Integrated Algebra Curriculum Map

Semester 1: Units 1, 2 and 3 **Semester 2: Units 4, 5, 6, and 7**

Essential Question	**Content/Skills** (with **suggested** days instruction for each unit)	**Performance Indicators (Appendix B)**	**Common Core Standards (Appendix C)**	**Resources**	**Assessment (Appendix A)**	**Modifications to instruction (*see footnote)**
Unit 1: Relationships between Quantities and reasoning with Equations and Inequalities						
What makes something a mathematical term? How do we translate written information into mathematical terms?	***1A: Number Theory and Operations (9 days instruction)***					
	Classifying Numbers/Comparing Numbers o Classifying numbers according to which set each number belongs o Comparing and ordering real numbers	N.6 Evaluate expressions involving factorials, absolute values, and exponential expressions	N.RN.3	1.3	**Diagnostic Test**	**Delayed Learners** Use algebra tiles to simplify expressions **Advanced Learners** Have students write complicated expressions for partners to solve **ELL's** Should construct math glossaries in English and use them during class and on homework assignments.
	Properties of Real Numbers o To understand and use the properties of rational numbers. o To reason logically with given facts to a conclusion	N.1 Identify and apply the properties of real numbers (closure, commutative, associative, distributive, identity, and inverse)	N.RN.3	2.5		
	Distributive Property/ Combining Like Terms o To understand and apply the distributive property.	N.1 Identify and apply the properties of real numbers (closure, commutative, associative, distributive, identity, and inverse) A.13 Add, subtract and multiply monomials and polynomials.		2.4		
	Adding and Subtracting Rational Expressions (Fractions) o To evaluate expressions using the property of numbers. o To understand and apply addition and subtraction of signed numbers	N.1 Identify and apply the properties of real numbers (closure, commutative, associative, distributive, identity, and inverse)		2.1, 2.2		
	Multiplying and Dividing Rational Expressions o To understand and apply the rules for multiplication and division of rational numbers.	N.1 Identify and apply the properties of real numbers (closure, commutative, associative, distributive,		2.3		

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		identity, and inverse) N.6 Evaluate expressions involving factorials, absolute values, and exponential expressions				
	Evaluating Algebraic Expressions (PEMDAS) o Symbols in algebra o Order of operations o Evaluating Algebraic Expressions	N.6 Evaluate expressions involving factorials, absolute values, and exponential expressions		1.2		
	Evaluating Algebraic Expressions with Parenthesis o Order of operations with parentheses (grouping symbols)	A.5 Write algebraic equations or inequalities that represent a situation N.6 Evaluate expressions involving factorials, absolute values, and exponential expressions		1.2		
	Modeling verbal Relationships with Variables o Translating English phrases to algebraic expressions and equations	A.1 Translate a quantitative verbal phrase into an algebraic expression A.2 Write verbal expressions that match given mathematical expressions A.3 Distinguish the difference between an algebraic expression and an algebraic equation A.4 Translate verbal sentences into mathematical equations or inequalities A.5 Write algebraic equations or inequalities that represent a situation	N.Q.2, A.SSE.1,	1.1		
	1B: Solving Equations (8 days instruction)					
	One-Step Equations	A.5 Write algebraic equations or inequalities that represent a situation A.6 Analyze and solve verbal problems whose	A.CED.1, A.CED.3 **A.REI.1, A.REI.3**	3		**Delayed Learners** Should be given steps for solving equations and

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What does it mean to balance an equation? What does it mean to solve an equation?	One-Step Equations	solution requires solving a linear equation or linear inequality in one variable. A.25 Solve equations involving fractional expressions.	A.CED.1, A.CED.3 **A.REI.1, A.REI.3**	3		allowed to use during class until memorized. Use simple examples initially, building to more complicated ones. **<u>Advanced Learners</u>** Have students look for multiple ways of solving the equations. Have them try and construct an equation with no solution
	Two-Step Equations ○ To understand and solve 2-step equations. ○ Using deductive reasoning to justify steps in solving equations ○ To write and solve equations that model real world situations		A.CED.1, A.CED.3 **A.REI.1, A.REI.3**	3.1		
	Solving Equations with Combining Like Terms and Distributive Property ○ To understand and apply the distributive property to solve equations. ○ To write and solve equations that model real world situations	N.1 Identify and apply the properties of real numbers (closure, commutative, associative, distributive, identity, and inverse) A.5 Write algebraic equations or inequalities that represent a situation A.22 Solve all types of linear equations in one variable.	A.CED.1, A.CED.3 **A.REI.1, A.REI.3**	3.2		
	Solving Equations with Variables on Both Sides/ Identities and No Solution ○ To understand how to solve equations with variables on both sides. ○ To write and solve equations that model real world situations	A.5 Write algebraic equations or inequalities that represent a situation A.6 Analyze and solve verbal problems whose solution requires solving a linear equation or linear inequality in one variable. A.22 Solve all types of linear equations in one variable.	A.CED.1, A.CED.3 **A.REI.1, A.REI.3**	3.3		
	Solving Equations with Fractions	A.25 Solve equations involving fractional expressions.	A.CED.1, A.CED.3 **A.REI.1, A.REI.3**	Extra		**<u>ELL's</u>** Should construct math glossaries in English and use

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	Transforming formula and solving literal equations ○ To transform formulas for particular variables	A23 Solve literal equations for a given variable	A.CED.2, A.CED.3, A.CED.4, **A.REI.1, A.REI.3**	3.4		them during class and on homework assignments.
	Consecutive Integer Problems ○ To write and solve equations that model real world situations involving consecutive integers, odd and even inclusive	A.6 Analyze and solve verbal problems whose solution requires solving a linear equation or linear inequality in one variable.	**A.REI.1**	Extra	**Test 1**	
What are proportions and how are they related to rates, ratios, scales and fractions? How does an understanding of percents and proportions help us make better spending decisions?	***1C: Proportional Reasoning (8 days instruction)***					
	Ratio and Rates, Unit Rates, Transforming Formulas ○ To understand and apply ratio in solving problems. ○ To find unit rates and to convert rates.	A.26 Solve algebraic proportions in one variable Which result in linear or quadratic equations. M.1 Calculate rates using appropriate units. M.2 Solve problems involving conversions within systems, given the relationship between the units.	N.Q.1, N.Q.2, N.Q.3, A.CED.4, **A.REI.1, A.REI.3**	3.4		**<u>Delayed Learners</u>** Use a table to organize information **<u>Advanced Learners</u>** Have students write their own proportion problems **<u>ELL's</u>** Should construct math glossaries in English and use them during class and on homework assignments.
	Solving Proportions ○ To understand and solve algebraic proportions		N.Q.1, N.Q.2, N.Q.3, A.CED.4, **A.REI.1, A.REI.3**	3.4		
	Similar Figures ○ To understand and apply proportions to solve similarity problems	A.6 Analyze and solve verbal problems whose solution requires solving a linear equation or linear inequality in one variable A.25 Solve equations involving fractional expressions. A.26 Solve algebraic proportions in one variable which result in linear or quadratic equations	N.Q.1, N.Q.2, N.Q.3, A.CED.4, **A.REI.1, A.REI.3**	3.5		
	Indirect Measurement and Scale Drawing ○ To investigate scale factors and ratios of perimeters, areas, and volume ○ To apply proportions using scale drawings to find distances.		N.Q.1, N.Q.2, N.Q.3, A.CED.4, **A.REI.1, A.REI.3**	3.5		
	Motion Problems/ Distance-Rate-Time ○ To define one variable in terms of another. ○ To translate, set-up and solve distance-rate-time problems	A.5 Write algebraic equations or inequalities that represent a situation	N.Q.1, N.Q.2, N.Q.3, A.CED.4, **A.REI.1, A.REI.3,** F.IF.6	3.6		

