeks*	**Statistics and Bivariate Data**	*Students will be able to…* • Construct and interpret scatter plots and two-way tables for patterns such as positive or negative association, linearity or curvature, and outliers. (8.SP.1) • Generate an approximate line of best fit. (8.SP.2) • Use the equation of a linear model to solve problems in the context of bivariate measurement data. (8.SP.3) • Interpret the slope and y-intercept of the line of best fit in context. (8.SP.3) • Show that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. (8.SP.4) • Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. (8.SP.4) • Use relative frequencies calculated for rows or columns to describe possible association between the two variables. (8.SP.4) *Some students may be ready to…* • Explain why some points on a scatter plot would not be chosen to write an equation that represents the data.	Observation Participation Manipulatives Guided Practice Independent Practice Worksheets Projects Quizzes Tests	**Investigate patterns of associations in bivariate data.** ▪ 8.SP.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. ▪ 8.SP.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. ▪ 8.SP.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.* ▪ 8.SP.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	**Critical Terms:** Bivariate data Scatter plot Line of best fit Clustering Outlier Positive/negative association **Supplemental Terms:** Linear/non-linear Slope Rate of change

		• Collect their own data, graph, interpret, and then make predictions using linear extrapolation and interpolation. • Find the standard deviation of a data set. • Use linear regression to generate the line of best fit.		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?*	