Trinity Area School District
Template for Curriculum Mapping

Course: Common Core Math 8 **Grade: 8**	**Overview of Course** (Briefly describe what students should understand and be able to do as a result of engaging in this course)**:** In grade 8, instructional time should focus on three critical areas: (1) formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations; (2) grasping the concept of a function and using functions to describe quantitative relationships; (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

Overarching Big Ideas, Enduring Understandings, and Essential Questions
(These "spiral" throughout the entire curriculum.)

Big Idea (A Big Idea is typically a noun and always transferable within and among content areas.)	**Standard(s) Addressed** (What Common Core Standard(s) and/or PA Standard(s) addresses this Big Idea?)	**Enduring Understanding(s)** (SAS refers to Enduring Understandings as "Big Ideas." EUs are the understandings we want students to carry with them after they graduate. EUs will link Big Ideas together. Consider having only one or two EUs per Big Idea.)	**Essential Question(s)** (Essential Questions are broad and open ended. Sometimes, EQs can be debated. A student's answer to an EQ will help teachers determine if he/she truly understands. Consider having only one or two EQs per Enduring Understanding.)
Variables and Properties of Real Numbers	**CC.2.1.8.E.1** **Distinguish between rational and irrational numbers using their properties.** **CC.2.1.8.E.4** **Estimate irrational numbers by comparing them to rational numbers.** **CC.2.1.HS.F.2** **Apply properties of rational and irrational numbers to solve real world or mathematical problems.** **CC.2.1.HS.F.4** **Use units as a way to understand problems and to guide the solution of multi-step problems.**	**Algebra uses symbols to represent quantities that are unknown or that vary. Mathematical phrases and real-world relationships can be represented using symbols and operations.** **Powers can be used to shorten representation of repeated multiplication.** **The definition of a square root can be used to find the exact square roots of some nonnegative numbers. The square roots of other nonnegative numbers can be approximated.** **Numbers can be classified by their characteristics.** **Relationships that are always true for real numbers are called properties.**	**Why is it helpful to write numbers in different ways?** **How can you represent quantities, patterns, and relationships?** **How are properties of real numbers related to algebra?**

Distributive Property	**CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents.** **CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.** **CC.2.1.HS.C.3 Write functions or sequences that model relationships between two quantities.**	**The distributive property is to be used when solving and simplifying all styles and types of equations. It will be used throughout all algebra classes and beyond.** **Multiplying using the distributive property is a fast and simple method to simplify an expression.**	**What truly defines a "like" term?** **When are all like terms completely combined?** **When is it logical to use the distributive property?** **Can the distributive property be used in a reverse method to solve problems?**
One-Step and Multi-Step Equations	**CC.2.1.HS.F.2 Apply properties of rational and irrational to solve real world or mathematical problems.** **CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.** **CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context.** **CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.** **CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.** **CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms.**	**Solving multi-step equations requires the ability to understand which terms or parts of an expression can be combined and which cannot.** **Solving multi-step equations is combining many one-step equation steps together.** **Multi-step equations are used as a stepping stone to solving more complex equations.** **Multi-step equations utilize the distributive property and all of the other mathematical properties necessary to solve equations.**	**Are there "rules" on how to solve multi-step equations?** **What are the rules? (Do the rules apply to all types of multi-step equations or just a select few?)** **How can understanding the concept of "like terms" help us simplify algebraic expressions?** **Are multi-step equations just a combination of many one-step equations or are the approaches handled differently?**
Inequalities	**CC.2.1.HS.F.2 Apply properties of rational and irrational to solve real world or mathematical problems.** **CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.**	**Inequalities are terms that are not equal.** **When solving an inequality, the student must take into consideration the sign of the inequality.** **The concept is similar when solving inequalities compared to solving equalities.**	**How is solving an inequality similar to solving an equation?** **How does solving an inequality differ from solving an equation?**

	CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context. **CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.** **CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.** **CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms.**	**Solving inequalities are similar to multi-step equations, except for a sign change.**	**Are there "rules" on how to solve multi-step inequalities?** **What are the rules? (Do the rules apply to all types of multi-step inequalities or just a select few?)** **How can understanding the concept of "like terms" help us simplify algebraic expressions?** **Are multi-step inequalities just a combination of many one-step inequalities or are the approaches handled differently?**
Functions	**CC.2.2.HS.D.1** **Interpret the structure of expressions to represent a quantity in terms of its context.** **CC.2.2.HS.D.2** **Write expressions in equivalent forms to solve problems.** **CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context.** **CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.** **CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities.** **CC.2.2.HS.C.5 Construct and compare linear, quadratic, and exponential models to solve problems.**	**A function is a relationship between two variables in which each value of the input variable is associated with a unique value of the output variable.** **Functions can be represented in a variety of different ways, such as graphs, tables, equations, or words. Each representation is particularly helpful in certain situations.** **A function that models a real-world situation can be used to make estimates or predictions about future occurrences.**	**How can using a graph give a visual representation of the comparison of two different quantities?** **What is the difference between a relation and a function? What tests can we use to prove a function is a relation?** **Can most real world examples have a function modeled after their behavior?**

