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## Pacing Guide

## Unit 1 - Foundations of Algebra

## Total Number of Instructional Days 16

| | Common Core Standard Covered | Major Topics/Concepts | Number of days |
|---|---|---|---|
| **1-1** | **Variables and Expressions**<br>CCSS.MATH.CONTENT.8.EE.A.1<br>CCSS.MATH.CONTENT.HSA.SSE.A.1<br>CCSS.MATH.CONTENT.HSA.SSE.A.1.A<br>CCSS.MATH.CONTENT.HSA.SSE.B.3 | • Interpret expressions that represent a quantity in terms of its context.<br>• Interpret parts of an expression, such as terms, factors, and coefficients.<br>• Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.<br>• Know and apply the properties of integer exponents to generate equivalent numerical expressions | 2 |
| **1-2** | **Order of Operations and Evaluating Expressions**<br>CCSS.MATH.CONTENT.8.EE.C.7.B<br>CCSS.MATH.CONTENT.HSN.RN.A.2<br>CCSS.MATH.CONTENT.HSA.SSE.B.3 | • Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.<br>• Rewrite expressions involving radicals and rational exponents using the properties of exponents.<br>• Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression | 2 |
| **1-3** | **Real Numbers and the Number Line**<br>CCSS.MATH.CONTENT.8.NS.A.1<br>CCSS.MATH.CONTENT.8.NS.A.2 | • 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.<br>• Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., $\pi 2$). | 2 |

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| **1-4** | **Properties of Real Numbers**<br>CCSS.MATH.CONTENT.8.NS.A.1<br>CCSS.MATH.CONTENT.8.NS.A.2 | • 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.<br>• Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π2). | 2 |
| **1-5** | **Adding and Subtracting Real Numbers**<br>CCSS.MATH.CONTENT.8.EE.A.1<br>CCSS.MATH.CONTENT.8.EE.A.4 | • Know and apply the properties of integer exponents to generate equivalent numerical expressions.<br>• 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. | 1 |
| **1-6** | **Multiplying and Dividing Real Numbers**<br>CCSS.MATH.CONTENT.8.EE.A.1<br>CCSS.MATH.CONTENT.8.EE.A.4 | • Know and apply the properties of integer exponents to generate equivalent numerical expressions.<br>• 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. | 1 |
| **1-7** | **The Distributive Property**<br>CCSS.MATH.CONTENT.8.EE.C.7.B | • Use the Distributive Property to evaluate and simplify expressions.<br>• Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. | 2 |

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| **1-8** | **An Introduction to Equations**<br>CCSS.MATH.CONTENT.8.EE.C.7.A<br>CCSS.MATH.CONTENT.8.EE.C.7.B<br>CCSS.MATH.CONTENT.HSA.CED.A.1<br>CCSS.MATH.CONTENT.HSA.REI.B.3<br>CCSS.MATH.CONTENT.HSA.CED.A.2 | • 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).<br>• Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.<br>• Create equations and inequalities in one variable and use them to solve problems.<br>• Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. | 2 |
| **1-9** | **Patterns, Equations, and Graphs**<br>CCSS.MATH.CONTENT.8.SP.A.1<br>CCSS.MATH.CONTENT.8.SP.A.2<br>CCSS.MATH.CONTENT.8.SP.A.4<br>CCSS.MATH.CONTENT.8.SP.A.3<br>CCSS.MATH.CONTENT.8.EE.B.5<br>CCSS.MATH.CONTENT.HSA.REI.A.1 | • Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.<br>• 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.<br>• Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. | 2 |

## Unit 2 - Solving Equations

## Total Number of Instructional Days 18

| | Common Core Standard Covered | Major Topics/Concepts | Number of days |
|---|---|---|---|
| **2-1** | **Solving One-Step Equations**<br>CCSS.MATH.CONTENT.8.EE.C.7<br>CCSS.MATH.CONTENT.8.EE.C.7.A<br>CCSS.MATH.CONTENT.HSA.REI.A.1<br>CCSS.MATH.CONTENT.HSA.REI.A.2<br>CCSS.MATH.CONTENT.HSA.REI.B.3 | • Solve linear equations in one variable.<br>• 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).<br>• Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. | 1 |
| **2-2** | **Solving Two-Step Equations**<br>CCSS.MATH.CONTENT.8.EE.C.7<br>CCSS.MATH.CONTENT.8.EE.C.7.B<br>CCSS.MATH.CONTENT.HSA.REI.A.1<br>CCSS.MATH.CONTENT.HSA.REI.A.2<br>CCSS.MATH.CONTENT.HSA.REI.B.3 | • Solve linear equations in one variable.<br>• Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.<br>• Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.<br>• Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.<br>• Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. | 2 |

