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Pacing Guide

Algebra 1

Unit 1 – The Foundations of Algebra — Total Number of Instructional Days 21

	Common Core Standard Covered	Major Topics/Concepts	Number of days
1-1	**The Real Number System** CCSS.MATH.CONTENT.8.NS.A.1	• Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.	2
1-2	**Operations on Integers** 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

1-3	**Simplifying Numerical Expressions (Order of Operations)** 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**
1-4	**Rational Numbers** CCSS.MATH.CONTENT.8.NS.A.1 CCSS.MATH.CONTENT.HSN.RN.B.3	• 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.	**2**
1-5	**Approximating Square Roots** CCSS.MATH.CONTENT.8.NS.A.2	• Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations*.	**2**
1-6	**Constants, Variables and Expressions** CCSS.MATH.CONTENT.HSA.SSE.A.1 CCSS.MATH.CONTENT.HSA.SSE.A.1.A CCSS.MATH.CONTENT.HSA.SSE.B.3	• Interpret expressions that represent a quantity in terms of its context. • Interpret parts of an expression, such as terms, factors, and coefficients. • Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*	**3**

1-7	**Evaluating Expressions** CCSS.MATH.CONTENT.HSN.RN.A.2 CCSS.MATH.CONTENT.HSA.SSE.B.3	• Rewrite expressions involving radicals and rational exponents using the properties of exponents. • Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*	2
1-8	**Equivalent Expressions** CCSS.MATH.CONTENT.HSA.APR.A.1 CCSS.MATH.CONTENT.HSA.SSE.A.2 CCSS.MATH.CONTENT.HSA.SSE.B.3	• 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. • Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 - y^4$ *as* $(x^2)^2 - (y^2)^2$*, thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$. • Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*	2
1-9	**Operations on Polynomials: Addition and Subtraction** CCSS.MATH.CONTENT.HSA.APR.A.1 CCSS.MATH.CONTENT.HSA.SSE.B.3	• 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. • Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*	2
1-10	**Operations on Polynomials: Multiplication and Division**	• 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

CCSS.MATH.CONTENT.HSA.APR.A.1 CCSS.MATH.CONTENT.HSA.APR.D.6 CCSS.MATH.CONTENT.HSA.SSE.B.3	• 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. • Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*

Unit 2 – Special Products and Factoring — Total Number of Instructional Days 17

	Common Core Standard Covered	Major Topics/Concepts	Number of Days
2-1	**Multiplying Binomials** CCSS.MATH.CONTENT.HSA.APR.A.1 CCSS.MATH.CONTENT.HSA.SSE.A.2 CCSS.MATH.CONTENT.HSA.SSE.B.3	• 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. • Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.* • Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*	2
2-2	**Square of a Binomial**	• Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction,	1

CCSS.MATH.CONTENT.HSA.APR.A.1
CCSS.MATH.CONTENT.HSA.SSE.A.2
CCSS.MATH.CONTENT.HSA.SSE.B.3

and multiplication; add, subtract, and multiply polynomials.

- Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*
- Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*

2-3 Square of a Trinomial

CCSS.MATH.CONTENT.HSA.APR.A.1
CCSS.MATH.CONTENT.HSA.SSE.A.2
CCSS.MATH.CONTENT.HSA.SSE.B.3

- 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.
- Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*
- Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*

1

2-4 Sum and Difference of Two Terms

CCSS.MATH.CONTENT.HSA.APR.A.1
CCSS.MATH.CONTENT.HSA.SSE.A.2
CCSS.MATH.CONTENT.HSA.SSE.B.3

- 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.
- Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*
- Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*

