Course Title: Honors Algebra II
Board Approval Date: 02/18/14
Credit / Hours: 1 credit
Reviewed Annually

Course Description: (Teacher Recommendation Required)

This course focuses on mastery of the PA Core Standards for mathematics. Algebra II Honors is a second year study of the concept and structure of Algebra. The course is taught at an accelerated pace so that participating students fulfill in one year the content requirements of the one year Algebra II course and the one half year Algebra III course. The Algebra II Honors student will further investigate several Algebra I topics including the expansion of the real number system, polynomials, factoring, and linear equations. Students will also study new topics including linear functions, relations, irrational and complex numbers, quadratic equations, relations and functions, variation, real number exponents, logarithms, conic sections, sequences, series, and binomial expansion.
*Students will need a TI-89 graphing calculator for this course.

Learning Activities / Modes of Assessment:

Large group instruction	Tests and Quizzes
Experiments	Teacher Observation
Small group work	Projects
Calculator activities	Learning Logs

Instructional Resources:

Algebra 2: Prentice Hall Mathematics (2004)

Course Pacing Guide

Course: **Honors Algebra II**	
Course Unit (Topic)	**Length of Instruction (Days/Periods)**
1. Algebra I Review	20 days
2. Quadratic Expressions, Functions, and Equations	25 days
3. Radical Expressions, Functions, and Equations	30 days
4. Exponential and Logarithmic Expressions, Functions, and Equations	25 days
5. Rational Expressions, Functions, and Equations	25 days
6. Sequences and Series	10 days
7. Probability and Statistics	15 days
8. Conic Sections	<u>15 days</u>
DAYS TOTAL	165 days

Topic: 1 Algebra I Review   Days: 20

Subject(s):   Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
Graphing lines Writing the equation of a line Solving systems of linear equations/inequalities Graphing absolute value equations/inequalities	Review Algebraic concepts of single-variable expressions and equations using the order of operations, sets of real numbers and the properties of real numbers.	CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context. CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations. CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities. CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverse of functions. CC.2.2.HS.C.5 Construct and compare linear, quadratic, and exponential models to solve problems. CC.2.2.HS.C.6 Interpret functions in terms of the situations they model. CC.2.1.HS.F.2 - Apply properties of rational and irrational numbers to solve real world or mathematical problems. CC.2.1.HS.F.3 - Apply quantitative reasoning to choose and Interpret units and scales in formulas, graphs and data displays. CC.2.2.HS.D.2 - Write expressions in equivalent forms to solve problems. CC.2.2.HS.D.7 - Create and graph equations or inequalities to describe numbers or relationships. CC.2.2.HS.D.8 - Apply inverse operations to solve equations or formulas for a given variable. CC.2.2.HS.D.9 - Use reasoning to solve equations and justify the solution method. CC.2.2.HS.D.10 - Represent, solve and interpret equations/inequalities and systems of equations/

Topic: 1 Algebra I Review

Days: 20

Subject(s):

Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
		inequalities algebraically and graphically. CC.2.4.HS.B.3 - Analyze linear models to make interpretations based on the data. CC.2.4.HS.B.1 - Summarize, represent, and interpret data on a single count or measurement variable.

Topic: 2 Quadratic Expressions, Functions, and Equations

Days: 25

Subject(s):

Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
Vertex of a Parabola Axis of Symmetry Translations Standard Form of a Quadratic Vertex Form of a Quadratic Factoring Quadratics Complex Numbers Completing the Square Quadratic Formula	Quadratic functions represent a family of curves with complex solutions. Quadratic equations can be solved using a variety of techniques.	CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context. CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations. CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities. CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverse of functions. CC.2.2.HS.C.5 Construct and compare linear, quadratic, and exponential models to solve problems. CC.2.2.HS.C.6 Interpret functions in terms of the situations they model. CC.2.1.HS.F.6 - Extend the knowledge of arithmetic operations and apply to complex numbers. CC.2.1.HS.F.7 - Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems. CC.2.2.HS.D.4 - Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs. CC.2.2.HS.D.3 - Extend the knowledge of arithmetic operations and apply to polynomials. CC.2.2.HS.D.5 - Use polynomial identities to solve problems. CC.2.2.HS.D.7 - Create and graph equations or inequalities to describe numbers or relationships. CC.2.1.HS.F.1 - Apply and extend the properties of exponents to solve problems with rational exponents. CC.2.1.HS.F.2 - Apply properties of rational and irrational numbers to solve real world or mathematical problems. CC.2.1.HS.F.3 - Apply quantitative reasoning to choose and Interpret units and scales in formulas, graphs and data displays. CC.2.1.HS.F.4 - Use units as a way to understand problems and to guide the solution of multi-step problems.

Topic: 2 Quadratic Expressions, Functions, and Equations

Days: 25

Subject(s):

Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
		CC.2.1.HS.F.5 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
		CC.2.2.HS.D.2 - Write expressions in equivalent forms to solve problems.
		CC.2.2.HS.D.1 - Interpret the structure of expressions to represent a quantity in terms of its context.
		CC.2.2.HS.D.8 - Apply inverse operations to solve equations or formulas for a given variable.
		CC.2.2.HS.D.9 - Use reasoning to solve equations and justify the solution method.
		CC.2.2.HS.D.10 - Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.
		CC.2.4.HS.B.2 - Summarize, represent, and interpret data on two categorical and quantitative variables.