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| **2-3** | **Solving Multi-Step Equations**<br><br>CCSS.MATH.CONTENT.8.EE.C.7<br><br>CCSS.MATH.CONTENT.8.EE.C.7.B<br><br>CCSS.MATH.CONTENT.HSA.REI.A.1<br><br>CCSS.MATH.CONTENT.HSA.REI.A.2<br><br>CCSS.MATH.CONTENT.HSA.REI.B.3 | • Solve linear equations in one variable.<br>• Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.<br>• Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.<br>• Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.<br>• Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. | **2** |
| **2-4** | **Solving Equations with Variables on Both Sides**<br><br>CCSS.MATH.CONTENT.8.EE.C.7<br><br>CCSS.MATH.CONTENT.8.EE.C.7.B<br><br>CCSS.MATH.CONTENT.HSA.REI.A.1<br><br>CCSS.MATH.CONTENT.HSA.REI.A.2<br><br>CCSS.MATH.CONTENT.HSA.REI.B.3 | • Solve linear equations in one variable.<br>• Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.<br>• Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.<br>• Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.<br>• Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. | **2** |

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| **2-5** | **Literal Equations and Formulas**<br>CCSS.MATH.CONTENT.8.EE.C.7<br>CCSS.MATH.CONTENT.8.EE.C.7.B<br>CCSS.MATH.CONTENT.HSA.REI.A.1<br>CCSS.MATH.CONTENT.HSA.REI.A.2<br>CCSS.MATH.CONTENT.HSA.REI.B.3 | • Solve linear equations in one variable.<br>• Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.<br>• Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.<br>• Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.<br>• Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. | **1** |
| **2-6** | **Ratios, Rates, and Conversions**<br>CCSS.MATH.CONTENT.HSF.LE.A.1.C<br>CCSS.MATH.CONTENT.HSN.Q.A.1<br>CCSS.MATH.CONTENT.HSN.Q.A.2<br>CCSS.MATH.CONTENT.HSN.Q.A.3 | • Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.<br>• Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.<br>• Define appropriate quantities for the purpose of descriptive modeling.<br>• Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. | **2** |
| **2-7** | **Solving Proportions**<br>CCSS.MATH.CONTENT.8.EE.B.5 | • Model with applications of proportions | **2** |

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| **2-8** | **Proportions and Similar Figures**<br>CCSS.MATH.CONTENT.8.EE.B.6<br>CCSS.MATH.CONTENT.HSG.SRT.A.2 | • Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.<br>• Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. | **2** |
| **2-9** | **Percentages**<br>CCSS.MATH.CONTENT.HSF.LE.A.1.C | • Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. | **2** |
| **2-10** | **Change Expressed as a Percent**<br>CCSS.MATH.CONTENT.HSF.IF.C.8.B<br>CCSS.MATH.CONTENT.HSF.LE.A.1.C | • Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)12^t$, $y = (1.2)^t/10$, and classify them as representing exponential growth or decay.<br>• Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another | **2** |

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## Unit 3 - Solving Inequalities

## Total Number of Instructional Days 14

| | Common Core Standard Covered | Major Topics/Concepts | Number of days |
|---|---|---|---|
| 3-1 | **Inequalities and Their Graphs**<br>CCSS.MATH.CONTENT.HSA.CED.A.3<br>CCSS.MATH.CONTENT.HSA.REI.D.12 | • Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.<br>• Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. | 2 |
| 3-2 | **Solving Inequalities Using Addition and Subtraction**<br>CCSS.MATH.CONTENT.HSA.REI.B.3 | • Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. | 1 |
| 3-3 | **Solving Inequalities Using Multiplication or Division**<br>CCSS.MATH.CONTENT.HSA.REI.B.3 | • Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. | 1 |
| 3-4 | **Solving Multi-Step Inequalities**<br>CCSS.MATH.CONTENT.HSA.REI.B.3 | • Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. | 2 |