1

2-5 Cube of a Binomial

- Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction,

1

	CCSS.MATH.CONTENT.HSA.APR.A.1 CCSS.MATH.CONTENT.HSA.SSE.A.2 CCSS.MATH.CONTENT.HSA.SSE.B.3	and multiplication; add, subtract, and multiply polynomials. • Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 - y^4$ *as* $(x^2)^2 - (y^2)^2$*, thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$. • Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*	
2-6	**Factoring the Common Monomial Factor** CCSS.MATH.CONTENT.HSA.APR.A.1 CCSS.MATH.CONTENT.HSA.SSE.A.2 CCSS.MATH.CONTENT.HSA.SSE.B.3	• 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. • Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 - y^4$ *as* $(x^2)^2 - (y^2)^2$*, thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$. • Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*	**2**
2-7	**Factoring the Difference of Two Squares** CCSS.MATH.CONTENT.HSA.APR.A.1 CCSS.MATH.CONTENT.HSA.SSE.A.2 CCSS.MATH.CONTENT.HSA.SSE.B.3	• 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. • Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 - y^4$ *as* $(x^2)^2 - (y^2)^2$*, thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$. • Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*	**2**
2-8	**Factoring a Perfect Square Trinomial**	• 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**

	CCSS.MATH.CONTENT.HSA.APR.A.1 CCSS.MATH.CONTENT.HSA.SSE.A.2 CCSS.MATH.CONTENT.HSA.SSE.B.3	• Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.* • Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*	
2-9	**Factoring a General Trinomial** CCSS.MATH.CONTENT.HSA.APR.A.1 CCSS.MATH.CONTENT.HSA.SSE.A.2 CCSS.MATH.CONTENT.HSA.SSE.B.3	• 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. • Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.* • Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*	**2**
2-10	**Factoring the Sum and Difference of Two Cubes** CCSS.MATH.CONTENT.HSA.APR.A.1 CCSS.MATH.CONTENT.HSA.SSE.A.2 CCSS.MATH.CONTENT.HSA.SSE.B.3	• 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. • Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.* • Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*	**2**
2-11	**Factoring by Grouping** CCSS.MATH.CONTENT.HSA.APR.A.1 CCSS.MATH.CONTENT.HSA.SSE.A.2	• 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. • Use the structure of an expression to identify ways to rewrite it. *For*	**1**

CCSS.MATH.CONTENT.HSA.SSE.B.3

example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.

- Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*

Unit 3 - Solving Equations and Inequalities in One Variable

Total Number of Instructional Days 17

	Common Core Standard Covered	Major Topics/Concepts	Number of Days
3-1	**Solving Equations Using Properties of Equality** CCSS.MATH.CONTENT.8.EE.C.7 CCSS.MATH.CONTENT.HSA.REI.A.1 CCSS.MATH.CONTENT.HSA.REI.B.3	• Solve linear equations in one variable. • 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. • Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	**3**
3-2	**Solving Equations Involving Factored Expressions** CCSS.MATH.CONTENT.8.EE.C.7	• Solve linear equations in one variable. • 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.	**2**

	CCSS.MATH.CONTENT.HSA.REI.A.1 CCSS.MATH.CONTENT.HSA.REI.B.3 CCSS.MATH.CONTENT.HSA.REI.B.4.B	• Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. • Solve quadratic equations by inspection (e.g., for $x^2 = 49$), 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 $a \pm bi$ for real numbers a and b.	
3-3	**Solving Equations Involving Variables in the Denominator** CCSS.MATH.CONTENT.8.EE.C.7 CCSS.MATH.CONTENT.HSA.REI.A.1 CCSS.MATH.CONTENT.HSA.REI.B.3	• Solve linear equations in one variable. • 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. • Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	**2**
3-4	**Literal Equations and Formulas** CCSS.MATH.CONTENT.HSA.CED.A.4	• Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R*.	**2**
3-5	**Inequalities and Their Graphs** 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**

3-6	**Solving Inequalities Using Addition and Subtraction** CCSS.MATH.CONTENT.HSA.REI.B.3	• Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	**2**
3-7	**Solving Inequalities Using Multiplication and Division** CCSS.MATH.CONTENT.HSA.REI.B.3	• Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	**2**
3-8	**Solving and Graphing Compound Inequalities** CCSS.MATH.CONTENT.HSA.REI.B.3	• Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	**2**

Unit 4 – Relations and Functions — Total Number of Instructional Days 12

	Common Core Standard Covered	Major Topics/Concepts	Number of Days
4-1	**Relations: Definition and Representation** CCSS.MATH.CONTENT.HSF.IF.A.1	• 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.	**2**

The graph of f is the graph of the equation $y = f(x)$.