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	Geometric Figures ○ Area and Perimeter of Composite Figures ○ Surface Area and Volume of Rectangular Prisms and Cylinders ○ Circumference and Area of Circles	G.1 Find the area and/or perimeter of figures composed of polygons and circles or sectors of a circle G.2 Use formulas to calculate volume and surface area of rectangular solids and cylinders	N.Q.1, N.Q.2, N.Q.3, A.CED.4, **A.REI.1, A.REI.3**	Activity Lab (4.7, 10.9)		
	Review Percent/ Percent of Change ○ To understand and apply the ratio of percent of change. ○ To apply the percent proportion to solve percent problems.	N .5 Solve algebraic problems arising from situations that involve fractions, decimals, percents	N.Q.1, N.Q.2, N.Q.3, A.CED.4, F.IF.6	3.7		
	Percent Error / Relative Error ○ To understand and apply the percent of error in calculating area and volume.	M.3 Calculate the relative error in measuring square and cubic units, when there is an error in the linear measure	N.Q.1, N.Q.2, N.Q.3, A.CED.4, F.IF.6, G.GMD.3	3.7		
How do inequalities compare and contrast to equations? Do we use different mathematical procedures when working with inequalities?	***1D: Solving Inequalities (6 days instruction)***					
	Simple Inequalities and Their Graphs ○ To find the solution to an inequality in one variable. ○ To plot inequalities on a number line. ○ Using the addition property to solve inequalities. ○ Using the subtraction property to solve inequalities ○ Using multiplication and division to solve inequalities.	A.4 Translate verbal sentences into mathematical equations or inequalities A.6 Analyze and solve verbal problems whose solution requires solving a linear equation or linear inequality in one variable A.21 Determine whether a given value is a solution to a given linear equation or linear inequality in one variable. A.24 Solve linear inequalities in one variable G.6 Graph linear inequalities	A.CED.1, A.CED.3, **A.REI.1, A.REI.3**	4.1, 4.2, 4.3		**<u>Delayed Learners</u>** Should be given steps for solving inequalities and allowed to use during class until memorized **<u>Advanced Learners</u>** Students should discuss situations that can be represented by inequalities and determine reasonable solutions
	Multi-Step Inequalities ○ Solving inequalities with one variable	A.5 Write algebraic equations or inequalities that represent a situation	A.CED.1, A.CED.3, **A.REI.1, A.REI.3**	4.4		

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	Multi-Step Inequalities ○ Solving inequalities with one variable	A.6 Analyze and solve verbal problems whose solution requires solving a linear equation or linear inequality in one variable A.24 Solve linear inequalities in one variable	A.CED.1, A.CED.3, **A.REI.1, A.REI.3**	4.4		**ELL's** Have students explain the word problems to a partner
	Inequalities with Variables on Both Sides		A.CED.1, A.CED.3, **A.REI.1, A.REI.3**	4.4		
	Compound Inequalities (and/or) ○ Solving and graphing compound inequalities.		A.CED.1, A.CED.3, **A.REI.1, A.REI.3**	4.5	**Test 2**	
Unit 2: Linear Relationships						
	2A: Relations and Functions (5 days instruction)					
What makes a relation a function? How do we write and use function notation?	Writing a Function Rule ○ Recognizing equations that describe a functional relationship. ○ Using tables to write function rules	A.5 Write algebraic equations or inequalities that represent a situation G.3 Determine when a relation is a function, by examining ordered pairs and inspecting graphs of relations	A.CED.1, A.CED.2, F.IF.1, F.IF.2, F.IF.5, F.BF.1a, b	1.4		**Delayed Learners** Have students substitute solutions into the function rule to check their answers. **Advanced Learners** Discuss why specific variables are graphed on the x-axis and others on the y-axis. Use terms independent & dependent variable **ELL's** Have students explain the terminology to a partner
	Domain and Range of a Function ○ Identifying independent (domain) and dependent (range) variables.		F.IF.1, F.IF.2, F.IF.5, F.BF.1a, b	1.4		
	Relations and Functions ○ To represent relations and functions using mapping diagrams, tables, and function rules ○ To determine when a relation is a function.	G.3 Determine when a relation is a function, by examining ordered pairs and inspecting graphs of relations	F.IF.1, F.IF.2, F.IF.5, F.BF.1a, b	5.2		
	Function Notation/ Evaluating Functions/ Function Rule ○ Identifying and graphing functions, using a table ○ To understand and write function rules. ○ To determine the range of a function given the domain and function rule ○ Modeling real world situations using function rules	A.5 Write algebraic equations or inequalities that represent a situation G.4 Identify and graph linear quadratic (parabolic), absolute value, and exponential functions	A.CED.1, A.CED.2, F.IF.1, F.IF.2, F.IF.5, F.BF.1a, b	5.3, 5.4		

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What kinds of relationships are expressed by linear equations? How can different graphing choices affect interpretation of the data?	***2B: Linear Relationships (9 days instruction)***					
	Direct Variation ○ To model and solve equations of direct variation, using the equation $y=kx$ ○ To find the constant of variation given a table of values. ○ To determine whether or not a relationship varies directly	N.5 Solve algebraic problems arising from situations that involve fractions, decimals, percents, and proportionality/direct variation. A.5 Write algebraic equations or inequalities that represent a situation	A.CED.2, A.CED.3, A.CED.4, **A.REI.10**, F.IF.4, F.IF.6, F.IF.7a, F.LE.5	5.5		**Delayed Learners** Have students use each ordered pair in a table to write equations rather than just one **Advanced Learners** Arrange a selection of equations in order from steepest to least steep **ELL's**
	Graphing a Line (Using a Table) ○ Identifying and graphing functions, using a table		A.CED.2, A.CED.3, A.CED.4, **A.REI.10**, F.IF.4, F.IF.6, F.IF.7a	Extra		
	Finding the slope of a line/ Rate of Change ○ To understand slope as a rate of change ○ To find the slope of a line given two points on the line ○ To determine the slope of a line based on the graph of the line ○ To identify the slopes of horizontal and vertical lines	A.32 Explain slope as a rate of change between dependent and independent variables. A. 33. Determine the slope of a line, given the coordinates of two points on the line.	A.CED.2, A.CED.3, A.CED.4, **A.REI.10,** F.IF.4, F.IF.6, F.IF.7a, F.BF.3, F.LE.5	6.1		
	Graphing a line using Slope, y-intercept Form ○ To write the equation of a line given a point on the line and its slope ○ To identify and graph linear functions. ○ To investigate how changing the coefficients of a function will affect its graph. ○ To model real world problems involving linear relationships	A.34 Write the equation of a line, given it s slope and the coordinates of a point on the line A.35 Write the equation of a line, given the coordinates of 2 points on the line A.37 Determine the slope of a line, given its equation in any form.	A.CED.2, A.CED.3, A.CED.4, **A.REI.10**, F.IF.4, F.IF.6, F.IF.7a, F.BF.3	6.2, 6.3		