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| **3-5** | **Working with Sets**<br>CCSS.MATH.CONTENT.HSA.REI.B.3<br>CCSS.MATH.CONTENT.HSS.CP.A.1 | • Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.<br>• Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). | 2 |
| **3-6** | **Compound Inequalities**<br>CCSS.MATH.CONTENT.HSA.REI.B.3<br>CCSS.MATH.CONTENT.HSA.REI.D.12 | • Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.<br>• Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. | 2 |
| **3-7** | **Absolute Value Equations and Inequalities**<br>CCSS.MATH.CONTENT.HSA.REI.B.3<br>CCSS.MATH.CONTENT.HSA.REI.D.12 | • Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.<br>• Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. | 2 |
| **3-8** | **Union and Intersection of Sets**<br>CCSS.MATH.CONTENT.HSS.CP.A.1 | • Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). | 2 |

## Unit 4 - An Introduction to Functions

## Total Number of Instructional Days 12

| | Common Core Standard Covered | Major Topics/Concepts | Number of days |
|---|---|---|---|
| **4-1** | **Using Graphs to Relate Two Quantities**<br>CCSS.MATH.CONTENT.8.F.A.1<br>CCSS.MATH.CONTENT.8.F.B.4<br>CCSS.MATH.CONTENT.HSF.IF.B.4 | • 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.<br>• Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.<br>• For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. | 2 |
| **4-2** | **Patterns and Linear Functions**<br>CCSS.MATH.CONTENT.8.F.A.1<br>CCSS.MATH.CONTENT.8.F.A.2<br>CCSS.MATH.CONTENT.8.F.A.3 | • 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.<br>• Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).<br>• Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. | 1 |

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| **4-3** | **Patterns and Nonlinear Functions**<br>CCSS.MATH.CONTENT.HSF.LE.A.3 | • Observe using graphs and tables that a quantity increasing exponentially, quadratically, or as a polynomial function. | 1 |
| **4-4** | **Graphing a Function Rule**<br>CCSS.MATH.CONTENT.8.F.A.1<br>CCSS.MATH.CONTENT.8.F.B.4 | • 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.<br>• Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. | 2 |
| **4-5** | **Writing a Function Rule**<br>CCSS.MATH.CONTENT.8.F.A.1<br>CCSS.MATH.CONTENT.8.F.A.3<br>CCSS.MATH.CONTENT.8.F.B.5 | • 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.<br>• Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.<br>• Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. | 2 |
| **4-6** | **Formalizing Relations and Functions**<br>CCSS.MATH.CONTENT.HSF.IF.A.1<br>CCSS.MATH.CONTENT.HSF.IF.A.2 | • Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).<br>• Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. | 2 |

## 4-7 Arithmetic Sequences

CCSS.MATH.CONTENT.HSF.BF.A.2

CCSS.MATH.CONTENT.HSF.LE.A.2

- Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
- Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

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## Unit 5 - Linear Functions

## Total Number of Instructional Days 16

| | Common Core Standard Covered | Major Topics/Concepts | Number of days |
|---|---|---|---|
| **5-1** | **Rate of Change and Slope**<br>CCSS.MATH.CONTENT.8.F.A.2<br>CCSS.MATH.CONTENT.8.F.B.4<br>CCSS.MATH.CONTENT.8.F.B.5<br>CCSS.MATH.CONTENT.8.EE.B.5<br>CCSS.MATH.CONTENT.HSF.IF.B.6<br>CCSS.MATH.CONTENT.HSF.LE.B.5<br>CCSS.MATH.CONTENT.HSS.ID.C.7 | • Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph.<br>• Describe qualitatively the functional relationship between two quantities by analyzing a graph.. Sketch a graph that exhibits the qualitative features of a function that has been described verbally.<br>• Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways<br>• Calculate and interpret the average rate of change of a function over a specified interval. Estimate the rate of change from a graph.<br>• Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. | 2 |
| **5-2** | **Direct Variation**<br>CCSS.MATH.CONTENT.HSF.IF.B.4<br>CCSS.MATH.CONTENT.HSF.LE.A.1.A<br>CCSS.MATH.CONTENT.HSF.LE.A.3 | • For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*<br>• Distinguish between situations that can be modeled with linear functions and with exponential functions.<br>• Observe using graphs and tables that a quantity increasing exponentially, quadratically, or as a polynomial function. | 2 |

