Trinity Area School District
Common Core Math 8 / Algebra 1 Curriculum Map

Course: CC Math 8/Algebra 1 **Grade(s): 7 and 8**	**This course is designed to introduce the foundational elements of algebra: variables, functions (basic, exponential), equations (single-step, multi-step, linear, quadratic), inequalities, graphs, and systems of equations, systems of inequalities, exponents, polynomials, and factoring. In addition, basic probability and statistics will be introduced. Students will spend considerable time evaluating, simplifying, and solving various types of equations using the order of operations. Students will evaluate and graph simple and more complex functions by hand, create scatterplots, compare and contrast parallel and perpendicular lines, use tables to examine data closely, and compare and contrast direct and inverse variation. Students develop a firm grasp of the underlying mathematical concepts while using algebra and concepts of geometry. Consistent problem–solving strategies will be introduced and utilized to assist in developing strong mathematical skills. This course will also cover the required topics for the eighth grade PSSA Mathematics Assessment.**

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.**	**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**	**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?**

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	CC.2.1.HS.F.4 **Use units as a way to understand problems and to guide the solution of multi-step problems.**	**other nonnegative numbers can be approximated.** **Numbers can be classified by their characteristics.** **Relationships that are always true for real numbers are called properties.**	
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.**	**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?**

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	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.**		
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.** **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.**	**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.** **Solving inequalities are similar to multi-step equations, except for a sign change.**	**How is solving an inequality similar to solving an equation?** **How does solving an inequality differ from solving an equation?** **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**	**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.**	**How can using a graph give a visual representation of the comparison of two different quantities?**

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	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.** **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.**	**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.**	**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?**
Rate of Change	**CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents.**	**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.)**	**What information is given in the different forms of a linear equation: slope-intercept form, point-slope form, and standard form?**

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	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 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.**	**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** **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.**	**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.**	**What are the different types of linear functions and when will each type be used most effectively?** **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?**

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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.** **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 parentheses affect the outcome of multiplied exponents?** **How are multiplication and division of exponents different, yet similar?** **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.**	**Polynomials are combinations of both numbers and letters with an addition or subtraction sign between them.**	**How do polynomials form a system similar to integers? (How are polynomials and integers alike?)**

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	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.**	**Like integers, polynomials can be added, subtracted, and multiplied.** **Recognize, evaluate, and simplify polynomials.**	**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	**Variables**	**Order of Operations utilizing numbers and variables**	**CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents.**	**Equations have to be solved in the appropriate order, following the order of operations (using the PEMDAS method).**	**Does it matter which factors in an equation are ordered first, as long as the correct end-answer is achieved? (Are there any mathematical operations that can**	**Participation Homework Quizzes/Tests In-Class Work Projects (possible)**	**Textbook On-Line Resources** **<u>Vocabulary:</u>** • Variable • Algebraic Expression • Equation • Open Sentence

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			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.3 Extend the knowledge of arithmetic operations and apply to polynomials.**	**Numbers and variables given in the problem need to be accounted for and solved correctly to obtain the correct answer (If any step in solving a problem is done in error, then the final answer will be wrong).**	**be done out of order and the correct answer still be obtained?)**		• Simplify • Exponent Base • Power • Evaluate • Natural Numbers • Whole Numbers • Integers • Rational Numbers • Irrational Numbers • Real Numbers • Counterexample • Inequality • Opposites • Absolute Value
August-September	**Statistics**	**Data Analysis**	**CC.2.4.HS.B.1 Summarize, represent, and interpret data on two categorical and quantitative variables.** **CC.2.4.HS.B.2 Summarize, represent, and interpret data on two categorical and quantitative variables.**	**The mean is the average of a collection of numbers.** **The median is the middle number of a collection of numbers.** **The mode is the most frequently occurring number of a collection of numbers.** **Calculating the statistical mean, median, and mode.**	**When is it appropriate to use the mean, median, or mode?** **When is one statistical approach superior to another statistical approach? (What situation in life suggests the need for the mean, median, and/or mode?)**	**Participation** **Homework** **Quizzes/Tests** **In-Class Work** **Projects (possible)** (where applicable)	**Textbook** **On-Line Resources** **<u>Vocabulary:</u>** • Scatter Plot • Positive Correlation • Negative Correlation • No Correlation • Trend Line • Measures of Central Tendency • Mean • Median • Mode • Outlier

