Teacher: CORE Adv. Algebra/Trig | Year: 2010-11

Course: Adv. Algebra/Trig | Month: All Months

September

Equations and Inequalities

Essential Questions	Content	Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Order of operations	Evaluate expressions using order of operations					
	Properties of Real Numbers	Classify real numbers as rational, irrational, integers, wholes or naturals					

		Equations	Translate verbal expressions into algebraic expressions and equations and vice versa (including absolute value word problems) Solve one step and multi-step equations using the properties of equality (including the use of fractions)												
		Absolute Value Equations	Evaluate expressions using absolute values Solve absolute value equations resulting in one solution, two solutions or no solutions											A2.A.1- Solve absolute value equations and inequalities involving linear expressions in one variable	
		Inequalities	Solve and graph the solutions to one step and multi-												

		step inequalities (including the use of fractions)						
	Compound and Absolute Value Inequalities	Solve and graph the solutions to compound and absolute value inequalities						A2.A.1- Solve absolute value equations and inequalities involving linear expressions in one variable

Linear Relations and Functions

Essential Questions	Content	Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Domain and Range	State if a relation is a function, using the vertical line test Analyze a table, a mapping and/or a set of ordered pairs to determine if a relation is a function Determine the domain and range of a function from its graph (include linear,	function relation vertical line test Domain Range Quadrants				A2.A.38- Determine when a relation is a function A2.A.37 - Define a relation and function A2.A.52- Identify relations and functions, using graphs A2.A.51 - Determine the domain and range of a function from its graph

		quadratic, absolute value and conics) Define a relation and a function Translate a mapping into a list of ordered pairs						
	Relations and Functions	Determine the domain and range of a function from its equation Analyze a table, a graph, a mapping and/or a set of ordered pairs to determine if a relation is a one-to-one function, an onto function, neither or both Use the horizontal line test to determine if a function is one-to-one Evaluate a function using function notation	one-to-one horizontal line test independent variable dependent variable				Need to supplement A2A40	A2.A.39- Determine the domain and range of a function from its equation A2.A.40- Write functions in functional notation A2.A.43 - Determine if a function is one-to-one, onto, or both
	Linear Relations and Functions	Determine the x and y intercepts given a linear equation						

		Write an equation in standard form Determine if a function is linear												
	Rate of Change and Slope	Calculate the rate of change given two coordinates Find the slope given a graph Find the rate of change given a word problem	rate of change slope											
	Writing Linear Equations	Write an equation in slope-intercept form Write an equation using point-slope form												
	Scatter Plots and Lines of Regression	Use technology to find linear regression equations Use technology to find correlation coefficients Use a linear regression equation to make										A2.S.8 - Interpret within the linear regression model the value of the correlation coefficient as a measure of the strength of the relationship		

		predictions Determine a correlation coefficient when given a scatterplot						

October

Quadratic Functions and Relations

Essential Questions	Content	Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Graphing quadratic functions	Determine domain and range of a quadratic function Find the y-intercept, axis of symmetry and vertex of quadratic functions Determine if a quadratic function has a maximum or a minimum Explore transformations of quadratic functions					A2.A.39- Determine the domain and range of a function from its equation
	Solving Quadratic Equations by Graphing	Find the roots of quadratics by graphing Recognize the terms roots, solutions, zeros and x-intercepts are synonomous Use technology to calculate the exact roots of a quadratic					

		function Find solutions to a word problem that requires a student write and solve a quadratic function												
	FOIL and Factoring Polynomials	Multiply two binomials using the FOIL method Factor polynomials including GCF, difference of two squares, perfect square trinomials and general trinomials Factor by grouping												A2.A.7- Factor polynomial expressions completely, using any combination of the following techniques: common factor extraction, difference of two perfect squares, quadratic trinomials
	Solving Quadratic Equations by Factoring	Solve polynomial equations by factoring												A2.A.7- Factor polynomial expressions completely, using any combination of the following techniques: common factor extraction, difference of two perfect squares,