## 5-3 Slope-Intercept Form

CCSS.MATH.CONTENT.8.F.B.4

CCSS.MATH.CONTENT.HSF.BF.A.1.A

CCSS.MATH.CONTENT.HSF.BF.A.1.B

CCSS.MATH.CONTENT.HSF.LE.B.5

CCSS.MATH.CONTENT.HSS.ID.C.7

- Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
- Determine an explicit expression, a recursive process, or steps for calculation from a context.
- Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.
- Interpret the parameters in a linear or exponential function in terms of a context.
- Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

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## 5-4 Point-Slope Form

CCSS.MATH.CONTENT.8.F.B.4

CCSS.MATH.CONTENT.HSF.BF.A.1.B

CCSS.MATH.CONTENT.HSF.LE.B.5

- Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
- Combine standard function types using arithmetic operations
- Interpret the parameters in a linear or exponential function in terms of a context.

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| **5-5** | **Standard Form**<br>CCSS.MATH.CONTENT.8.F.B.4<br>CCSS.MATH.CONTENT.HSF.BF.A.1.B<br>CCSS.MATH.CONTENT.HSF.LE.B.5 | • Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.<br>• Combine standard function types using arithmetic operations<br>• Interpret the parameters in a linear or exponential function in terms of a context | 2 |
| **5-6** | **Parallel and Perpendicular Lines**<br>CCSS.MATH.CONTENT.HSG.GPE.B.5 | • Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). | 2 |

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| **5-7** | **Scatter Plots and Trend Lines**<br>CCSS.MATH.CONTENT.8.F.B.4<br>CCSS.MATH.CONTENT.8.F.B.5<br>CCSS.MATH.CONTENT.HSF.IF.A.1<br>CCSS.MATH.CONTENT.HSF.IF.B.4<br>CCSS.MATH.CONTENT.HSA.REI.D.10 | • Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.<br>• Describe qualitatively the functional relationship between two quantities by analyzing a graph. Sketch a graph that exhibits the qualitative features of a function that has been described verbally.<br>• For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.<br>• Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). | 2 |
| **5-8** | **Graphing Absolute Value Functions**<br>CCSS.MATH.CONTENT.HSF.IF.C.7<br>CCSS.MATH.CONTENT.HSF.IF.C.7.B | • Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.<br>• Graph absolute value functions. | 2 |

## Unit 6 - Systems of Equations and Inequalities

## Total Number of Instructional Days 12

| | Common Core Standard Covered | Major Topics/Concepts | Number of days |
|---|---|---|---|
| **6-1** | **Solving Systems by Graphing**<br>CCSS.MATH.CONTENT.8.EE.C.8<br>CCSS.MATH.CONTENT.8.EE.C.8.A<br>CCSS.MATH.CONTENT.HSA.REI.C.6<br>CCSS.MATH.CONTENT.HSA.REI.D.11 | • Analyze and solve pairs of simultaneous linear equations.<br>• 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.<br>• Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.<br>• Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. | 2 |
| **6-2** | **Solving Systems Using Substitution**<br>CCSS.MATH.CONTENT.8.EE.C.8.B<br>CCSS.MATH.CONTENT.HSA.REI.C.5<br>CCSS.MATH.CONTENT.HSA.REI.C.6 | • Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.<br>• Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.<br>• Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. | 2 |
| **6-3** | **Solving Systems Using Elimination**<br>CCSS.MATH.CONTENT.8.EE.C.8.B | • Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.<br>• Prove that, given a system of two equations in two variables, replacing one | 2 |