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		G.5 Identify and generalize how changing the coefficients of a function affects its graph				
	Writing Equations of a Line ○ Given any point and a slope ○ Given any two points	A. 34 Write the equation of a line given its slope and the coordinates of a point on the line. A.35 Write the equation of a line, given the coordinates of 2 points on the line A.A.39 Determine whether a given point is on a line, given the equation of the line	A.CED.2, A.CED.3, A.CED.4, **A.REI.10,** F.IF.4, F.IF.6, F.IF.7a, F.BF.3	6.4, 6.5		
	Parallel Lines ○ To discover that parallel lines have equal slopes ○ To determine if lines are parallel based on their graphs or equations ○ To write equations of lines parallel to each other	A.36 Write the equation of a line parallel to the *x*- or *y*-axis.	A.CED.2, A.CED.3, A.CED.4, **A.REI.10**, F.IF.4, F.IF.6, F.IF.7a, F.BF.3, F.LE.5	6.6	**Test 3**	
What does the intersection points of a system of graphs tell us? What information does the solution set of a system of equations give us?	***2C: Systems of Equations (7 days instruction)***					
	Solving systems of equations graphically ○ To understand how to solve systems of equations graphically. ○ To analyze special types of systems ○ To understand how to solve a system using a graphing calculator	A.7 Analyze and solve verbal problems whose solution requires solving systems of linear equations of 2 variables G.7 Graph and solve systems of linear equations and inequalities with rational coefficients in 2 variables	A.CED.2, A.CED.3, A.CED.4, A.REI.6, **A.REI.10, A.REI.11**	7.1		**<u>Delayed Learners</u>** When solving word problems have students list all the information and what they need to find **<u>Advanced Learners</u>** Have students
	Solving systems of equations algebraically (substitution) ○ To understand how to solve a system by using substitution	A.7 Analyze and solve verbal problems whose solution requires solving systems of linear equations of 2 variables	A.CED.2, A.CED.3, A.CED.4, **A.REI.6**	7.2		

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	Solving systems of equations algebraically (substitution) o To understand how to solve a system by using substitution	A.10 Solve systems of 2 linear equations in 2 variables algebraically G.7 Graph and solve systems of linear equations and inequalities with rational coefficients in 2 variables	A.CED.2, A.CED.3, A.CED.4, **A.REI.6**	7.2		write a system of three equations that form a triangle **ELL's** Have students explain the difference between intercept and intersect
	Solving systems of equations algebraically (elimination) o To understand how to use addition or subtraction to solve a system o To understand how to use multiplication to solve a system.		A.CED.2, A.CED.3, A.CED.4, **A.REI.5, A.REI.6**	7.3		
	Applications of linear systems o To model real world applications that lead to writing and solving systems of equations	A.7 Analyze and solve verbal problems whose solution requires solving systems of linear equations of 2 variables G.7 Graph and solve systems of linear equations and inequalities with rational coefficients in 2 variables	A.CED.2, A.CED.3, A.CED.4, **A.REI.5, A.REI.6, A.REI.10, A.REI.11**	7.4		
Why does the solution set for a system of inequalities differ from the solution set of a system of equations?	***2D: Graphing Inequalities (4 days instruction)***					
	Graphing and modeling linear inequalities o To understand how to graph linear inequalities. o To determine where the solution set lies on the coordinate plane (above or below the line)	A.6 Analyze and solve verbal problems whose solution requires solving a linear equation or linear inequality in one variable A.21 Determine whether a given value is a solution to a given linear equation or linear inequality in one variable. G.6 Graph linear inequalities	A.CED.3, **A.REI.10, A.REI.12**	7.5		**Delayed Learners** Make sure that students are using a number of points to verify a solution **Advanced Learners** Write their own inequalities and solve them graphically
	Graphing systems of linear inequalities o To understand and graph systems of linear inequalities o To identify the solution set on the	A.40 Determine whether a given point is in the solution ser of a system of inequalities.	A.CED.3, **A.REI.10, A.REI.12**	7.6		

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	coordinate plane ○ To model real world problems that involve writing and solving a system of linear inequalities	G.7 Graph and solve systems of linear equations and inequalities with rational coefficients in 2 variables			**Test 4**	**ELL's** Emphasize the difference between the inequality symbols and what they mean on a graph
Unit 3: Descriptive Statistics and Data Analysis (9 days instruction)						
How can we use statistical data to make informed decisions? How can we collect and present data in a way that makes it accessible and useful?	Measures of Central Tendency ○ To find mean, median, mode, and range ○ To represent data using a stem and leaf plot ○ To interpret the data in a stem and leaf plot	S.4 Compare and contrast the appropriateness of different measure of central tendency for a given data set. S.16 Recognize how linear transformations of one-variable data affect the data's mean, median, mode, and range.	S.1D.2, S.ID.3	1.6		**Delayed Learners** Create their own list of numbers where the median and mean are the same
	Box and Whisker Plot ○ To understand the applications of box-and whisker plots ○ To understand how the minimum, maximum, and the 3 quartiles are used to construct a box-and-whisker plot.	S.5 Construct a histogram, cumulative frequency histogram, and a box-and-whisker plot, given a set of data S.6 Understand how the five statistical summary (minimum, maximum, and the three quartiles) is used to construct a box-and-whisker plot S.9 Analyze and interpret a frequency distribution table or histogram, a cumulative frequency distribution table or histogram, or a box-and-whisker plot S.11 Find the percentile rank of an item in a data set	N.Q.1, S.ID.1, S.1D.2, S.ID.3	NY2		**Advanced Learners** Describe a situation where the mean or the median or the mode would be the best measure of central tendency **ELL's**