	CC.2.2.HS.C.6 **Interpret functions in terms of the situations they model.** **CC.2.2.8.C.1** **Define, evaluate, and compare functions.** **CC.2.2.8.C.2** **Use concepts of functions to model relationships between quantities.**		
Rate of Change	**CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents.** **CC.2.1.HS.F.2 Apply properties of rational and irrational to solve real world or mathematical problems.** **CC.2.1.HS.F.3 Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.** **CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.** **CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships** **CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.**	**The slope of a linear function represents a constant rate of change for f(x) when x changes by a fixed amount. (The steepness of a line determines how quickly or how slowly the data changes.)** **The equation of a line defines the relationship between two variables.** **The rate of change is used in all aspects of life -- from the math classroom to correctly building a new roof on a home.**	**What information is given in the different forms of a linear equation: slope-intercept form, point-slope form, and standard form?** **How can you justify that slopes are undefined or zero?** **How and when do we use slope in our daily lives?**
Linear Functions	**CC.2.2.8.B.2**	**A function is a relationship between two variables in which each value of the input**	**What are the different types of linear functions and when will each type be used most effectively?**

	Understand the connections between proportional relationships, lines, and linear equations. **CC.2.2.8.B.3** **Analyze and solve linear equations and pairs of simultaneous linear equations.** **CC.2.2.HS.D.10** **Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.**	**variable is associated with a unique value of the output variable.** **Functions can be represented in a variety of different ways, such as graphs, tables, equations, or words. Each representation is particularly helpful in certain situations.** **A function that models a real-world situation can be used to make estimates or predictions about future occurrences.**	**Can linear functions be used to model real-world scenarios?** **How can the relationship between two lines be compared?** **How can systems of equations effectively compare two sets of data?**
Scatter Plots and Data Analysis	**CC.2.4.8.B.1** **Analyze and/or interpret bivariate data displayed in multiple representations.** **CC.2.4.8.B.2** **Understand that patterns of association can be seen in bivariate data utilizing frequencies.** **CC.2.4.HS.B.1** **Summarize, represent, and interpret data on a single count or measurement variable.** **CC.2.4.HS.B.2** **Summarize, represent, and interpret data on two categorical and quantitative variables.** **CC.2.4.HS.B.3** **Analyze linear models to make interpretations based on the data.**	**Two sets of data can be graphed as ordered pairs to determine if the two sets of data are related.** **Scatter plots are used to find trends in data to compare relationships. Three types of relationships occur in scatter plots: positive correlation, negative correlation, or no correlation.**	**How are patterns used when comparing two quantities?** **How can you make predictions based on the graph of a scatter plots?** **What are the different types of correlation and how can they be used to identify the slope of a line?**
Exponents	**CC.2.1.HS.F.1** **Apply and extend the properties of exponents to solve problems with rational exponents.**	**Properties of exponents make it easier to simplify products or quotients of powers with the same base or powers raised to a power or products raised to a power.**	**How do parentheses affect the outcome of multiplied exponents?** **How are multiplication and division of exponents different, yet similar?**

		The idea of exponents can be extended to include zero and negative exponents. **Simplify and evaluate expressions involving multiplying and dividing with exponents, powers of powers, and powers of products.**	**How do negative and zero exponents affect the simplifying of an exponential expression?**
Polynomials	**CC.2.2.HS.D.3** **Extend the knowledge of arithmetic operations and apply to polynomials.** **CC.2.2.HS.D.4** **Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.** **CC.2.2.HS.D.5** **Use polynomial identities to solve problems.**	**Polynomials are combinations of both numbers and letters with an addition or subtraction sign between them.** **Like integers, polynomials can be added, subtracted, and multiplied.** **Recognize, evaluate, and simplify polynomials.**	**How do polynomials form a system similar to integers? (How are polynomials and integers alike?)** **How would we perform the basic mathematical operations on polynomials and polynomial equations?**

Big Ideas, Enduring Understandings, and Essential Questions Per Unit of Study
(These do NOT "spiral" throughout the entire curriculum, but are specific to each unit.)