4-2	**Functions: Definition and Representation** CCSS.MATH.CONTENT.8.F.A.1 CCSS.MATH.CONTENT.HSF.IF.A.1 CCSS.MATH.CONTENT.HSF.IF.C.9 CCSS.MATH.CONTENT.HSF.BF.A.1	• Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.[1] • 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 $y = f(x)$. • Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum*. • Write a function that describes a relationship between two quantities.[*]	**2**
4-3	**The Function Notation** CCSS.MATH.CONTENT.8.F.A.1 CCSS.MATH.CONTENT.HSF.IF.A.1 CCSS.MATH.CONTENT.HSF.IF.A.2	• Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.[1] • 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 $y = f(x)$. • Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	**2**

4-4 The Composition of Functions

CCSS.MATH.CONTENT.8.F.A.1
CCSS.MATH.CONTENT.HSF.IF.A.1
CCSS.MATH.CONTENT.HSF.IF.A.2
CCSS.MATH.CONTENT.HSF.BF.A.1.C

- Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.[1]
- 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 $y = f(x)$.
- Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- (+) Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time*.

2

4-5 Writing a Function Rule

CCSS.MATH.CONTENT.8.F.A.1
CCSS.MATH.CONTENT.HSF.IF.A.1
CCSS.MATH.CONTENT.HSF.IF.A.2
CCSS.MATH.CONTENT.HSF.BF.A.1
CCSS.MATH.CONTENT.HSF.LE.A.2

- Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.[1]
- 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 $y = f(x)$.
- Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

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- Write a function that describes a relationship between two quantities.*
- 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).

4-6	**Graph of a Function** CCSS.MATH.CONTENT.HSF.IF.A.1 CCSS.MATH.CONTENT.HSF.IF.A.2 CCSS.MATH.CONTENT.HSF.IF.B.4	• 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 $y = f(x)$. • Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. • 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**

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Unit 5 – Linear Functions and Equations

Total Number of Instructional Days 22

	Common Core Standard Covered	Major Topics/Concepts	Number of Days
5-1	**Linear Functions: Defined and Described** CCSS.MATH.CONTENT.8.F.A.3 CCSS.MATH.CONTENT.HSF.LE.A.1 CCSS.MATH.CONTENT.HSF.LE.A.1.A CCSS.MATH.CONTENT.HSF.LE.A.1.B	• Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line*. • Distinguish between situations that can be modeled with linear functions and with exponential functions. • Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. • Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	**3**
5-2	**Domain and Range of Linear Functions** CCSS.MATH.CONTENT.8.F.A.1 CCSS.MATH.CONTENT.8.F.A.3 CCSS.MATH.CONTENT.HSF.IF.A.1 CCSS.MATH.CONTENT.HSF.IF.A.2	• Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.[1] • Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line*. • Understand that a function from one set (called the domain) to another	**2**

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 $y = f(x)$.

- Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

5-3	**Standard Form and Slope-Intercept Form of Linear Equations** CCSS.MATH.CONTENT.8.EE.B.6 CCSS.MATH.CONTENT.8.F.A.3 CCSS.MATH.CONTENT.8.F.B.4 CSS.MATH.CONTENT.HSA.SSE.A.2 CCSS.MATH.CONTENT.HSA.SSE.B.3	• 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. • Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line*. • 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. • Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.* • Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*	**3**

5-4 Slope and Intercepts of a Line

CCSS.MATH.CONTENT.8.EE.B.6
CCSS.MATH.CONTENT.HSF.LE.A.1

- 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.
- Distinguish between situations that can be modeled with linear functions and with exponential functions.