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| | CCSS.MATH.CONTENT.HSA.REI.C.5<br>CCSS.MATH.CONTENT.HSA.REI.C.6 | equation by the sum of that equation and a multiple of the other produces a system with the same solutions.<br>• Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. | |
| **6-4** | **Applications of Linear Systems**<br>CCSS.MATH.CONTENT.8.EE.C.8.C<br>CCSS.MATH.CONTENT.8.F.B.5<br>CCSS.MATH.CONTENT.HSA.REI.C.6 | • Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.<br>• Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.<br>• Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. | 2 |
| **6-5** | **Linear Inequalities**<br>CCSS.MATH.CONTENT.HSA.REI.B.3<br>CCSS.MATH.CONTENT.HSA.REI.D.12 | • Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. | 2 |
| **6-6** | **Systems of Linear Inequalities**<br>CCSS.MATH.CONTENT.HSA.REI.D.12 | • Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. | 2 |

## Unit 7 - Exponents and Exponential Functions

## Total Number of Instructional Days 14

| | Common Core Standard Covered | Major Topics/Concepts | Number of days |
|---|---|---|---|
| **7-1** | **Zero and Negative Exponents**<br>CCSS.MATH.CONTENT. 8.EE.A.1<br>CCSS.MATH.CONTENT.8.EE.A.3 | • Know and apply the properties of integer exponents to generate equivalent numerical expressions.<br>• 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. | 1 |
| **7-2** | **Multiplying Powers with the Same Base**<br>CCSS.MATH.CONTENT.8.EE.A.1<br>CCSS.MATH.CONTENT.8.EE.A.2<br>CCSS.MATH.CONTENT.8.EE.A.3<br>CCSS.MATH.CONTENT.HSN.RN.B.3 | • Know and apply the properties of integer exponents to generate equivalent numerical expressions.<br>• Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.<br>• 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.<br>• Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. | 2 |
| **7-3** | **More Multiplication Properties of Exponents**<br>CCSS.MATH.CONTENT.8.EE.A.1<br>CCSS.MATH.CONTENT.HSN.RN.B.3 | • Know and apply the properties of integer exponents to generate equivalent numerical expressions.<br>• Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. | 2 |

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| **7-4** | **Division Properties of Exponents**<br>CCSS.MATH.CONTENT.8.EE.A.1 | • Know and apply the properties of integer exponents to generate equivalent numerical expressions. | 2 |
| **7-5** | **Rational Exponents and Radicals**<br>CCSS.MATH.CONTENT.HSN.RN.A.1<br>CCSS.MATH.CONTENT.HSN.RN.A.2 | • Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.<br>• Rewrite expressions involving radicals and rational exponents using the properties of exponents. | 2 |
| **7-6** | **Exponential Functions**<br>CCSS.MATH.CONTENT.HSF.IF.C.7.E<br>CCSS.MATH.CONTENT.HSA.CED.A.1<br>CCSS.MATH.CONTENT.HSF.BF.A.1.B<br>CCSS.MATH.CONTENT.HSF.LE.A.1<br>CCSS.MATH.CONTENT.HSF.LE.A.2<br>CCSS.MATH.CONTENT.HSF.LE.B.5 | • Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.<br>• Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.<br>• Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.<br>• Distinguish between situations that can be modeled with linear functions and with exponential functions.<br>• Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).<br>• Interpret the parameters in a linear or exponential function in terms of a context. | 2 |
| **7-7** | **Exponential Growth and Decay**<br>CCSS.MATH.CONTENT.HSF.LE.A.3 | • Observe using graphs and tables that a quantity increasing exponentially, quadratically, or as a polynomial function. | 2 |

## 7-8 Geometric Sequences

CCSS.MATH.CONTENT.HSF.BF.A.2

CCSS.MATH.CONTENT.HSA.SSE.B.4

- Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
- Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.