Month of Instruction (In what month(s) will you teach this unit?)	**Title of Unit**	**Big Idea(s)** (A Big Idea is typically a noun and always transferable within and among content areas.)	**Standard(s) Addressed** (What Common Core Standard(s) and/or PA Standard(s) addresses this Big Idea?)	**Enduring Understanding(s)** (SAS refers to Enduring Understandings as "Big Ideas." EUs are the understandings we want students to carry with them after they graduate. EUs will link Big Ideas together. Consider having only one or two EUs per Big Idea.)	**Essential Question(s)** (Essential Questions are broad and open ended. Sometimes, EQs can be debated. A student's answer to an EQ will help teachers determine if he/she truly understands. Consider having only one or two EQs per Enduring Understanding.)	**Common Assessment(s)*** (What assessments will all teachers of this unit use to determine if students have answered the Essential Questions?)	**Common Resource(s)* Used** (What resources will all teachers of this unit use to help students understand the Big Ideas?)
August-September	**The Number System**	Real Numbers	CC.2.1.8.E.1 Distinguish between rational and irrational	Rational numbers are numbers that can be written as fractions.	Why is it necessary to write numbers in different ways?	Chapter Test Quizzes	Glencoe Math – Common Core Edition, Course 3,

			numbers using their properties. CC.2.1.8.E.4 Estimate irrational numbers by comparing t hem to rational numbers. .	When writing repeated multiplication using powers, the repeated factor is the base and the number of times it repeats is the exponent. When multiplying powers with the same base, keep the base and add the exponents. When dividing powers with the same base, keep the base and subtract the exponents. All irrational numbers are non-terminating, non-repeating decimals. Negative exponents do not produce negative numbers. They produce fractions. Scientific notation is a way to write very large or very small numbers. If you know the area of a square of the volume of a cube, you could find the length of one side by finding the square root or the cube root.	How can I write repeated multiplication using powers? How can I use properties of integer exponents to simplify algebraic and numeric expressions? How can I determine if a number is a rational number? How is scientific notation useful in the real world? Why would I need to use square roots and cube roots? How can I estimate the square root of a non-perfect square? How are real numbers different from irrational numbers?	Quarterly Assessment	McGraw Hill Education, 2013 Notes Homework Activities

				Square roots of non-perfect squares can be found by estimating which two perfect squares the original number is between.			
October - November	**Solving Equations**	Solving 1 Variable Equations	CC.2.2.8.B.2 Understand the connections between proportional relationships, lines, and l inear equations. CC.2.2.8.B.3 Analyze and solve Linear equations and pairs of simultaneous linear equations.	The "solution" to an equation is any value or set of values that can be substituted for the variable to make the statement true. When writing an equation, assigning a variable to an unknown helps you when translating the verbal model into an algebraic equation. Any two variable equation with variable exponents of 1 represents a linear relationship. An equation may have 1 solution, infinitely many solutions, or no solution.	What does "solution to an equation" mean? Why is it important to define a variable before writing an equation? How many possible solutions are there to a linear equation in 1 variable? Describe them.	Chapter Test Quizzes Quarterly Exam	Glencoe Math – Common Core Edition, Course 3, McGraw Hill Education, 2013 Notes Homework Activities
November-December	Solving Equations	Solving 2 Variable Equations	CC.2.2.8.B.3 Analyze and solve linear equations and pairs of simultaneous linear equations.	Slope is the ratio of vertical change to horizontal change. Slope means rate of change.	How can you use a table to determine if there is a proportional relationship between two quantities?	Chapter Test Quizzes Quarterly Exam	Glencoe Math – Common Core Edition, Course 3, McGraw Hill Education, 2013

			CC.2.2.8.C.1 Define, evaluate, and compare functions. CC.2.2.8.C.2 Use concepts of functions to model relationships between q uantities.	Two quantities have a proportional linear relationship if they have a constant ratio (rate of change). Slope, unit rate, and constant rate of change mean the same thing. You can write the ratio $\frac{y}{x}$ for each pair of points in a table to determine if a constant ratio exists. In any linear relationship, the rate of change is constant. You can graph a linear equation by finding the x- and y-intercepts and plotting the ordered pairs. If you don't know the y-intercept, you can substitute the slope and a point into the equation. In the linear equation y=mx+b, m represents the slope and b represents the y-intercept.	In any linear relationship, why is the slope always the same? What is the relationship among unit rate, slope, and constant rate of change of a proportional linear relationship? How does the y-intercept appear in these three representations: table, equation, graph? How can the x-intercept and y-intercept be used to graph a linear equation? How does using the point-slope form of a linear equation make it easier to write the equation of a line? How can you use a graph to solve a system of equations? How can you solve a system of equations? What do m and b represent if an		Notes Homework Activities