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		and identify the point values for first, second, and third quartiles				
	Histogram ○ To analyze and interpret a histogram	S.5 Construct a histogram, cumulative frequency histogram, and a box-and-whisker plot, given a set of data S.9 Analyze and interpret a frequency distribution table or histogram, a cumulative frequency distribution table or histogram, or a box-and-whisker plot	N.Q.1, S.ID.1, S.1D.2, S.ID.3	Activity Lab		
	Cumulative Histogram ○ To analyze and interpret a cumulative frequency histogram		N.Q.1, S.ID.1, S.1D.2, S.ID.3	Activity Lab		
	Scatter Plots ○ Relating 2 groups of data (bivariate data) in a scatter plot ○ To use scatter plots to determine whether a positive, negative, or no correlation exists	S.7 Create a scatter plot of bivariate data. S.8 Construct manually a reasonable line of best fit for a scatter plot and determine the equation of that line S.12 Identify the relationship between the independent and dependant variables from a scatter plot	N.Q.1, S.ID.1, S.1D.2, S.ID.3, S.ID.6a, c	1.5		
	Correlations and Predictions (trend line, line of best fit) ○ Investigating trends in scatter plots (positive, negative, etc.) ○ Determining the reasonable line of best fit ○ To understand the difference between correlation and causation ○ To make predictions from the line of best fit ○ To identify the equation of the line of best fit	S.13 Understand the difference between correlation and causation S.14 Identify variables that might have a correlation but not a causal relationship S.17 Use a reasonable line of best fit to make a prediction involving interpolation or extrapolation.	N.Q.1, F.LE.2, S.ID.1, S.1D.2, S.ID.3, S.ID.6a, c, S.ID.7, S.ID.9	NY5, 6.7		
	Identifying Types of Data/ Sampling and Surveys	S.1 Categorize data as qualitative or quantitative S.2 Determine whether the		NY1		

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		data to be analyzed is univariate or bivariate S.3 Determine when collected data or display of data may be biased S.10 Evaluate published reports and graphs that are based on data by considering: experimental design, appropriateness of the data analysis, and the soundness of the conclusions S.15 Identify and describe sources of bias and its effect, drawing conclusions from data			**End Semester Test 5**	
Unit 4: Radicals and Right Triangle Relationships						
What are radicals and how do we work with them?	***4A: Operations with Radicals (5 days instruction)***					
	Finding Square Roots/ Estimating Using Square Roots o To simplify square root expressions of perfect squares	N.2 Simplify radical term		3.8		**Delayed Learners** Emphasize only like radicals can be combined **Advanced Learners** Have students factor expressions such as $(x^2 - 5)$ **ELL's**
	Simplifying radicals o To simplify non-perfect square radical expressions by removing perfect square factors	N.2 Simplify radical term N.3 Perform the 4 arithmetic operations using like and unlike terms		11.1		
	Multiplication and division of radicals o To simplify products and quotients of radical expressions using the distributive			11.2		
	Adding and Subtracting Radicals o To simplify sums and differences by combining like radicals			11.2		
How can we make practical use of the properties of	***4B: Pythagorean Theorem and Trigonometry (5 days instruction)***					
	Pythagorean Theorem o To review the properties of a right triangle and the Pythagorean Theorem	A.45 Determine the measure of a third side of a right triangle using the	G.SRT.8	3.9		**Delayed Learners** Remind students

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right angle triangles?	○ To model real world situations involving the Pythagorean Theorems	Pythagorean Theorem, given the lengths of any 2 sides.	G.SRT.8	3.9		they cannot identify a right angle by inspection – they must use the formula **<u>Advanced Learners</u>** Use more complicated word problems that require multi-steps **<u>ELL's</u>** Draw a compass to show the conventions of direction
	Pythagorean Theorem and Converse ○ To apply the Pythagorean Theorem and its converse to find missing sides of a right triangle ○ To determine if a triangle is a right triangle given the length of the 3 sides		G.SRT.8	3.9		
	Trigonometric Ratios ○ To define the 3 basic trigonometric ratios ○ To use the calculator to find the trigonometric ratios of given angles	A.42 Find the sine, cosine, and tangent ratios of an angle of a right triangle, given the lengths of the sides. A.44 Find the measure of a side of a right triangle, given an acute angle and the length of another side.	G.SRT.6, G.SRT.7, G.SRT.8	11.5		
	Using trigonometry to find missing sides and angles in right triangles	A.42 Find the sine, cosine, and tangent ratios of an angle of a right triangle, given the lengths of the sides. A.43 Determine the measure of an angle of a right triangle, given the length of any 2 sides of the triangle A.44 Find the measure of a side of a right triangle, given an acute angle and the length of another side.	G.SRT.6, G.SRT.7, G.SRT.8	11.5		
	Applications of trigonometry in right triangles ○ To model real world situations that can be solved using trigonometric ratios (using angles of elevation and depression)		G.SRT.6, G.SRT.7, G.SRT.8	11.6	**Test 6**	
Unit 5: Polynomials						
	5A: Operations with Polynomial Expressions (15 days instruction)					
How do the properties of exponents affect	Zero and Negative Exponents ○ To simplify expression with zero and negative exponent	N.6 Evaluate expressions involving factorials, absolute values, and		8.3, 8.4, 8.5		**<u>Delayed Learners</u>** Have students

Essential Question	**Content/Skills** (with **suggested** days instruction for each unit)	**Performance Indicators (Appendix B)**	**Common Core Standards (Appendix C)**	**Resources**	**Assessment (Appendix A)**	**Modifications to instruction (*see footnote)**
operations with polynomials?	○ To evaluate exponential expressions	exponential expressions.		8.3, 8.4, 8.5		order scientific numbers. Have students write out numbers in 'long' form to help with rules of exponents Have students keep track of like terms by use of different colors **Advanced Learners** Explain why 2^6 and not 2^{10} is twice 2^5 Have students solve more complicated polynomials problems **ELL's** Explain how to interpret the calculator display of scientific numbers Have students keep track of like terms by use of different colors
	Scientific Notation ○ To write numbers in scientific and standard notation ○ To use scientific notation	N.4 Understand and use scientific notation to compute products and quotients		8.5		
	Multiplying and Dividing powers of the same base ○ To multiply powers ○ To work with scientific notation ○ To raise a power to a power ○ To raise a product to a power	N.4 Understand and use scientific notation to compute products and quotients A.12 Multiply and divide monomial expressions with a common base, using the properties of exponents		8.1		
	Power-to-Power, Product & Quotient to Power ○ To divide powers with the same base ○ To raise a quotient to a power			8.2		
	Power-to-Power, Product & Quotient to Power ○ To divide powers with the same base ○ To raise a quotient to a power	A.13 Add, subtract, and multiply monomials and polynomials.	A.APR.1	9.1		
	Adding and Subtracting Polynomials ○ To identify monomial and polynomials ○ To add and subtract polynomials		A.APR.1	9.2		
	Multiplying two monomials/ monomial and polynomial ○ To use the laws of exponents to multiply monomials and polynomials		A.APR.1	9.3		
What information do the factors of a polynomial give us?	Multiplying binomials (including product of binomials and trinomials) ○ To multiply a binomial by a binomial using the distributive property twice ○ To multiply trinomials and binomials		A.APR.1	9.4		
	Multiplying special cases (conjugates) - and binomial squares ○ To find the square of a binomial ○ To find the difference of squares		A.SSE.1, A.SSE.2	9.2		
	Factoring using GCF ○ To factor a monomial from a polynomial	A.20 Factor algebraic expressions completely,	A.SSE.1, A.SSE.2	9.7		