							quadratic trinomials
	Complex Numbers	Write square roots of negative numbers using the iumaginary unit i Simplify powers of i Determine the conjugate of a complex number Add, subtract, multiply and divide using imaginary and complex numbers Rationalize the denominator using the complex conjugate					A2.N.6-Write square roots of negative numbers in terms of i A2.N.7-Simplify powers of i A2.N.8 - Determine the conjugate of a complex number A2.N.9 - Perform arithmetic operations on complex numbers and write the answer in the form bi a + . Note: This includes simplifying expressions with complex denominators.
	Completing the Square	Write a trinomial as a perfect square trinomial then solve Solve trinomials by completing					A2.A.24 - Know and apply the technique of completing the square

		square (could include imaginary solutions)					
	The Quadratic Formula and the Discriminant	Describe nature of the roots after computatating the discriminant Solve quadratic equations using the quadratic formula					A2.A.2-Use the discriminant to determine the nature of the roots of a quadratic equation A2.A.25 - Solve quadratic equations, using the quadratic formula
	Sums and Products of Roots	Use the coefficients of a quadratic equation to determine the sum and product of the roots Write a quadratic equation when given the sum and product of the roots Write a quadratic equation when given two roots					A2.A.21 - Determine the quadratic equation, given the sum and product of its roots A2.A.20 - Determine the sum and product of the roots of a quadratic equation by examining its coefficients
	Quadratic Inequalities	Graph a quadratic					A2.A.4- Solve

			inequality and write the solution Solve and write solutions to quadratic inequalities					quadratic inequalities in one and two variables, algebraically and graphically

November

Polynomial and Polynomial Functions

Essential Questions	Content	Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Operations with Polynomials	Simplify expressions using the properties of exponents Simplify polynomial expressions using the properties of exponents					A2.A.8 - Apply the rules of exponents to simplify expressions involving negative and/or fractional exponents A2.A.9 - Rewrite algebraic expressions that contain negative exponents using only positive exponents
	Polynomial Functions	Evaluate functions given values in the domain (include constants and polynomial expressions)					A2.A.41 - Use functional notation to evaluate functions for given values in the domain
	Analyzing	Given a					A2.A.50 -

	Graphs of Polynomial Functions	graph of a higher degree function, locate its zero's by describing the two consecutive integers in which they lie Locate a function's relative max and min					Approximate the solution to polynomial equations of higher degree by inspecting the graph
	Regression Equations	Use technology to calculate quadratic, quartic and cubic regressions.					A2.S.7 - Determine the function for the regression model, using appropriate technology, and use the regression function to interpolate and extrapolate from the data
	Solving Polynomial Equations	Factor or use the quadratic formula to find solutions to polynomial equations of higher degree					A2.A.26 - Find the solution to polynomial equations of higher degree that can be solved using factoring and/or the quadratic

							formula

Inverses and Radical Functions and Relations

Essential Questions	Content	Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Operations on Functions	Find the composition of functions involving constants and polynomials.					A2.A.42 - Find the composition of functions
	Inverse Functions and Relations	Identify if two relations are inverses of each other by: 1) Graphically - reflection in the line y=x 2) Switching x and y in a table of values 3) Composition 4) Algebraically - interchange x and y and solve for y					A2.A.44 - Define the inverse of a function A2.A.45- Determine the inverse of a function and use composition to justify the result
	Square Root Functions and Transformations	State the domain and range Perform transformations with functions and relations: f(x+a) f(x) + a f(-x) -f(x) a f(x) Determine a parent function				Supplement Transformations	A2.A.41 -Use functional notation to evaluate functions for given values in the domain A2.A.46- Perform transformations with functions and relations:) (a x f + , a x f

		when given a graph. Utilizing that to identify transformations.					+) (,) (x f ? ,) (x f ? ,) (x af
	nth Roots	Simplify radical expressions (omit absolute values used in Glencoe)					A2.A.13- Simplify radical expressions
	Operations with Radical Expressions	Rationalize denominators, including using conjugates Add, subtract, multiply (include distribution) and divide radicals Simplifying quotients with an index other than two Identify the conjugate					A2.N.2- Perform arithmetic operations (addition, subtraction, multiplication, division) with expressions containing irrational numbers in radical form A2.N.4- Perform arithmetic operations on irrational expressions A2.N.5- Rationalize a denominator containing a radical expression A2.A.14 - Perform addition, subtraction, multiplication and division of radical expressions