4

5-5 Determining Points on the Line

CCSS.MATH.CONTENT.8.EE.B.6
CCSS.MATH.CONTENT.HSF.LE.A.2
CCSS.MATH.CONTENT.HSA.REI.D.10

- 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.
- 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).
- 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).

3

5-6 Graphing Linear Equations

CCSS.MATH.CONTENT.8.EE.B.5
CCSS.MATH.CONTENT.8.F.A.2
CCSS.MATH.CONTENT.8.F.A.3
CCSS.MATH.CONTENT.8.F.B.5
CCSS.MATH.CONTENT.HSF.IF.B.4
CCSS.MATH.CONTENT.HSF.IF.C.7.A

- Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
- Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change*.
- Interpret the equation $y = mx + b$ as defining a linear function, whose

3

graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line*.

- 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.
- 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*.*
- Graph linear and quadratic functions and show intercepts, maxima, and minima.

5-7 Finding the Equation of the Line **4**

CCSS.MATH.CONTENT.HSA.CED.A.2
CCSS.MATH.CONTENT.HSF.IF.C.8
CCSS.MATH.CONTENT.HSF.BF.A.1
CCSS.MATH.CONTENT.HSF.LE.A.2

- Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
- Write a function that describes a relationship between two quantities.
- 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 6 – Linear Inequalities and Their Graphs — Total Number of Instructional Days 9

	Common Core Standard Covered	Major Topics/Concepts	Number of Days
6-1	**Linear Inequality in Two Variables Defined** CCSS.MATH.CONTENT.HSA.CED.A.3 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*. • 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.	**3**
6-2	**Solutions of Linear Inequalities in Two Variables** CCSS.MATH.CONTENT.HSA.CED.A.3 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*. • 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.	**3**

6-3 Graphs of Linear Inequalities CCSS.MATH.CONTENT.HSA.CED.A.3 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*. • 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.	**3**

Unit 7 – Systems of Linear Equations and Inequalities Total Number of Instructional Days 15

Common Core Standard Covered	Major Topics/Concepts	Number of Days
7-1 Solving Systems by Graphing CCSS.MATH.CONTENT.8.EE.C.8 CCSS.MATH.CONTENT.8.EE.C.8.A CCSS.MATH.CONTENT.HSA.REI.C.6 CCSS.MATH.CONTENT.HSA.CED.A.3	• Analyze and solve pairs of simultaneous linear equations. • 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. • Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. • 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*	**3**

combinations of different foods.

7-2	**Solving Systems Using Substitution** CCSS.MATH.CONTENT.8.EE.C.8 CCSS.MATH.CONTENT.8.EE.C.8.B CCSS.MATH.CONTENT.HSA.REI.C.5 CCSS.MATH.CONTENT.HSA.REI.C.6 CCSS.MATH.CONTENT.HSA.CED.A.3	• Analyze and solve pairs of simultaneous linear equations. • Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6*. • 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. • Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. • 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*.	**3**
7-3	**Solving Systems Using Elimination** CCSS.MATH.CONTENT.8.EE.C.8 CCSS.MATH.CONTENT.8.EE.C.8.B CCSS.MATH.CONTENT.HSA.REI.C.5 CCSS.MATH.CONTENT.HSA.REI.C.6 CCSS.MATH.CONTENT.HSA.CED.A.3	• Analyze and solve pairs of simultaneous linear equations. • Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6*. • 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. • Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	**3**

		• 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*.	
7-4	**Applications of Linear Systems** CCSS.MATH.CONTENT.8.EE.C.8.C	• Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair*.	**3**
7-5	**Systems of Linear Inequalities** 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.	**3**

Unit 8 – Quadratic Functions and Equations   Total Number of Instructional Days 20