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							• Range • Stem-and-leaf plot
September	**Rational Numbers**	**Rational Numbers**	**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.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms.** **CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.**	**Rational numbers are numbers that terminate and don't continue forever.** **Subtracting rational numbers is the same as adding a negative number.** **Reciprocals are fractions that are flipped over.** **Dividing rational numbers is the same as multiplying by the reciprocal.**	**When is it appropriate to subtract vs. add a negative value?** **When do I multiply by the reciprocal vs. divide by the number?**	**Participation** **Homework** **Quizzes/Tests** **In-Class Work** **Projects (possible)** (where applicable)	**Textbook** **On-Line Resources** **<u>Vocabulary:</u>** • Multiplicative inverse • Reciprocal

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			CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.				
September	**Rational Numbers**	**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.**	**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?**	**Participation** **Homework** **Quizzes/Tests** **In-Class Work** **Projects (possible)** (where applicable)	**Textbook** **On-Line Resources** **<u>Vocabulary:</u>** • Distributive Property • Term • Constant • Coefficient • Like Terms • Deductive Reasoning

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September	**Rational Numbers**	**Probability**	**CC.2.4.HS.B.1 Summarize, represent, and interpret data on two categorical and quantitative variables.** **CC.2.4.HS.B.4 Recognize and evaluate random processes underlying statistical experiments** **CC.2.4.HS.B.6 Use the concepts of independence and conditional probability to interpret data.** **CC.2.4.HS.B.7 Apply the rules of probability to compute probabilities of compound events in a uniform probability model.**	**Compare and contrast experimental and theoretical probability.**	**Does it make more sense to base a statement on experimental or theoretical probability? (When would you use the specific types of probability to solve problems?)**	**Participation** **Homework** **Quizzes/Tests** **In-Class Work** **Projects (possible)**	**Textbook** **On-Line Resources** **<u>Vocabulary:</u>** • Probability • Outcome • Sample Space • Event • Theoretical Probability • Complement of an Event • Odds • Experimental Probability • Independent Events • Dependent Events

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October	**Solving Equations**	**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**	**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.**	**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?**	**Participation** **Homework** **Quizzes/Tests** **In-Class Work** **Projects (possible)**	**Textbook** **On-Line Resources** **<u>Vocabulary:</u>** • Solution of an equation • Equivalent Equations • Inverse Operations • Identity • No Solution

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			arithmetic operations and apply to polynomials. **CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms.** **CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.**				
October	**Solving Equations**	**Ratio and Proportion**	**CC.2.1.HS.F.2 Apply properties of rational and irrational to solve real world or mathematical problems.** **CC.2.2.HS.D.9 Use reasoning to solve equations**	**Ratios and proportions deal with fractions and their comparisons.** **Applying ratio and proportion to real-life situations.** **Solving ratio and proportion problems**	**How can problems involving ratios and rates be solved without using a proportion?** **What is the relationship between a ratio and a proportion? (How are ratios**	**Participation** **Homework** **Quizzes/Tests** **In-Class Work** **Projects (possible)**	**Textbook** **On-Line Resources** **<u>Vocabulary:</u>** • Ratio • Rate • Unit Rate • Unit Analysis (Dimensional Analysis) • Proportion

			and justify the solution method. **CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.** **CC.2.1.HS.C.3 Write functions or sequences that model relationships between two quantities.**	**means setting two fractions equal to one another and cross-multiplying to get an answer.**	**and proportions similar?)** **How does a proportion compare two equivalent ratios?**		• Extremes of the proportion • Means of the proportions • Cross Product
October-November	**Inequalities**	**Solving Inequalities**	**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**	**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**	**How is solving an inequality similar to solving an equation?** **How does solving an inequality differ from solving an equation?**	**Participation** **Homework** **Quizzes/Tests** **In-Class Work** **Projects (possible)**	**Textbook** **On-Line Resources** **<u>Vocabulary:</u>** • Solution of an inequality • Equivalent Inequalities

			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.**	**compared to solving equalities.**			