Essential Question	**Content/Skills** (with **suggested** days instruction for each unit)	**Performance Indicators (Appendix B)**	**Common Core Standards (Appendix C)**	**Resources**	**Assessment (Appendix A)**	**Modifications to instruction (*see footnote)**
	(using GCF)	including trinomials with a lead coefficient of one.				
	Factoring special cases ○ To factor perfect square trinomials ○ To factor difference of 2 perfect squares	A.19 Identify and factor the difference of 2 perfect squares. A.20 Factor algebraic expressions completely, including trinomials with a lead coefficient of one.	A.SSE.1, A.SSE.2	9.5, 9.7		
	Factoring quadratic trinomials a=1 ○ To factor trinomials of the type $ax^2 + bx + c$	A.20 Factor algebraic expressions completely, including trinomials with a lead coefficient of one.				
	Factoring completely ○ To factor expressions that involve multi-step factoring				**Test 7**	
How can we use our knowledge of fractions and factoring to work with rational expressions and equations?	***5B: Rational Expressions and Equations (7 days instruction)***					
	Simplifying rational expressions ○ To simplify rational expressions by factoring ○ To determine when a rational expression is undefined	A.15 Find values of a variable for which an algebraic fraction is undefined. A.16 Simplify fractions with polynomials in the numerator and denominator by factoring both and renaming them in lowest terms.	A.SSE.2	12.2		**Delayed Learners** Explain why (3 -x) is equal to -1(x-3) **Advanced Learners** Use more complicated examples **ELL's**
	Multiplying and Dividing rational expressions ○ To multiply and divide rational expressions by using factoring ○ To divide polynomials	A.14 Divide a polynomial by a monomial or binomial, where the quotient has no remainder. A.18 Multiply and divide algebraic fractions and express the product or quotient in simplest form.	A.SSE.2	12.3, 12.4		
	Adding and Subtracting rational expressions ○ To add and subtract rational expressions with like denominators ○ To add and subtract rational expressions with unlike denominators	A.17 Add or subtract fractional expressions with monomial or like binomial denominators	A.SSE.2	12.5	**Test 8**	

Essential Question	**Content/Skills** (with **suggested** days instruction for each unit)	**Performance Indicators (Appendix B)**	**Common Core Standards (Appendix C)**	**Resources**	**Assessment (Appendix A)**	**Modifications to instruction (*see footnote)**
Unit 6: Non- Linear Functions & Modeling						
	6A: Quadratic Functions (12 days instruction)					
What type of behavior does a function exhibit when it is considered quadratic? What are the ways that we can find the points common to a system of quadratic and linear equations or inequalities?	Graphing quadratic functions ○ To graph quadratic functions of the form $y = ax^2$ ○ To graph quadratic functions of the form $y = ax^2 + c$ ○ To use the graphing calculator to graph quadratic	G.4 Identify and graph linear, quadratic (parabolic), absolute value, and exponential functions G.10 Determine the vertex and axis of symmetry of a parabola, given its graph A.8 Analyze and solve verbal problems that involve quadratic equations.	**A.REI.10**, F.IF.4, F.IF.5, F.IF.7, F.IF.8, F.IF.9, A.SSE.3, F.BF.3	10.1, 10.2		**Delayed Learners** Review factoring with students. Solve systems both graphically & algebraically side by side to show that different methods can be used. Use the graphing calculator to solve the systems **Advanced Learners** Have students explain how they can tell if a quadratic equation has any solution. Draw graphs of examples of quadratics having 2, 1 and 0 solutions. **ELL's**
	Graph functions of the form $y = ax^2+bx+c$ ○ To determine the equation of the axis of symmetry and turning point of a quadratic function given its graph or equation ○ To determine the effects of changing the coefficients a, b, and c on the intercepts, turning points, and axis of symmetry	G.4 Identify and graph linear, quadratic (parabolic), absolute value, and exponential functions G.10 Determine the vertex and axis of symmetry of a parabola, given its graph A.8 Analyze and solve verbal problems that involve quadratic equations. A.41 Determine the vertex and axis of symmetry of a parabola, given its	**A.REI.10**, F.IF.4, F.IF.5, F.IF.7, F.IF.8, F.IF.9, F.BF.3	10.1, 10.2		
	Solving quadratic equations graphically ○ To solve quadratic equations by graphing ○ To use the graphing calculator to find the zeroes of the graph	G.4 Identify and graph linear, quadratic (parabolic), absolute value, and exponential functions G.8 Find the roots of a parabolic function graphically.	**A.REI.10**, F.IF.4, F.IF.5, F.IF.7, F.IF.8, F.IF.9, A.SSE.3	10.3		

Essential Question	**Content/Skills** (with **suggested** days instruction for each unit)	**Performance Indicators (Appendix B)**	**Common Core Standards (Appendix C)**	**Resources**	**Assessment (Appendix A)**	**Modifications to instruction (*see footnote)**
	Solving quadratic equations graphically ○ To solve quadratic equations by graphing ○ To use the graphing calculator to find the zeroes of the graph	A.8 Analyze and solve verbal problems that involve quadratic equations.	**A.REI.10**, F.IF.4, F.IF.5, F.IF.7, F.IF.8, F.IF.9, A.SSE.3	10.3		Show them how to use the graphing calculator to solve the systems Assist them in interpreting the real world problems
	Solving quadratic equations with square roots ○ To solve incomplete quadratic equations of the form $ax^2+c=0$ by using square roots.	A.28. Understand the difference and connection between roots of a quadratic equation and factors of a quadratic expression.	**A.REI.10,** F.IF.4, F.IF.5, F.IF.7, F.IF.8, F.IF.9, A.SSE.3	10.3		
	Solving quadratic equations algebraically (in standard form) ○ To solve quadratic equations by factoring.	A.8 Analyze and solve verbal problems that involve quadratic equations.	F.IF.8, F.IF.9	10.4		
	Solving quadratic equations algebraically (not in standard form) ○ To rearrange equations into standard form ○ To solve rational equations ○ To determine when a rational expression is undefined	A.20 Factor algebraic expressions completely, including trinomials with a lead coefficient of one. A.26 Solve algebraic proportions in one variable which result in linear or quadratic equations A.27 Understand and apply the multiplication property of zero to solve quadratic equations with integral coefficients and integral roots.	F.IF.8, F.IF.9, A.SSE.3	10.4		
	Solving quadratic-linear systems (graphically) ○ To graph each function and determine the point(s) of intersection ○ To use the graphing calculator to locate the point(s) of intersection	A. 11 Solve a system of one linear and one quadratic equation in two variables, where only factoring is required	**A.REI.7, A.REI.10,** F.IF.4, F.IF.5, F.IF.7, F.IF.8, F.IF.9, A.SSE.3	NY-6		
	Solving quadratic-linear systems (algebraically) ○ To use substitution and/or to solve a quadratic-linear system algebraically	G.9 Solve systems of linear and quadratic equations graphically Note: Only use systems of linear and quadratic equations that lead to solutions whose coordinates are integers	**A.REI.7**, F.IF.8, F.IF.9, A.SSE.3, A.CED.1, A.CED.2	NY-6		
	Applications of quadratic equations ○ To model real world applications involving quadratics and systems of quadratic-linear		**A.REI.7, A.REI.10**, F.IF.4, F.IF.5, F.IF.7,	NY-6		