	Common Core Standard Covered	Major Topics/Concepts	Number of Days
8-1	**Quadratic Functions Defined** CCSS.MATH.CONTENT.HSF.IF.A.1 CCSS.MATH.CONTENT.HSA.CED.A.1 CCSS.MATH.CONTENT.HSF.IF.C.9	• 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 $y = f(x)$.	**3**

		• 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*. • Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum*.	
8-2	**The Graph of Quadratic Functions** CCSS.MATH.CONTENT.HSF.IF.C.7 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.* • Graph linear and quadratic functions and show intercepts, maxima, and minima.	**3**
8-3	**Solving Quadratic Equations by Extracting Square Roots** CCSS.MATH.CONTENT.HSA.REI.B.4 CCSS.MATH.CONTENT.HSA.REI.B.4.B	• Solve quadratic equations in one variable. • Solve quadratic equations by inspection (e.g., for $x^2 = 49$), 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 $a \pm bi$ for real numbers a and b.	**2**

8-4	**Solving Quadratic Equations by Factoring** CCSS.MATH.CONTENT.HSA.REI.B.4 CCSS.MATH.CONTENT.HSF.IF.C.8.A CCSS.MATH.CONTENT.HSA.SSE.B.3.A CCSS.MATH.CONTENT.HSA.REI.B.4.B	• Solve quadratic equations in one variable. • 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. • Factor a quadratic expression to reveal the zeros of the function it defines. • Solve quadratic equations by inspection (e.g., for $x^2 = 49$), 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 $a \pm bi$ for real numbers a and b.	**3**
8-5	**Solving Quadratic Equations by Completing the Square** CCSS.MATH.CONTENT.HSA.REI.B.4 CCSS.MATH.CONTENT.HSF.IF.C.8.A CCSS.MATH.CONTENT.HSA.SSE.B.3.B CCSS.MATH.CONTENT.HSA.REI.B.4.B	• Solve quadratic equations in one variable. • 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. • Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. • Solve quadratic equations by inspection (e.g., for $x^2 = 49$), 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 $a \pm bi$ for real numbers a and b.	**3**
8-6	**Solving Quadratic Equations by Using the Quadratic Formula** CCSS.MATH.CONTENT.HSA.REI.B.4	• Solve quadratic equations in one variable. • 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.	**2**

CCSS.MATH.CONTENT.HSA.REI.B.4.A
CCSS.MATH.CONTENT.HSA.REI.B.4.B

- Solve quadratic equations by inspection (e.g., for $x^2 = 49$), 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 $a \pm bi$ for real numbers a and b.

8-7 Discriminant and Nature of Roots — **2**

CCSS.MATH.CONTENT.HSA.REI.B.4.A
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.
- Solve quadratic equations by inspection (e.g., for $x^2 = 49$), 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 $a \pm bi$ for real numbers a and b.

8-8 Systems of Linear and Quadratic Equations — **2**

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. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.

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Unit 9 – Exponents and Exponential Functions   Total Number of Instructional Days 20

	Common Core Standard Covered	Major Topics/Concepts	Number of Days
9-1	**Positive Integral Exponents** CCSS.MATH.CONTENT.8.EE.A.1 CCSS.MATH.CONTENT.8.EE.A.3	• Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$. • Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 times 10^8 and the population of the world as 7 times 10^9, and determine that the world population is more than 20 times larger*.	**2**
9-2	**Zero and Negative Exponents** CCSS.MATH.CONTENT. 8.EE.A.1 CCSS.MATH.CONTENT.8.EE.A.3	• Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$. • Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 times 10^8 and the population of the world as 7 times 10^9, and determine that the world population is more than 20 times larger*.	**2**
9-3	**Simplifying Exponential Expressions** CCSS.MATH.CONTENT.8.EE.A.1 CCSS.MATH.CONTENT.8.EE.A.3	• Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$. • 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	**3**