							A2.A.15 - Rationalize denominators involving algebraic radical expressions
	Rational Exponents	Write algebraic expressions with fractional exponents as radical expressions, and vice versa Evaluate expressions with negative exponents Apply the rules of exponents to simplify Evaluate expressions with fractional exponents					A2.N.1- Evaluate numerical expressions with negative and/or fractional exponents, without the aid of a calculator (when the answers are rational numbers) A2.N.3- Perform arithmetic operations with polynomial expressions containing rational coefficients A2.A.8 - Apply the rules of exponents to simplify expressions involving negative and/or fractional exponents A2.A.10 -

								Rewrite algebraic expressions with fractional exponents as radical expressions A2.A.11 - Rewrite algebraic expressions in radical form as expressions with fractional exponents
		Solving Radical Equations	Solve radical equations Solve nth root equations, where n is greater than 2					A2.A.22 - Solve radical equations

December

Exponential and Logarithmic Functions and Relations

Essential Questions	Content	Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Graphing Exponential Functions	Graph exponential growth and exponential decay functions Identify the domain and range of exponential growth and exponential decay functions by					A2.A.39- Determine the domain and range of a function from its equation A2.A.53 - Graph exponential functions of the form x b y = for

		using its equation Identify the domain and range of exponential growth and exponential decay functions by using its graph Identify an exponential function as either growth or decay Identify asymptotes of an exponential graph					positive values of b, including e b = A2.A.51 - Determine the domain and range of a function from its graph
	Solving Exponential Equations	Rewrite exponential equations with common bases, and then solve Evaluate exponential expressions, including compund interest Evaluate exponential functions with base e					A2.A.27- Solve exponential equations with and without common bases A2.A.12 - Evaluate exponential expressions, including those with base e
	Logaritms and Logarithmic Functions	Write a logarithm equation in base exponent form					A2.A.54 - Graph logarithmic functions, using the inverse of

			Write a base exponent equation in log form Graph a log function and its inverse Evaluate log expressions					the related exponential function A2.A.28- Solve a logarithmic equation by rewriting as an exponential equation A2.A.18 - Evaluate logarithmic expressions in any base
		Graphing Technology Lab: Choosing the Best Model	Determine from a scatter plot whether a linear, logarithmic, exponential, or power regression model is most appropriate (supplement with JMAP multiple choice questions) Determine the function for the regression model, using appropriate technology, and use the regression function to interpolate					A2.S.6- Determine from a scatter plot whether a linear, logarithmic, exponential, or power regression model is most appropriate A2.S.7 - Determine the function for the regression model, using appropriate technology, and use the regression function to interpolate and extrapolate from the

		and extrapolate from te data					data
	Solving Logarithmic Equations	Solve log equations when given logs of the same base on both sides of the equal sign Solve log equations by first re-writing in base exponent form					A2.A.28- Solve a logarithmic equation by rewriting as an exponential equation A2.A.18 - Evaluate logarithmic expressions in any base A2.A.19 - Apply the properties of logarithms to rewrite logarithmic expressions in equivalent forms
	Properties of Logarithms	Rewrite log expressions using the product, quotient and power properties Solve log expressions using the product, quotient and power properties					A2.A.18 - Evaluate logarithmic expressions in any base A2.A.19 - Apply the properties of logarithms to rewrite logarithmic expressions in equivalent forms