Essential Question	**Content/Skills** (with **suggested** days instruction for each unit)	**Performance Indicators (Appendix B)**	**Common Core Standards (Appendix C)**	**Resources**	**Assessment (Appendix A)**	**Modifications to instruction (*see footnote)**
	functions (projectile motion)		F.IF.8, F.IF.9, A.SSE.3, A.CED.1, A.CED.2		**Test 9**	
What makes a graph exponential?	***6B: Other Non-Linear Functions (6 days instruction)***					
	Graphing Exponential Functions ○ To evaluate exponential functions ○ Graphing exponential functions	N.6 Evaluate expressions involving factorials, absolute values, and exponential expressions G.4 Identify and graph linear, quadratic (parabolic), absolute value, and exponential functions	**A.REI.11,** F.IF.7E, F.LE.2, F.LE.3, F.LE.5	8.7		**Delayed Learners** Use a tree diagram to illustrate exponential growth **Advanced Learners** Ask them to explain if exponential decay can ever lead to a zero answer **ELL's** Ensure students realize that decay is the opposite of growth
How do absolute value functions differ from linear functions?	Exponential Growth and Decay ○ To model real life exponential growth applications (compound interest, population) ○ To model real life exponential decay applications (half-life, depreciation)	A.9 Analyze and solve verbal problems that involve exponential growth and decay.	A.SSE.1, A.CED.1, F.IF.8b, F.BF.1b, F.LE.1, F.LE.2, F.LE.3, F.LE.5	8.8		
	Graphing and Translating Absolute Value Functions ○ To graph absolute value functions ○ To translate absolute value functions horizontally and vertically	G.4 Identify and graph linear, quadratic (parabolic), absolute value, and exponential functions	**A.REI.11,** F.IF.7b, F.BF.3,	6.8		
Unit 7: Counting Methods and Probability (9 days instruction)						
How can we use sets to represent data?	Sets ○ To use roster form and set builder notation to identify subsets ○ To identify subsets and complements of sets ○ To use interval notation	A.29 Use set-builder notation and/or interval notation to illustrate the elements of a set, given the elements in roster form A.30 Find the complement of a subset of a given set, within a given universe	S.CP.1	NY3		**Delayed Learners** Have students collect their own data and design probability questions from this data
	Operations on Sets To find the union and intersection of sets	A.31 Find the intersection of sets (no more than three sets) and/or union of sets	S.CP.1	NY4		
	Venn Diagrams		S.CP.1	NY4		**Advanced**

Essential Question	**Content/Skills** (with **suggested** days instruction for each unit)	**Performance Indicators (Appendix B)**	**Common Core Standards (Appendix C)**	**Resources**	**Assessment (Appendix A)**	**Modifications to instruction (*see footnote)**
What are the chances of that happening?	○ To use the union and intersection of sets to form Venn diagrams ○ To represent data using Venn diagrams	(no more than three sets)	S.CP.1	NY4		**Learners** Have them design questions for the class use permutations to find the sample space **ELL's** Emphasize the difference between with replacement and without replacement.
	The multiplication counting principle ○ Using the multiplication counting principle to determine the number of items in a sample space ○ To use a tree diagram	N.7 Determine the number of possible events, using counting techniques		12.7		
	Finding Permutations (and factorials) ○ Defining permutation notation ○ Finding permutations	N.6 Evaluate expressions involving factorial(s), absolute value(s), and exponential expression(s) N.8 Determine the number of possible arrangements (permutations)		12.7		
	Experimental Probability ○ To define terminology used in probability such as event, outcome, sample space ○ To determine the number of elements in a sample space ○ To find the experimental probability by performing experiments and recording data	S.19 Determine the number of elements in a sample space and determine the number of favorable events		2.6		
	Theoretical Probability ○ To understand the difference between theoretical and experimental probability. ○ To understand the probability of an event and its complement.	S.20 Calculate the probability of an event and its complement. S.21 Determine empirical probabilities based on specific sample data. S.22 Determine, based on calculated probability of a set of events, if: some or all are equally likely to occur; one is more likely to occur than another; whether or not an event is certain to happen or not to happen		2.6		

Essential Question	**Content/Skills** (with **suggested** days instruction for each unit)	**Performance Indicators (Appendix B)**	**Common Core Standards (Appendix C)**	**Resources**	**Assessment (Appendix A)**	**Modifications to instruction (*see footnote)**
	Probability of Independent Events with Replacement o To determine probabilities based on specific data o To understand the probability of independent events.	S.21 Determine empirical probabilities based on specific sample data. S.23 Calculate the probability of: a series of independent events; a series of dependent events; 2 mutually exclusive events; 2 events that are not mutually exclusive.	S.CP.2	2.7		
	Probability of Two Dependent Events without Replacement o To understand the probability of dependent events. o To understand conditional probability	S.18 Know the definition of conditional probability and use it to solve for probabilities in finite sample spaces. S.23 Calculate the probability of: a series of independent events; a series of dependent events; 2 mutually exclusive events; 2 events that are not mutually exclusive.		2.7	**End Semester Test 10**	

*The modifications shown here are examples of the modifications that can be used to differentiate instruction. Individual lesson plans will provide more detailed differentiation

Appendix A: Grading Policy

Appendix B: Performance Indicators

Number Sense and Operations Strand

Number Theory

A.N.1 Identify and apply the properties of real numbers (closure, commutative, associative, distributive, identity, inverse)

Students will understand meanings of operations and procedures, and how they relate to one another.

Operations

A.N.2 Simplify radical terms (no variable in the radicand)

A.N.3 Perform the four arithmetic operations using like and unlike radical terms and express the result in simplest form

A.N.4 Understand and use scientific notation to compute products and quotients of numbers greater than 100%

A.N.5 Solve algebraic problems arising from situations that involve fractions, decimals, percents (decrease/increase and discount), and proportionality/direct variation

A.N.6 Evaluate expressions involving factorial(s), absolute value(s), and exponential expression(s)

A.N.7 Determine the number of possible events, using counting techniques or the Fundamental Principle of Counting

A.N.8 Determine the number of possible arrangements (permutations) of a list of items

Algebra Strand

Variables and Expressions

A.A.1 Translate a quantitative verbal phrase into an algebraic expression

A.A.2 Write verbal expressions that match given mathematical expressions

Equations and Inequalities

A.A.3 Distinguish the difference between an algebraic expression and an algebraic equation

A.A.4 Translate verbal sentences into mathematical equations or inequalities

A.A.5 Write algebraic equations or inequalities that represent a situation

A.A.6 Analyze and solve verbal problems whose solution requires solving a linear equation in one variable or linear inequality in one variable

A.A.7 Analyze and solve verbal problems whose solution requires solving systems of linear equations in two variables

A.A.8 Analyze and solve verbal problems that involve quadratic equations

A.A.9 Analyze and solve verbal problems that involve exponential growth and decay

A.A.10 Solve systems of equations in two variables algebraically (See A.G.7)

A.A. 11 Solve a system of one linear and one quadratic equation in two variables, where only factoring is required

Students will perform algebraic procedures accurately.