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			CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.				
November	**Inequalities**	**Multi-Step 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.** **CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in**	**Solving multi-step inequalities requires the ability to understand which terms or parts of an expression can be combined, and which cannot. (It is important to apply theories of like terms when solving multi-step equations.)** **Solving multi-step inequalities is combining many one-step inequality steps together.**	**How can a real-world situations can be represented by an inequality?** **When solving an inequality, what operations require the student to reverse the inequality symbol?**	**Participation** **Homework** **Quizzes/Tests** **In-Class Work** **Projects (possible)**	**Textbook** **On-Line Resources** **Study Island** (where applicable) **<u>Vocabulary:</u>** • Compound Inequality

			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.** **CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities**				

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			algebraically and graphically.				
November-December	**Graphs and Functions**	**Relations and Functions**	**CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.** **CC.2.1.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context.** **CC.2.1.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.** **CC.2.1.HS.C.6 Interpret functions in terms of the**	**Relations and functions can be represented numerically, graphically, algebraically, and/or verbally. (Relations and functions can be thought of as equations to help the students comprehend the concepts better.)** **The properties of functions and function operations are used to model and analyze real-world applications and quantitative relationships frequently through graphical approaches. (Graphs are a great way to model and show how data works together.)**	**When and why are relations and functions represented in multiple ways?** **How are the properties of functions and functional operations useful?**	**Participation** **Homework** **Quizzes/Tests** **In-Class Work** **Projects (possible)**	**Textbook** **On-Line Resources** **<u>Vocabulary:</u>** • Function • Function Rule • Dependent Variable • Independent Variable • Domain • Range • Relation • Vertical-Line Test • Function Notation • Discrete Data • Continuous Data

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			situations they model.				
December	**Graphs and Functions**	**Direct Variation**	**CC.2.1.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context.** **CC.2.1.HS.C.6 Interpret functions in terms of the situations they model.** **CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.** **CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.** **CC.2.2.8.C.1 Define, evaluate, and compare functions.**	**The function y = kx describes a proportional relationship in which y varies directly as x.** **The function y = k/x describes a proportional relationship in which y varies inversely as x. (The equation y = kx is different from y = k/x in both approach and answer for direct variation and inverse variation.)**	**How will students recognize and represent direct and inverse variations in various ways?** **Where are direct and inverse variation used in everyday life?**	**Participation** **Homework** **Quizzes/Tests** **In-Class Work** **Projects (possible)**	**Textbook** **On-Line Resources** **<u>Vocabulary:</u>** • Direct Variation • Constant of Variation for direct Variation • Inverse Variation • Constant of variation for inverse variation

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			CC.2.2.8.C.2 Use concepts of functions to model relationships between quantities.				
January	**Linear Equations and their Graphs**	**Rate of Change (Slope)**	**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.**	**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 Pythagorean Theorem can be used to find slope and distance of a line.**	**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?** **How can the Pythagorean Theorem be used to find the slope and distance of a line.**	**Participation** **Homework** **Quizzes/Tests** **In-Class Work** **Projects (possible)**	**Textbook** **On-Line Resources** **<u>Vocabulary</u>** • Rate of change • Slope • Parent function • Linear parent function • Y intercept • Slope intercept form • Standard form • X intercept • Point slope form

			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.** **CC.2.3.8.A.3 Understand and apply the Pythagorean Theorem to solve problems.**				

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January	**Scatter Plots**	**Scatter Plots and Data Analysis**	**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.**	**Scatter Plots are used to represent trends in data points.** **Lines of Best Fit, which model a linear function, can be created to find an estimation for any data point.**	**What types of correlation can be represented by a scatter plot?** **Does the correlation help you understand the slope and y-intercept of a line of best fit?** **How can the line of best fit help you to predict additional data points?**	**Participation** **Homework** **Quizzes/Tests** **In-Class Work** **Projects (possible)**	**Textbook** **On-Line Resources** **<u>Vocabulary</u>** • Line of Best Fit • Trend Line • Positive Correlation • Negative Correlation • No Correlation • Estimate
January	**Linear Equations and their Graphs**	**Parallel and Perpendicular Lines**	**CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.** **CC.2.3.HS.A.11 Apply coordinate geometry to prove simple geometric theorems algebraically.**	**The slopes of parallel lines are equal.** **The slopes of perpendicular lines are negative reciprocals of each other. (Negative reciprocals are a change in the sign and a flipping of the fraction.)**	**How can the relationships between parallel and perpendicular lines be proven?** **How can you determine whether lines are parallel, perpendicular, or neither?** **What is the relationship between horizontal and vertical lines and can this**	**Participation** **Homework** **Quizzes/Tests** **In-Class Work** **Projects (possible)**	**Textbook** **On-Line Resources** **<u>Vocabulary</u>** • Parallel lines • Perpendicular lines • Negative reciprocal