				In y = mx+b form, b represents the beginning point on the graph. In a table, the y-intercept is the y-value when the x-value is 0. In a system of equations the ordered pair for the point of intersection of the graphs is the solution of the system because it satisfies both equations. When writing an equation, x represents the independent variable and y represents the dependent variable.	equation is in slope intercept form?		
January-February	Functions	Functions	CC.2.2.8.C.1 Define, evaluate, and compare functions. CC.2.2.8.C.2 Use concepts of functions to model relationships between q uantities.	Words, equations, tables, and graphs can be used to represent linear relationships. You can use a graph to write an equation by choosing 2 points on the graph and finding the slope. Use the slope and 1 point from the graph in slope-intercept form to find the y-intercpet. A set of ordered pairs is a relation.	How can you use a graph to write an equation? How do tables and graphs represent relations? How can functions be used to solve real-world situations? What are the advantages and disadvantages to representing a function as an equation instead of a graph?	Chapter Test Quizzes Quarterly Exam	Glencoe Math – Common Core Edition, Course 3, McGraw Hill Education, 2013 Notes Homework Activities

				In a relation, the set of x-coordinates is called the domain and the set of y-coordinates is called the range. Functions are relationships that assign each member of the domain to a unique member of the range, and the relationship is recognizable across representations. The initial value of a function is the y-intercept of the equation. The initial value of a function shown in a table is the corresponding y-value when x=0. If a table shows a constant rate of change between the x- and y-values, the function is linear. Y=mx+b is a linear function whose graph is a straight line.	What are functions? How is the initial value of a function represented in a table and in a graph? How can you use a table or a graph to determine if a function is linear or nonlinear? When does the graph of a quadratic function open upward or downward?		

February - March	Geometry - Triangles and the	Angles, Polygons,	CC.2.3.8.A.3 Understand and apply the Pythagorean	A missing length of a right triangle can be	How can you use different measurements to	Chapter Test Quizzes Quarterly Exam	Glencoe Math – Common Core Edition, Course 3,

	Pythagorean Theorem	Pythagorean Theorem	Theorem to solve problems.	determined by using the Pythagorean Theorem. In a right triangle, $(leg)^2 + (leg)^2 = (hypotenuse)^2$ In a triangle if $(a)^2 + (b)^2 = (c)^2$ then the triangle is a right triangle. C is the longest side.	solve real-life problems? When can you use the Pythagorean Theorem to solve a problem? How can you prove the Pythagorean Theorem and its converse? What is the relationship among the sides of a right triangle? How do you know if a triangle is a right triangle? What is meant by the "legs and hypotenuse" of a right triangle and what is their relation to the Pythagorean Thoerem? What is the relationship between the square root of a number and the square of a number? What is the relationship among the sides of a right triangle?		McGraw Hill Education, 2013 Notes Homework Activities

					How do you find a missing side of a right triangle? How can you use the Pythagorean Theorem to find the distance between two points on the coordinate plane?		
March-April	Geometry - Transformations	Transformations	CC.2.3.8.A.2 Understand and apply congruence, similarity, and geometric transformations using various tools.	Translations, reflections, and rotations are transformations that do not change the shape or size of a figure, just the position. A transformation is an operation that places an original figure, the pre-image, onto a new figure, the image. A dilation is the only transformation that results in a figure that is not congruent to the original figure. Dilations reduce or enlarge a figure to create a similar figure.	How can we best show or describe the change in position of a figure? How are figures translated on the coordinate plane? How can you determine the coordinates of a figure after a reflection over either axis? What is the difference between rotating a figure about a given point that is a vertex and rotating the same figure about the origin if the rotation is less than 360^{o}? What are the results of a dilation of a triangle? What is a scale factor?	Chapter Test Quizzes Quarterly Exam	Glencoe Math – Common Core Edition, Course 3, McGraw Hill Education, 2013 Notes Homework Activities