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## Unit 8 - Polynomials and Factoring

## Total Number of Instructional Days 16

| | Common Core Standard Covered | Major Topics/Concepts | Number of days |
|---|---|---|---|
| 8-1 | **Adding and Subtracting Polynomials**<br>CCSS.MATH.CONTENT.HSA.APR.A.1 | • Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. | 2 |
| 8-2 | **Multiplying and Factoring**<br>CCSS.MATH.CONTENT.HSA.APR.A.1 | • Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. | 2 |
| 8-3 | **Multiplying Binomials**<br>CCSS.MATH.CONTENT.HSA.APR.A.1 | • Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. | 2 |
| 8-4 | **Multiplying Special Cases**<br>CCSS.MATH.CONTENT.HSA.APR.C.4<br>CCSS.MATH.CONTENT.HSA.SSE.A.2 | • Prove polynomial identities and use them to describe numerical relationships<br>• Use the structure of an expression to identify ways to rewrite it. | 2 |
| 8-5 | **Factoring x^2 + bx + c**<br>CCSS.MATH.CONTENT.HSA.REI.B.4.B<br>CCSS.MATH.CONTENT.HSF.IF.C.8.A | • Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.<br>• Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. | 2 |

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| **8-6** | **Factoring ax^2 + bx + c**<br>CCSS.MATH.CONTENT.HSA.REI.B.4.B<br>CCSS.MATH.CONTENT.HSF.IF.C.8.A | • Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.<br>• Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. | 2 |
| **8-7** | **Factoring Special Cases**<br>CCSS.MATH.CONTENT.HSF.IF.C.8.A<br>CCSS.MATH.CONTENT.HSA.REI.B.4.B<br>CCSS.MATH.CONTENT.HSA.SSE.A.2 | • Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.<br>• Use the structure of an expression to identify ways to rewrite it.<br>• Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. | 2 |
| **8-8** | **Factoring by Grouping**<br>CCSS.MATH.CONTENT.HSA.REI.B.4.B<br>CCSS.MATH.CONTENT.HSF.IF.C.8.A | • Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.<br>• Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. | 2 |

## Unit 9 - Quadratic Functions and Equations

## Total Number of Instructional Days 16

| | Common Core Standard Covered | Major Topics/Concepts | Number of days |
|---|---|---|---|
| 9-1 | **Quadratic Graphs and Their Properties**<br>CCSS.MATH.CONTENT.HSF.IF.C.7<br>CCSS.MATH.CONTENT.HSF.IF.C.7.A | • Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.<br>• Graph quadratic functions and show intercepts, maxima, and minima. | 2 |
| 9-2 | **Quadratic Functions**<br>CCSS.MATH.CONTENT.HSA.CED.A.1<br>CCSS.MATH.CONTENT.HSF.IF.C.7.A<br>CCSS.MATH.CONTENT.HSF.IF.C.8.A<br>CCSS.MATH.CONTENT.HSF.IF.C.9 | • Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.<br>• Graph linear and quadratic functions and show intercepts, maxima, and minima.<br>• Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.<br>• Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). | 2 |
| 9-3 | **Solving Quadratic Equations**<br>CCSS.MATH.CONTENT.HSA.REI.B.4<br>CCSS.MATH.CONTENT.HSA.REI.B.4.A<br>CCSS.MATH.CONTENT.HSA.REI.B.4.B | • Solve quadratic equations in one variable.<br>• Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x - p)2 = q that has the same solutions. Derive the quadratic formula from this form.<br>• Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b. | 2 |

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| **9-4** | **Factoring to Solve Quadratic Equations**<br>CCSS.MATH.CONTENT.HSA.REI.B.4<br>CCSS.MATH.CONTENT.HSA.REI.B.4.A<br>CCSS.MATH.CONTENT.HSA.REI.B.4.B | • Solve quadratic equations in one variable.<br>• Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x - p)2 = q that has the same solutions. Derive the quadratic formula from this form.<br>• Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b. | 2 |
| **9-5** | **Completing the Square**<br>CCSS.MATH.CONTENT.HSA.REI.B.4.B<br>CCSS.MATH.CONTENT.HSF.IF.C.8.A | • Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.<br>• Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. | 2 |
| **9-6** | **The Quadratic Formula and the Discriminant**<br>CCSS.MATH.CONTENT.HSA.REI.B.4.A<br>CCSS.MATH.CONTENT.HSA.REI.B.4.B | • Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x - p)2 = q that has the same solutions. Derive the quadratic formula from this form.<br>• Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b. | 2 |