							A2.A.28- Solve a logarithmic equation by rewriting as an exponential equation
	Common Logarithms	Solve an application which results in an exponential function, both graphically and algebraically (supplement with JMAP A2A6) Solve an exponential equation that has the variable as the exponent by taking the log of both sides Recognize that a common log has a base of 10 Evaluate logarithms using the change of base formula					A2.A.6- Solve an application which results in an exponential function A2.A.28- Solve a logarithmic equation by rewriting as an exponential equation A2.A.18 - Evaluate logarithmic expressions in any base A2.A.19 - Apply the properties of logarithms to rewrite logarithmic expressions in equivalent forms
	Base e and Natural Logarithms	Recognize e as an irraional number					A2.A.12 - Evaluate exponential expressions,

			Use e as the base of a natural log Write an exponential equation with base e in natural logarithm equation form Write a natural logarithm equation in base exponent form Solve, evaluate, and or simplify natural logs using the properties of logarithms Solve compund interest equations					including those with base e A2.A.18 - Evaluate logarithmic expressions in any base A2.A.19 - Apply the properties of logarithms to rewrite logarithmic expressions in equivalent forms A2.A.53 - Graph exponential functions of the form x b y = for positive values of b, including e b =

January

Rational Functions and Relations

Essential Questions	Content	Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Multiplying and Dividing Rational Expressions	Multiply and divide rational expressions Identify when a rational expression is undefined Simplify					A2.A.16 - Perform arithmetic operations with rational expressions and rename to lowest terms

		complex fractions that involve a single fraction in the numerator, and a single fraction in the denominator						A2.A.17 - Simplify complex fractional expressions
	Adding and Subtracting Rational Expressions		Add and subtract rational expressions, including monomial and polynomial denominators Simplify complex fractions that involve adding/subtracting in the numerator and denominator					A2.A.16 - Perform arithmetic operations with rational expressions and rename to lowest terms A2.A.17 - Simplify complex fractional expressions
	Variation Functions	Use direct and inverse variation to solve for unknown values Use joint and combined variation to solve for unknown values	Direct Variation Inverse Variation					A2.A.5- Use direct and inverse variation to solve for unknown values
	Solving Rational Equations and Inequalities	Solve rational equations and inequalities Reject extraneous						A2.A.23 - Solve rational equations and inequalities

		solutions						

February

Conic Sections

Essential Questions	Content	Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Calculating Midpoint and Distance Parabolas Ellipses Hyperbolas	Calculate midpoint and distance Recognize the equation for parabolas, ellipses and hyperbolas Graph an ellipse and a hyperbola					
	Circles	Determine the domain and range of a circle (both by looking at its equation and its graph) Determine the center-radius form for the equation of a circle in standard form by completing the square Write the equation of a circle (1) when given its graph,					A2.A.39- Determine the domain and range of a function from its equation A2.A.47 - Determine the center-radius form for the equation of a circle in standard form A2.A.48 - Write the equation of a circle, given its center and a point on the

		(2) it's center and a point on a cirlce, (3) given the endpoints of its diameter					circle A2.A.49 - Write the equation of a circle from its graph A2.A.51 - Determine the domain and range of a function from its graph
	Solving Quadratic Systems	Algebraically solve a quadratic/linear system					A2.A.3- Solve systems of equations involving one linear equation and one quadratic equation algebraically Note: This includes rational equations that result in linear equations with extraneous roots.

Sequences and Series

Essential Questions	Content	Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Arithmetic & Geometric Sequences	Classify a sequence as arithmetic or geometric Find the formula for the nth term of					A2.A.29 - Identify an arithmetic or geometric

			an arithmetic or geometric sequence Determine the common difference in an arithmetic sequence Determine the common ratio in a geometric sequence Calculate a specified term of an aritmetic or geometric sequence					sequence and find the formula for its nth term A2.A.30 - Determine the common difference in an arithmetic sequence A2.A.31 - Determine the common ratio in a geometric sequence A2.A.32- Determine a specified term of an arithmetic or geometric sequence
	Arithmetic & Geometric Series	Recognize that a series is the sum of the terms of a sequence Write a series in sigma notation Determine the sum of the first n terms of an arithmetic or						A2.A.34 - Represent the sum of a series, using sigma notation A2.A.35- Determine the sum of the first n terms of an arithmetic or geometric series A2.N.10 -