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			CC.2.3.HS.A.14 Apply geometric concepts to model and solve real world problems. **CC.2.2.8.B.2 Understand the connections between proportional relationships, lines, and linear equations.**		**relationship be proven?**		
February	**Systems of Equations**	**Solving Systems of Equations Graphically**	**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.6 Extend the knowledge of rational functions to rewrite in equivalent forms.**	**Solving systems of equations graphically requires knowledge of slope and graphical intercepts. (When solving multiple equations on a graph, you must be able to graph a line in the proper steepness and the proper x and y intercepts.)** **Graphing systems of equations is nothing more than solving and graphing two equations then**	**What information can be gained, if any, when solving a linear inequality graphically? (How is solving a straight-line inequality on a graph beneficial in gaining insight and knowledge of the problem?)**	**Participation Homework Quizzes/Tests In-Class Work Projects (possible)**	**Textbook On-Line Resources** **<u>Vocabulary</u>** • Systems of linear equations • Solutions of systems of linear equations • No solution • Infinitely many solutions • Systems of linear inequalities • Solutions of systems of linear inequalities • Linear inequalities

			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.** **CC.2.2.8.B.3 Analyze and solve linear equations and pairs of simultaneous linear equations.**	**calculating their intersection.**			
February	**Systems of Equations**	**Solving Systems of Equations Algebraically**	**CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.**	**It is possible to solve systems of equations utilizing algebraic approaches such as the substitution method, the elimination method, or matrices.**	**What are the benefits of having different types of strategies to solve systems of equations related to real-world situations?** **When do you use a particular method?**	**Participation** **Homework** **Quizzes/Tests** **In-Class Work** **Projects (possible)**	**Textbook** **On-Line Resources** **<u>Vocabulary</u>** • Substitution method • Elimination method

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			CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms. **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.**	**A variety of representations of linear systems of equations are used to model and solve real-world problems. (Many different methods are utilized to solve systems of equations problems.)**	**(Which method of solving equations algebraically is beneficial at what time?)** **What is the best method to solve a system of equations and inequalities in problem solving?**		
March	**Exponents**	**Scientific Notation**	**CC.2.1.HS.C.1 Use the concept and notation of functions to interpret and apply them in**	**Represent large and small numbers using scientific notation.** **When the exponent in scientific notation is negative, the**	**How does multiplying by a power of 10 affect the decimal? (What happens to the number, does it**	**Participation Homework Quizzes/Tests In-Class Work Projects (possible)**	**Textbook On-Line Resources** **<u>Vocabulary</u>** • Scientific notation • Exponents

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			terms of their context. **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.**	**number is less than 1.** **When the exponent in scientific notation is positive, the number is greater than 1.**	**get larger or smaller?)** **How does scientific notation differ from standard notation?** **When is it beneficial to write a number in scientific notation? (Should you always use scientific notation when dealing with science or should we use it other times as well?)**		• Simplify • Negative Exponents • Rational Exponents
March	**Exponents**	**Multiplication and Division of Exponents**	**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.**	**Simplify and evaluate expressions involving multiplying with exponents, powers of powers, and powers of products. (The exponents, and the approaches taken to solve and simplify exponents, will vary based on how the exponents are arranged in the problem.)**	**How do parentheses affect the outcome of multiplied exponents?** **How are multiplication and division of exponents different, yet similar?**	**Participation Homework Quizzes/Tests In-Class Work Projects (possible)**	**Textbook On-Line Resources** **<u>Vocabulary</u>** • Base • Power • Exponent • Exponential function