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| **9-7** | **Linear, Quadratic, and Exponential Models**<br>CCSS.MATH.CONTENT.HSF.LE.A.1<br>CCSS.MATH.CONTENT.HSF.LE.A.1.A<br>CCSS.MATH.CONTENT.HSF.LE.A.1.B<br>CCSS.MATH.CONTENT.HSF.LE.A.1.C<br>CCSS.MATH.CONTENT.HSF.LE.A.2<br>CCSS.MATH.CONTENT.HSF.LE.B.5 | • Distinguish between situations that can be modeled with linear functions and with exponential functions.<br>• Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.<br>• Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.<br>• Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.<br>• Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).<br>• Interpret the parameters in a linear or exponential function in terms of a context. | 2 |
| **9-8** | **Systems of Linear and Quadratic Equations**<br>CCSS.MATH.CONTENT.HSA.REI.C.7 | • Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. | 2 |

## Unit 10 - Radical Expressions and Equations

## Total Number of Instructional Days 12

| | Common Core Standard Covered | Major Topics/Concepts | Number of days |
|---|---|---|---|
| **10-1** | **Pythagorean Theorem**<br>CCSS.MATH.CONTENT.8.G.B.6<br>CCSS.MATH.CONTENT.8.G.B.7<br>CCSS.MATH.CONTENT.8.G.B.8<br>CCSS.MATH.CONTENT.HSG.SRT.C.8 | • Understand and apply the Pythagorean Theorem.<br>• Explain a proof of the Pythagorean Theorem and its converse.<br>• Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.<br>• Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.<br>• Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. | 2 |
| **10-2** | **Simplifying Radicals**<br>CCSS.MATH.CONTENT.8.EE.A.2<br>CCSS.MATH.CONTENT.HSN.RN.A.1<br>CCSS.MATH.CONTENT.HSN.RN.A.2 | • Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.<br>• Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.<br>• Rewrite expressions involving radicals and rational exponents using the properties of exponents. | 2 |

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| **10-3** | **Operations with Radical Expressions**<br>CCSS.MATH.CONTENT.8.EE.A.2<br>CCSS.MATH.CONTENT.HSN.RN.A.1<br>CCSS.MATH.CONTENT.HSN.RN.A.2 | • Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.<br>• Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.<br>• Rewrite expressions involving radicals and rational exponents using the properties of exponents. | 2 |
| **10-4** | **Solving Radical Equations**<br>CCSS.MATH.CONTENT.HSA.REI.A.2 | • Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. | 2 |
| **10-5** | **Graphing Square Root Functions**<br>CCSS.MATH.CONTENT.HSF.IF.A.1<br>CCSS.MATH.CONTENT.HSF.IF.A.2<br>CCSS.MATH.CONTENT.HSF.IF.C.7.B | • Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).<br>• Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.<br>• Graph square root. | 2 |
| **10-6** | **Trigonometric Ratios**<br>CCSS.MATH.CONTENT.HSG.SRT.C.6<br>CCSS.MATH.CONTENT.HSG.SRT.C.7<br>CCSS.MATH.CONTENT.HSG.SRT.C.8 | • Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.<br>• Explain and use the relationship between the sine and cosine of complementary angles.<br>• Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. | 2 |

## Unit 11 - Rational Expressions and Functions

## Total Number of Instructional Days 14

| | Common Core Standard Covered | Major Topics/Concepts | Number of days |
|---|---|---|---|
| **11-1** | **Simplifying Rational Expressions**<br>CCSS.MATH.CONTENT.HSA.SSE.A.1<br>CCSS.MATH.CONTENT.HSA.SSE.A.1.A<br>CCSS.MATH.CONTENT.HSA.APR.A.1 | • Interpret expressions that represent a quantity in terms of its context.<br>• Interpret parts of an expression, such as terms, factors, and coefficients.<br>• Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. | 2 |
| **11-2** | **Multiplying and Dividing Rational Expressions**<br>CCSS.MATH.CONTENT.HSA.APR.A.1<br>CCSS.MATH.CONTENT.HSA.APR.D.7 | • Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.<br>• Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions. | 2 |
| **11-3** | **Dividing Polynomials**<br>CCSS.MATH.CONTENT.HSA.APR.D.7<br>CCSS.MATH.CONTENT.HSA.APR.D.6 | • Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.<br>• Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system. | 2 |