					How are dilations similar to scale drawings? How can you identify rotational symmetry? What are the results of a dilation of a triangle?		
April	Geometry - Congruence and Similarity	Congruence, Similarity, Transformations	CC.2.3.8.A.2 Understand and apply congruence, similarity, and geometric transformations using various tools. CC.2.2.8.B.2 Understand the connections between proportional relationships, lines, and linear equations.	Indirect measurement is a technique using properties of similar polygons to find distances or lengths that are difficult to measure directly. You can prove two figures are congruent if one is the result of a translation, reflection, or rotation of the other. If $\Delta ABC \cong \Delta DEF$, then $m\angle A \cong m\angle D$ $m\angle B \cong m\angle E$ $m\angle C \cong m\angle F$ $\overline{AB} = \overline{DE}$ $\overline{BC} = \overline{EF}$ $\overline{CA} = \overline{FD}$ Drawing a diagram is a good strategy for solving spatial and geometric problems. Sometimes it is helpful to list the information from the	How can you determine congruence and similarity? How does a combination of transformations differ from a single transformation? How are they the same? Why do translations, reflections, and rotations create congruent images? Which three pairs of corresponding parts can be used to show that two triangles are congruent? How can the coordinate plane help you determine that corresponding sides are congruent?	Chapter Test Quizzes Quarterly Exam	Glencoe Math – Common Core Edition, Course 3, McGraw Hill Education, 2013 Notes Homework Activities

				problem and use the list to make a diagram. Congruent Triangles are exactly the same, only the position changes and/or orientation. A dilation is the only transformation that results in a figure that is not congruent to the original figure. Two figures are similar if the second can be obtained from the first by a sequence of transformations and dilations. Corresponding sides of similar figures are proportional. The ratio of the rise to the run of two slop triangles formed by a line is equal to the slope of the line. The perimeters of similar figures are related by the scale factor. The areas of similar figures are related by	How are two triangle related if they have the same shape but different sizes? What is the difference between using transformations to create similar figures versus using transformations to create congruent figures? How would you determine if the lengths of the corresponding sides are proportional? How does the scale factor of a dilation relate to the ratio of two of the corresponding sides of the pre-image and the image? How do similar triangles make it easier to measure very tall objects? How is the slope of a line related to the similar slope triangles formed by the line? If you know two figures are similar and		

				the square of the scale factor. The ratio of the vertical leg to the horizontal leg of each similar slope triangle formed by the line is equivalent to the absolute value of the slope. Squaring and taking the square root are inverse operations.	you are given the area of both figures, how can you determine the scale factor of the similarity? How does a scale factor affect a figure, its area, and its position in the coordinate plane?		
April - May	Geometry - Volume and Surface Area	Volume, Surface Area, Effects on SA and Volume when changing one dimension and/or multiplying by a scale factor.	CC.2.3.8.A.1 Apply the concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems.	The area of a geometric figure is the measure of the surface enclosed by the figure. Area is measured in Square units. Volumes of all figures are measured in cubic units. Volume of a figure is found by multiplying the area of the Base times the height of the figure, except those that come to a point. The volume of a figure that comes to a point is one third of the area of the Base times the height of the figure.	What information is essential in finding volume? What is a square/cubic unit? How are the units of measurement for volume different than those used for area? How is a calculation affected if you round π to 3.14 or use the pi key on your calculator?	Chapter Test Quizzes Quarterly Exam	Glencoe Math – Common Core Edition, Course 3, McGraw Hill Education, 2013 Notes Homework Activities

				Volume is the measure of space inside a figure (the amount the containers holds).			
May	Statistics and Probability - Scatter Plots and Data Analysis	Scatter Plots, Data Analysis	CC.2.4.8.B.1 Analyze and/or interpret bivariate data displayed in multiple representations. CC.2.4.8.B.2 Understand that patterns of association can be seen in bivariate data utilizing frequencies.	To write an equation for a line of fit you can find the slope and use point slope form or solve for b in slope intercept form. The easiest way to investigate the relationship or trends between two sets of data is to write the data as ordered pairs and graph the data on a coordinate plane to see if there is a trend in the data. A scatter plot is a graph that shows the relationship between a data set with two variables graphed as ordered pairs on a coordinate plane. A set of data points with positive association indicate that the values of the two variables are increasing at the same time. A negative association indicates that as the value of the independent variable increases, the value of	How can I use a graph to investigate the relationship or trend between two sets of data? What are the inferences that can be drawn from sets of data points having a positive association and a negative association? How do you write an equation for a line of fit? How do you use a line of fit to make predictions? Why do we estimate a line of best fit for a scatter plot? How is a two-way table used when determining possible associations between two different categories form the same sample group?	Chapter Test Quizzes Quarterly Exam	Glencoe Math – Common Core Edition, Course 3, McGraw Hill Education, 2013 Notes Homework Activities

				the dependent variable decreases. It is important to interpret the meaning of the slope and *y*-intercept in context of a problem. A line of best fit helps in making interpretations and predictions about the situation modeled in the data set.			