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			CC.2.1.HS.C.6 Interpret functions in terms of the situations they model.				
April	**Polynomials and Factoring**	**Performing Mathematical Functions on Polynomials**	**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.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.**	**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 polynomials.** **Add, subtract, multiply, and divide 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?**	**Participation Homework Quizzes/Tests In-Class Work Projects (possible)**	**Textbook On-Line Resources** **<u>Vocabulary</u>** • Monomial • Degree of monomial • Polynomial • Standard form of a polynomial • Degree of a polynomial • Binomial • Trinomial • Quadratic • Cubic • Difference of a square • FOIL

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			CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms.				
April	**Polynomials and Factoring**	**Factoring 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.6 Extend the knowledge of rational functions to rewrite in equivalent forms.**	**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 polynomials.** **Add, subtract, multiply, and divide polynomials.**	**Can polynomials be factored various ways to achieve the same end result?** **How would we perform the basic mathematical operations on polynomials and polynomial equations?**	**Participation Homework Quizzes/Tests In-Class Work Projects (possible)**	**Textbook On-Line Resources** **<u>Vocabulary</u>** • Perfect square • Factoring by grouping • Monomial • Degree of monomial • Polynomial • Standard form of a polynomial • Degree of a polynomial • Binomial • Trinomial • Quadratic • Cubic • Difference of a square • FOIL
April-May	**Radical Equations and Expressions**	**Simplifying Radicals**	**CC.2.2.HS.D.10 Represent, solve, and interpret equations/**	**Corresponding to every power, there is a root. For example, just as there are**	**To simplify the nth root of an expression, what**	**Participation Homework Quizzes/Tests In-Class Work**	**Textbook On-Line Resources** **<u>Vocabulary</u>**

			inequalities and systems of equations/ inequalities algebraically and graphically. **CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.** **CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.** **CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.**	**squares (second powers), there are square roots. Just as there are cubes (third powers), there are cube roots, and so on.** **You can simplify a radical expression when the exponent of one factor of the radicand is a multiple of the radical's index.**	**must be true about the expression? When you square each side of an equation, how is the resulting equation related to the original?** **How do you add and subtract radical expressions?** **What is the inverse operation of a radical?**	**Projects (possible)**	• like radicals • nth root • principal root • radical equation • radical function • radicand • rational exponent • rationalize the denominator • square root equation • square root function

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			CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable. **CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context.** **CC.2.1.8.E.4 Estimate irrational numbers by comparing them to rational numbers.** **CC.2.2.8.B.1 Apply concepts of radicals and integer exponents to generate equivalent expressions.**				
May	**Quadratic Equations and Functions**	**Quadratic Functions and Graphs**	**CC.2.1.HS.F.6 Extend the knowledge of arithmetic**	**Quadratic equations are in the form $ax^2 + bx + c$.**	**How are quadratic equations used in the "real" world?**	**Participation Homework Quizzes/Tests In-Class Work**	**Textbook On-Line Resources**

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			operations and apply to complex numbers. **CC.2.1.HS.F.7 Apply concepts of complex numbers in polynomial identities and quadratic expressions to solve problems.**	**How and why quadratic equations are used.** **Determining which method of solving quadratic equations is best to use given the situation.**	**What are the different ways to solve quadratic equations and when is each method appropriate?**	**Projects (possible)**	**<u>Vocabulary</u>** • Quadratic function • Standard form of a quadratic function • Parabola • Axis of symmetry • Vertex • Minimum • Maximum • Quadratic parent function
May	**Quadratic Equations and Functions**	**Quadratic Formula**	**CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.** **CC.2.1.HS.F.7 Apply concepts of complex numbers in polynomial identities and quadratic expressions to solve problems.**	**Solve polynomials that can't be factored using the quadratic formula.**	**Will the quadratic formula provide the same solution as factoring if a polynomial can be factored?** **When is it better to use the quadratic formula than to use factoring?**	**Participation** **Homework** **Quizzes/Tests** **In-Class Work** **Projects (possible)**	**Textbook** **On-Line Resources** **<u>Vocabulary</u>** • Quadratic equation • Standard form of a quadratic equation • Roots of the equation • Zeros of the function • Zero product property • Completing the square • Quadratic formula