		express how many times as much one is than the other. *For example, estimate the population of the United States as 3 times 10^8 and the population of the world as 7 times 10^9, and determine that the world population is more than 20 times larger*.	
9-4	**Rational Exponents and Radicals** CCSS.MATH.CONTENT.HSN.RN.A.1 CCSS.MATH.CONTENT.HSN.RN.A.2 CCSS.MATH.CONTENT.HSA.SSE.B.3	• 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. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5*. • Rewrite expressions involving radicals and rational exponents using the properties of exponents. • Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*	**4**
9-5	**Exponential Functions Defined** CCSS.MATH.CONTENT.HSF.IF.A.1 CCSS.MATH.CONTENT.HSF.IF.C.7.E CCSS.MATH.CONTENT.HSF.LE.A.1 CCSS.MATH.CONTENT.HSF.LE.A.1.A CCSS.MATH.CONTENT.HSF.LE.A.2 CCSS.MATH.CONTENT.HSF.LE.B.5	• 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 $y = f(x)$. • Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. • Distinguish between situations that can be modeled with linear functions and with exponential functions. • Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. • Construct linear and exponential functions, including arithmetic and	**3**

geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

- Interpret the parameters in a linear or exponential function in terms of a context.

9-6	**Exponential Equations** CCSS.MATH.CONTENT.HSA.CED.A.1 CCSS.MATH.CONTENT.HSA.REI.A.1 CCSS.MATH.CONTENT.HSA.SSE.B.3.C	• 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*. • 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. • Use the properties of exponents to transform expressions for exponential functions. *For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%*.	**3**
9-7	**Exponential Growth and Decay** CCSS.MATH.CONTENT.HSF.LE.A.1.B CCSS.MATH.CONTENT.HSF.LE.A.1.C	• Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. • Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	**3**

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Unit 10 - Rational and Radical Expressions and Equations

Total Number of Instructional Days 24

Common Core Standard Covered	Major Topics/Concepts	Number of Days
10-1 Simplifying Rational Expressions CCSS.MATH.CONTENT.HSA.SSE.B.3 CCSS.MATH.CONTENT.HSA.APR.D.6 CCSS.MATH.CONTENT.HSA.APR.D.7	• Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.* • 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. • (+) 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.	**3**
10-2 Multiplying and Dividing Rational Expressions CCSS.MATH.CONTENT.HSA.SSE.B.3 CCSS.MATH.CONTENT.HSA.APR.D.6 CCSS.MATH.CONTENT.HSA.APR.D.7	• Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.* • 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. • (+) 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,	**3**

		subtract, multiply, and divide rational expressions.	
10-3	**Adding and Subtracting Rational Expressions** CCSS.MATH.CONTENT.HSA.SSE.B.3 CCSS.MATH.CONTENT.HSA.APR.D.6 CCSS.MATH.CONTENT.HSA.APR.D.7	• Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.* • 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. • (+) 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.	**3**
10-4	**Solving Rational Expressions** CCSS.MATH.CONTENT.HSA.APR.D.6 CCSS.MATH.CONTENT.HSA.APR.D.7	• 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. • (+) 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.	**3**
10-5	**Simplifying Radicals** CCSS.MATH.CONTENT.8.EE.A.2 CCSS.MATH.CONTENT.HSN.RN.A.1	• Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational. • Explain how the definition of the meaning of rational exponents	**3**

	CCSS.MATH.CONTENT.HSN.RN.A.2	follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5*. • Rewrite expressions involving radicals and rational exponents using the properties of exponents.	
10-6	**Operations with Radical Expressions** CCSS.MATH.CONTENT.8.EE.A.2 CCSS.MATH.CONTENT.HSN.RN.A.1 CCSS.MATH.CONTENT.HSN.RN.A.2	• Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational. • 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. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5*. • Rewrite expressions involving radicals and rational exponents using the properties of exponents.	**3**
10-7	**Solving Radical Equations** CCSS.MATH.CONTENT.HSA.REI.A.1 CCSS.MATH.CONTENT.HSA.REI.A.2	• 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. • Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	**3**
10-8	**Graphing Square Root Functions** CCSS.MATH.CONTENT.HSF.IF.C.7.B	• Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	**3**