			geometric series Know and apply sigma notation (include doing so on the Nspire)					Know and apply sigma notation
		Recursive Formulas	Introduce the Fibonacci Sequence Specify terms of a sequence, given its recursive definition Write recursive formulas					A2.A.33- Specify terms of a sequence, given its recursive definition
		The Binomial Theorem	Apply the binomial theorem to expand a binomial Determine a specific term of a binomial expansion					A2.A.34 - Represent the sum of a series, using sigma notation A2.A.36- Apply the binomial theorem to expand a binomial and determine a specific term of a binomial expansion

March

Probability and Statistics

Essential Questions	Content	Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Permutations	Determine if a					A2.S.9 -

		and Combinations	situation requires a permutation or a combination Calcualte the number of permutations Calcualte the number of combinations Use permutations, combinations and the multiplication counting principal to determine the number of elements in a sample space and a specific subset					Differentiate between situations requiring permutations and those requiring combinations A2.S.10- Calculate the number of possible permutations) (r n P of n items taken r at a time A2.S.11 - Calculate the number of possible combinations) (r nC of n items taken r at a time A2.S.12 -Use permutations, combinations, and the Fundamental Principle of Counting to determine the number of elements in a sample space and a specific subset (event)
		Experiments, Surveys and Observational Studies	Classify a situation as a survey, an observation or a controlled experiment					A2.S.1 - Understand the differences among various kinds of

		Determine if a survey is biased, and identify the factors that may cause the bias Classify a factor as a correlation or a causation					studies (e.g., survey, observation, controlled experiment) A2.S.2 - Determine factors which may affect the outcome of a survey
	Statistical Analysis	Calculate measures of central tendancy (using technology) when given a list of data, and a table that includes a frequency column Calculate measures of dispersion (range, quartiles, inter quartile range, standard deviation and variance) for both samples and populations					A2.S.3 - Calculate measures of central tendency with group of Data frequency distributions A2.S.4- Calculate measures of dispersion (range, quartiles, interquartile range, standard deviation, variance) for both samples and populations
	Conditional Probability	Calculate conditional probabilities					
	Probability	Calculate					A2.S.13 -

	Distribution	theoretical probabilities (include "or" means to add, "and" means to multiply) Use given data to calculate empirical probabilities					Calculate theoretical probabilities, including geometric applications A2.S.14 - Calculate empirical probabilities
	The Normal Distribution	Use the reference table to apply the characteristics of the normal distribution					A2.S.4- Calculate measures of dispersion (range, quartiles, interquartile range, standard deviation, variance) for both samples and populations A2.S.5 - Know and apply the characteristics of the normal distribution
	Binomial Distribution	Given events involving terms exactly, at least and at most, apply the binomial probability formula. Understand that the larger the sample (n > 50), the more likely					A2.S.15 - Know and apply the binomial probability formula to events involving the terms exactly, at least, and at most A2.S.16 -Use the normal

			the data will reflect the characteristics of the normal curve					distribution as an approximation for binomial probabilities

April

Trigonometric Functions

Essential Questions	Content	Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Trig Functions in Right Triangles						
	Angles and Angle Measure						
	Geometry Lab: Areas of Parallelograms						
	Trig Functions of General Angles						
	Law of Sines						
	Law of Cosines						
	Circular Functions						
	Graphing Trig Functions						
	Translations of Trig Graphs						
	Inverse Trig Functions						

May

Trigonometric Identities and Equations

Essential	Content	Skills	Vocabulary	Assessments	Lessons	Resources	Standards

	Questions								
		Trig Identities							
		Verifying Trig Identities							
		Sum and Difference of Angles Identities							
		Double-Angle and Half-Angle Identities							
		Solving Trig Equations							
June	Course Review								
	Essential Questions	Content	Skills	Vocabulary	Assessments	Lessons	Resources	Standards	