Variables and Expressions

A.A.12 Multiply and divide monomial expressions with a common base, using the properties of exponents

A.A.13 Add, subtract, and multiply monomials and polynomials

A.A.14 Divide a polynomial by a monomial or binomial, where the quotient has no remainder

A.A.15 Find values of a variable for which an algebraic fraction is undefined.
A.A.16 Simplify fractions with polynomials in the numerator and denominator by factoring both and renaming them to lowest terms
A.A.17 Add or subtract fractional expressions with monomial or like binomial denominators
A.A.18 Multiply and divide algebraic fractions and express the product or quotient in simplest form
A.A.19 Identify and factor the difference of two perfect squares
A.A.20 Factor algebraic expressions completely, including trinomials with a lead coefficient of one (after factoring a GCF)

Equations and Inequalities

A.A.21 Determine whether a given value is a solution to a given linear equation in one variable or linear inequality in one variable
A.A.22 Solve all types of linear equations in one variable
A.A.23 Solve literal equations for a given variable
A.A.24 Solve linear inequalities in one variable
A.A.25 Solve equations involving fractional expressions Note: Expressions, which result in linear equations in one variable.
A.A.26 Solve algebraic proportions in one variable, which result in linear or quadratic equations
A.A.27 Understand and apply the multiplication property of zero to solve quadratic equations with integral coefficients and integral roots
A.A.28 Understand the difference and connection between roots of a quadratic equation and factors of a quadratic expression

Students will recognize, use, and represent algebraically patterns, relations, and functions.

Patterns, Relations, and Functions

A.A.29 Use set-builder notation and/or interval notation to illustrate the elements of a set, given the elements in roster form
A.A.30 Find the complement of a subset of a given set, within a given universe
A.A.31 Find the intersection of sets (no more than three sets) and/or union of sets (no more than three sets)

Coordinate Geometry

A.A.32 Explain slope as a rate of change between dependent and independent variables
A.A.33 Determine the slope of a line, given the coordinates of two points on the line
A.A.34Write the equation of a line, given its slope and the coordinates of a point on the line
A.A.35 Write the equation of a line, given the coordinates of two points on the line
A.A.36 Write the equation of a line parallel to the x- or y-axis
A.A.37 Determine the slope of a line, given its equation in any form
A.A.38 Determine if two lines are parallel, given their equations in any form
A.A.39 Determine whether a given point is on a line, given the equation of the line
A.A.40 Determine whether a given point is in the solution set of a system of linear inequalities
A.A.41 Determine the vertex and axis of symmetry of a parabola, given its equation

Trigonometric Functions

A.A.42 Find the sine, cosine, and tangent ratios of an angle of a right triangle, given the lengths of the sides
A.A.43 Determine the measure of an angle of a right triangle, given the length of any two sides of the triangle
A.A.44 Find the measure of a side of a right triangle, given an acute angle and the length of another side
A.A.45 Determine the measure of a third side of a right triangle using the Pythagorean theorem, given the lengths of any two sides

Geometry Strand

Shapes

A.G.1 Find the area and/or perimeter of figures composed of polygons and circles or sectors of a circle
A.G.2 Use formulas to calculate volume and surface area of rectangular solids and cylinders

Students will apply coordinate geometry to analyze problem solving situations.

Coordinate Geometry

A.G.3 Determine when a relation is a function, by examining ordered pairs and inspecting graphs of relations

A.G.4 Identify and graph linear, quadratic (parabolic), absolute value, and exponential functions
A.G.5 Investigate and generalize how changing the coefficients of a function affects its graph
A.G.6 Graph linear inequalities
A.G.7 Graph and solve systems of linear equations and inequalities with rational coefficients in two variables (See A.A.10)
A.G.8 Find the roots of a parabolic function graphically Note: Only quadratic equations with integral solutions.
A.G.9 Solve systems of linear and quadratic equations graphically Note: Only use systems of linear and quadratic equations that lead to solutions whose coordinates are integers.
A.G.10 Determine the vertex and axis of symmetry of a parabola, given its graph (See A.A.41) Note: The vertex will have an ordered pair of integers and the axis of symmetry will have an integral value.

Measurement Strand

Units of Measurement

A.M.1 Calculate rates using appropriate units (e.g., rate of a space ship versus the rate of a snail)
A.M.2 Solve problems involving conversions within measurement systems, given the relationship between the units
Students will understand that all measurement contains error and be able to determine its significance.

Error and Magnitude

A.M.3 Calculate the relative error in measuring square and cubic units, when there is an error in the linear measure
A.M.2 Solve problems involving conversions within measurement systems, given the relationship between the units

Statistics and Probability Strand

Organization and Display of Data

A.S.1 Categorize data as qualitative or quantitative
A.S.2 Determine whether the data to be analyzed is univariate or bivariate
A.S.3 Determine when collected data or display of data may be biased
A.S.4 Compare and contrast the appropriateness of different measures of central tendency for a given data set
A.S.5 Construct a histogram, cumulative frequency histogram, and a box-and-whisker plot, given a set of data
A.S.6 Understand how the five statistical summary (minimum, maximum, and the three quartiles) is used to construct a box-and-whisker plot
A.S.7 Create a scatter plot of bivariate data
A.S.8 Construct manually a reasonable line of best fit for a scatter plot and determine the equation of that line

Analysis of Data

A.S.9 Analyze and interpret a frequency distribution table or histogram, a cumulative frequency distribution table or histogram, or a box-and-whisker plot
A.S.10 Evaluate published reports and graphs that are based on data by considering: experimental design, appropriateness of the data analysis, and the soundness of the conclusions
A.S.11 Find the percentile rank of an item in a data set and identify the point values for first, second, and third quartiles
A.S.12 Identify the relationship between the independent and dependent variables from a scatter plot (positive, negative, or none)
A.S.13 Understand the difference between correlation and causation
A.S.14 Identify variables that might have a correlation but not a causal relationship
Students will make predictions that are based upon data analysis.

Predictions from Data

A.S.15 Identify and describe sources of bias and its effect, drawing conclusions from data
A.S.16 Recognize how linear transformations of one-variable data affect the data's mean, median, mode, and range
A.S.17 Use a reasonable line of best fit to make a prediction involving interpolation or extrapolation
Students will understand and apply concepts of probability.