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| **11-4** | **Adding and Subtracting Rational Expressions**<br>CCSS.MATH.CONTENT.HSA.APR.A.1<br>CCSS.MATH.CONTENT.HSA.APR.D.7 | • Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.<br>• Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions | 2 |
| **11-5** | **Solving Rational Expressions**<br>CCSS.MATH.CONTENT.HSA.APR.D.7 | • Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions | 2 |
| **11-6** | **Inverse Variation**<br>CCSS.MATH.CONTENT.HSA.SSE.B.3 | • Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. | 2 |
| **11-7** | **Graphing Rational Functions**<br>CCSS.MATH.CONTENT.HSF.IF.C.7<br>CCSS.MATH.CONTENT.HSF.IF.C.7.D | • Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.<br>• Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. | 2 |

## Unit 12 - Data Analysis and Probability

## Total Number of Instructional Days 15

| | Common Core Standard Covered | Major Topics/Concepts | Number of days |
|---|---|---|---|
| **12-1** | **Organizing Data Using Matrices**<br>CCSS.MATH.CONTENT.HSN.VM.C.6<br>CCSS.MATH.CONTENT.HSN.VM.C.7 | • Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.<br>• Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled. | 2 |
| **12-2** | **Frequency and Histograms**<br>CCSS.MATH.CONTENT.8.SP.A.4<br>CCSS.MATH.CONTENT.HSS.ID.A.1<br>CCSS.MATH.CONTENT.HSS.ID.B.5 | • Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.<br>• Represent data with plots on the real number line (dot plots, histograms, and box plots).<br>• Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. | 2 |
| **12-3** | **Measures of Central Tendency and Dispersion**<br>CCSS.MATH.CONTENT.HSS.ID.A.2<br>CCSS.MATH.CONTENT.HSS.ID.A.3<br>CCSS.MATH.CONTENT.HSS.ID.A.4 | • Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.<br>• Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).<br>• Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. | 2 |

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| **12-4** | **Box-and-Whisker Plots**<br>CCSS.MATH.CONTENT.HSS.ID.A.1 | • Represent data with plots on the real number line (dot plots, histograms, and box plots). | 2 |
| **12-5** | **Samples and Surveys**<br>CCSS.MATH.CONTENT.HSS.CP.A.1<br>CCSS.MATH.CONTENT.HSS.IC.B.3<br>CCSS.MATH.CONTENT.HSS.IC.B.4 | • Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").<br>• Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.<br>• Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. | 2 |
| **12-6** | **Permutations and Combinations**<br>CCSS.MATH.CONTENT.HSS.CP.B.9 | • Use permutations and combinations to compute probabilities of compound events and solve problems. | 1 |
| **12-7** | **Theoretical and Experimental Probability**<br>CCSS.MATH.CONTENT.HSS.ID.B.5<br>CCSS.MATH.CONTENT.HSS.ID.B.6<br>CCSS.MATH.CONTENT.HSS.ID.B.6.A<br>CCSS.MATH.CONTENT.HSS.ID.B.6.B<br>CCSS.MATH.CONTENT.HSS.ID.B.6.C | • Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.<br>• Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.<br>• Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or chooses a function suggested by the context. Emphasize linear, quadratic, and exponential models.<br>• Informally assess the fit of a function by plotting and analyzing residuals.<br>• Fit a linear function for a scatter plot that suggests a linear association. | 2 |

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| **12-8** | **Probability of Compound Events**<br>CCSS.MATH.CONTENT.HSS.ID.C.7<br>CCSS.MATH.CONTENT.HSS.ID.C.8<br>CCSS.MATH.CONTENT.HSS.ID.C.9<br>CCSS.MATH.CONTENT.HSS.MD.B.6<br>CCSS.MATH.CONTENT.HSS.MD.B.7 | • Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.<br>• Compute (using technology) and interpret the correlation coefficient of a linear fit.<br>• Distinguish between correlation and causation.<br>• Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).<br>• Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game). | 2 |