Unit 11 - Sequences and Series | Total Number of Instructional Days 14

Common Core Standard Covered		Major Topics/Concepts	Number of Days
11-1	**Sequences Defined** CCSS.MATH.CONTENT.HSF.BF.A.1.A CCSS.MATH.CONTENT.HSF.IF.A.3	• Determine an explicit expression, a recursive process, or steps for calculation from a context. • Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.*	**2**
11-2	**Recursive Formula for Sequences** CCSS.MATH.CONTENT.HSF.BF.A.1.A CCSS.MATH.CONTENT.HSF.IF.A.3	• Determine an explicit expression, a recursive process, or steps for calculation from a context. • Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.*	**2**
11-3	**Arithmetic Sequence** CCSS.MATH.CONTENT.HSF.BF.A.2 CCSS.MATH.CONTENT.HSF.LE.A.2 CCSS.MATH.CONTENT.HSF.IF.A.3	• 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). • Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) =$*	**3**

f(n) + f(n-1) for n ≥ 1.

11-4	**Geometric Sequence** CCSS.MATH.CONTENT.HSF.BF.A.2 CCSS.MATH.CONTENT.HSF.LE.A.2 CCSS.MATH.CONTENT.HSF.IF.A.3	• 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). • Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1*.	**3**
11-5	**Other Types of Sequences** CCSS.MATH.CONTENT.HSF.IF.A.3	• Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1*.	**2**
11-6	**The Binomial Theorem** CCSS.MATH.CONTENT.HSA.APR.C.5	• (+) Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.[1]	**2**

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Unit 12 - Statistics and Probability

Total Number of Instructional Days 25

	Common Core Standard Covered	Major Topics/Concepts	Number of Days
12-1	**Shapes of Distributions** CCSS.MATH.CONTENT.HSS.ID.A.1 CCSS.MATH.CONTENT.HSS.ID.A.2 CCSS.MATH.CONTENT.HSS.ID.A.3	• Represent data with plots on the real number line (dot plots, histograms, and box plots). • 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. • Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	**3**
12-2	**The Center of Data Distributions** CCSS.MATH.CONTENT.HSS.ID.A.1 CCSS.MATH.CONTENT.HSS.ID.A.2 CCSS.MATH.CONTENT.HSS.ID.A.3	• Represent data with plots on the real number line (dot plots, histograms, and box plots). • 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. • Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	**4**
12-3	**Measure of Variability for Symmetrical and Skewed Distribution** CCSS.MATH.CONTENT.HSS.ID.A.1 CCSS.MATH.CONTENT.HSS.ID.A.2	• Represent data with plots on the real number line (dot plots, histograms, and box plots). • 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.	**4**

12-4	**Categorical Data on Two Variables** CCSS.MATH.CONTENT.HSS.ID.B.5	• 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.	**3**
12-5	**Numerical Data on Two Variables** CCSS.MATH.CONTENT.HSS.ID.B.6 CCSS.MATH.CONTENT.HSS.ID.B.6.A	• Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. • Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.	**3**
12-6	**Permutations and Combinations** CCSS.MATH.CONTENT.HSS.CP.B.9	• (+) Use permutations and combinations to compute probabilities of compound events and solve problems.	
12-7	**Probability of Compound Events** CCSS.MATH.CONTENT.HSS.CP.B.6 CCSS.MATH.CONTENT.HSS.CP.B.7 CCSS.MATH.CONTENT.HSS.CP.B.8 CCSS.MATH.CONTENT.HSS.CP.B.9	• Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A*, and interpret the answer in terms of the model. • Apply the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B), and interpret the answer in terms of the model. • (+) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model. • (+) Use permutations and combinations to compute probabilities of compound events and solve problems. •	**4**

12-8	**Probability of Independent Events** CCSS.MATH.CONTENT.HSS.CP.A.2	• Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent.	**4**