Probability

A.S.18 Know the definition of conditional probability and use it to solve for probabilities in finite sample spaces
A.S.19 Determine the number of elements in a sample space and the number of favorable events
A.S.20 Calculate the probability of an event and its complement
A.S.21 Determine empirical probabilities based on specific sample data
A.S.22 Determine, based on calculated probability of a set of events, if: some or all are equally likely to occur /one is more likely to occur than another
whether or not an event is certain to happen or not to happen
A.S.23 Calculate the probability of: a series of independent events /two mutually exclusive events
two events that are not mutually exclusive

Appendix C: Common Core State Standards

Table 1: Linking the CCSS to the Curriculum Map units

CCSS	Unit number	CCSS	Unit number	CCSS	Unit number	CCSS	Unit number
N.Q.1	1C, 3	**A.CED.4**	1B, 1C, 2B, 2C	**F.IF.5**	2A, 6A	**G.SRT.6**	4B
N.Q.2	1C	**A.REI.1**	1B, 1C, 1D	**F.IF.6**	1C, 2B	**G.SRT.7**	4B
N.Q.3	1C	**A.REI.3**	1B, 1C, 1D	**F.IF.7**	2B, 6A., 6B	**G.SRT.8**	4B
N.RN.2	1A	**A.REI.5**	2C	**F.IF.8**	6A, 6B	**S.CP.1**	7
N.RN.3	1A	**A.REI.6**	2C	**F.IF.9**	6A	**S.CP.2**	7
A.SSE.1	1A, 5A, 6B	**A.REI.7**	6A	**F.BF.1**	2A, 2B, 6B	**S.ID.1**	3
A.SSE.2	5A	**A.REI.10**	2B, 6A	**F.BF.3**	6A, 6B	**S.ID.2**	3
A.SSE.3	6A	**A.REI.11**	2C, 6B	**F.LE.1**	6B	**S.ID.3**	3
A.APR.1	5A	**A.REI.12**	2D	**F.LE.2**	3, 6B	**S.ID.6**	3
A.CED.1	1B, 1D, 2A, 6A, 6B	**F.IF.1**	2A	**F.LE.3**	6B	**S.ID.7**	3
A.CED.2	1B, 2A, 6A	**F.IF.2**	2A	**F.LE.5**	2B, 6B	**S.ID.9**	3
A.CED.3	1B, 1D, 2B	**F.IF.4**	2B, 6A	**G.GMD.3**	1A, 1C		

NUMBER AND QUANTITY
NRN The real number system
NQ Quantities
NCN The complex number system
NVM Vector & matrix quantities
ALGEBRA
ASSE Seeing Structure in Expressions
AAPR Arithmetic with Polynomials and Rational Expressions
ACED Creating Equations

GEOMETRY
GCO Congruence
GSRT Similarity Right Triangles & Trigonometry
GC Circles
GGPE Expressing Geometric Properties with Equations
GGMD Geometric Measurement and Dimension
GMG Modeling with Geometry
STATISTICS & PROBABILITY
SID Interpreting Categorical & Quantitative data

AREI Reasoning with Equations & Inequalities

FUNCTIONS

FIF Interpreting Functions
FBF Building Functions
FLE Linear, Quadratic & Exponential models
FTF Trigonometric Functions

SIC Making Inferences & Justifying Conclusions
SCP Conditional Probability & the Rules of Probability
SMD Using Probability to make decisions

Table 2: Details of the CCSS

Units	***Common Core State Standards Addressed***
Unit 1: Relationships between Quantities and reasoning with Equations and Inequalities	
1A: Number Theory and Operations	N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.
	A.SSE 1 Interpret expressions that represent a quantity in terms of its context.*
	N.RN.3 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.
1B: Solving Equations	A.CED 1 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.*
	A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
	A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*
	A.CED.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.*
	A.REI 1 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.
	A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
1C: Proportional Reasoning	N.Q 1 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.
	N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.
	N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
	A.CED.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.*
	A.REI 1 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.
	A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

	F.IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table: over a specified interval. Estimate the rate of change from a graph.*
1D: Solving Inequalities	A.CED 1 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.*
	A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*
	A.REI 1 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.
	A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
Unit 2: Linear Relationships	
2A: Relations and Functions	A.CED 1 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.*
	A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
	F.IF 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)*.
	F.IF.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
	F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.**
	F.BF 1 Write a function that describes a relationship between two quantities.* a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. 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.*
2B: Linear Relationships	A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
	A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*

	A.CED.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.*
	A.REI.l0 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).
	F.IF.4 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.***
	F.IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.*
	F.IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
	F.BF.3 Identify the effect on the graph of replacing *f(x)* by *f(x) + k, k f(x), f(kx),* and *f(x + k)* for specific values of *k* (both positive and negative); find the value of *k* given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
2C: Systems of Equations	A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
	A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*
	A.CED.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.*
	A.REI.5 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.
	A.REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
	A.REI.l0 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).
	A.REI 11 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.*

2D: Graphing Inequalities	A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*
	A.REI.l0 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).
	A.REI.l2 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.
Unit 3: Descriptive Statistics and Data Analysis	N.Q.1Use 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.
	F.LE.2 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).
	S.ID.1 Represent data with plots on the real number line (dot plots, histograms and box plots).
	S.ID.2 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.
	S.ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers)
	S.ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Uses given functions or choose a function suggested by the context. Emphasize linear and exponential models.* c. Fit a linear function for a scatter plot that suggests a linear association
	S.ID.7 Interpret the slope (rate of change): and the intercept (constant term): of a linear model in the context of the data.
	S.ID.9 Distinguish between correlation and causation.
Unit 4: Radicals and Right Triangle Relationships	
4A: Operations with Radicals	
4B: Pythagorean Theorem and Trigonometry	
	G.SRT.6 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
	G.SRT.7 Explain and use the relationship between the sine and cosine of complementary angles
	G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Unit 5: Polynomials	
5A: Operations with Polynomial Expressions	N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.
	A.SSE 1 Interpret expressions that represent a quantity in terms of its context.* a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret* $P(1+r)^n$ *as the product of P and a factor not depending on P.*
	A.SSE.2 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* $(x^2 - y^2)(x^2 + y^2)$.
	A.APR 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.
5B: Rational Expressions and Equations	A.CED 1 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*.
	A.SSE.2 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* $(x^2 - y^2)(x^2 + y^2)$.
Unit 6: Non- Linear Functions & Modeling	
6A: Quadratic Functions	**A.REI.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** $x^2 + y^2 = 3$**.**
	F.IF.4 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.**
	F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.**
	F.IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
	F.IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. 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.

	F.IF.9 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.*
	A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.* a. Factor a quadratic expression to reveal the zeros of the function it defines.
	A.CED 1 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*.
	A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
	F.BF.3 Identify the effect on the graph of replacing *f(x)* by *f(x) + k, k f(x), f(kx),* and *f(x + k)* for specific values of *k* (both positive and negative); find the value of *k* given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
6B: Other Non-Linear Functions	A.SSE 1 Interpret expressions that represent a quantity in terms of its context.* a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret* $P(1+r)^n$ *as the product of P and a factor not depending on P.*
	A.CED 1 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.*
	A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
	A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
	A.REI.l0 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).
	A.REI.11 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.*
	F.IF.4 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.**

	F.IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
	F.IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify <u>percent rate of change</u> in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*
	F.BF 1 Write a function that describes a relationship between two quantities.* a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. 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.*
	F.BF.3 Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
	F.LE 1 Distinguish between situations that can be modeled with linear functions and with exponential functions. a. Prove that linear functions grow by equal differences over equal intervals; and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
	F.LE.2 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).
	F.LE.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
	F.LE.5 Interpret the parameters in a linear or exponential function in terms of a context.
Unit 7: Counting methods and Probability	S.CP.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") S.CP.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.