Topic: 3 Radical Expressions, Functions, and Equations

Subject(s):

Days: 30

Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
Rational Exponents Radical Expressions Conjugate Radical Equations Extraneous Solutions Inverse Relations Graphing Radical Functions	Radical functions represent a family of curves. Radical equations can be solved using a variety of techniques.	CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context. CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations. CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities. CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverse of functions. CC.2.2.HS.C.6 Interpret functions in terms of the situations they model. CC.2.1.HS.F.6 - Extend the knowledge of arithmetic operations and apply to complex numbers. CC.2.1.HS.F.1 - Apply and extend the properties of exponents to solve problems with rational exponents. CC.2.1.HS.F.2 - Apply properties of rational and irrational numbers to solve real world or mathematical problems. CC.2.1.HS.F.3 - Apply quantitative reasoning to choose and Interpret units and scales in formulas, graphs and data displays. CC.2.1.HS.F.4 - Use units as a way to understand problems and to guide the solution of multi-step problems. CC.2.1.HS.F.5 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. CC.2.2.HS.D.1 - Interpret the structure of expressions to represent a quantity in terms of its context. CC.2.2.HS.D.2 - Write expressions in equivalent forms to solve problems. CC.2.2.HS.D.7 - Create and graph equations or inequalities to describe numbers or relationships. CC.2.2.HS.D.8 - Apply inverse operations to solve equations or formulas for a given variable. CC.2.2.HS.D.9 - Use reasoning to solve equations and justify the solution method.

Topic: 4 Exponential and Logarithmic Expressions, Functions, and Equations

Subject(s):

Days: 25

Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
Regression Modeling Growth Factor Decay Factor Asymptote Exponential Function/ Equation Logarithmic Function/ Equation Properties of Logarithms Natural Logarithm The number e	Logarithmic and exponential functions can be used to model real-life applications. Logarithmic and Exponential Equations can be solved using various techniques.	CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context. CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations. CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities. CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverse of functions. CC.2.2.HS.C.5 Construct and compare linear, quadratic, and exponential models to solve problems. CC.2.2.HS.C.6 Interpret functions in terms of the situations they model. CC.2.1.HS.F.1 - Apply and extend the properties of exponents to solve problems with rational exponents. CC.2.1.HS.F.2 - Apply properties of rational and irrational numbers to solve real world or mathematical problems. CC.2.1.HS.F.3 - Apply quantitative reasoning to choose and Interpret units and scales in formulas, graphs and data displays. CC.2.1.HS.F.4 - Use units as a way to understand problems and to guide the solution of multi-step problems. CC.2.1.HS.F.5 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. CC.2.2.HS.D.2 - Write expressions in equivalent forms to solve problems. CC.2.2.HS.D.7 - Create and graph equations or inequalities to describe numbers or relationships. CC.2.2.HS.D.8 - Apply inverse operations to solve equations or formulas for a given variable. CC.2.2.HS.D.9 - Use reasoning to solve equations and justify the solution method. CC.2.2.HS.D.10 - Represent, solve and interpret equations/inequalities and systems of equations/ inequalities algebraically and graphically.

Topic: 4 Exponential and Logarithmic Expressions, Functions, and Equations

Subject(s):

Days: 25

Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
		CC.2.4.HS.B.2 - Summarize, represent, and interpret data on two categorical and quantitative variables. CC.2.4.HS.B.5 - Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.

Topic: 5 Rational Expressions, Functions, and Equations

Subject(s):

Days: 25

Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
Inverse Proportion Asymptotes Simplifying Rational Expressions Extraneous Solutions Solving Rational Equations	Rational Expressions can be used to model real-world situations. Rational Equations can be solved using various techniques.	CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context. CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations. CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities. CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverse of functions. CC.2.2.HS.C.6 Interpret functions in terms of the situations they model. CC.2.1.HS.F.2 - Apply properties of rational and irrational numbers to solve real world or mathematical problems. CC.2.1.HS.F.3 - Apply quantitative reasoning to choose and Interpret units and scales in formulas, graphs and data displays. CC.2.1.HS.F.4 - Use units as a way to understand problems and to guide the solution of multi-step problems. CC.2.1.HS.F.5 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. CC.2.2.HS.D.2 - Write expressions in equivalent forms to solve problems. CC.2.2.HS.D.4 - Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs. CC.2.2.HS.D.5 - Use polynomial identities to solve problems. CC.2.2.HS.D.6 - Extend the knowledge of rational functions to rewrite in equivalent forms. CC.2.2.HS.D.7 - Create and graph equations or inequalities to describe numbers or relationships. CC.2.2.HS.D.8 - Apply inverse operations to solve equations or formulas for a given variable. CC.2.2.HS.D.9 - Use reasoning to solve equations and justify the solution method. CC.2.4.HS.B.2 - Summarize, represent, and interpret data on two categorical and quantitative variables.

Topic: 6 Sequences and Series

Subject(s):

Days: 10

Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
Arithmetic Sequence/ Series Geometric Sequence/ Series Common Difference Common Ratio nth term	There are different types of sequences and series that can be used in a variety of situations. Formulas can be applied to more quickly find particular terms of a sequence and sums of various series.	CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities. CC.2.1.HS.F.1 - Apply and extend the properties of exponents to solve problems with rational exponents. CC.2.1.HS.F.2 - Apply properties of rational and irrational numbers to solve real world or mathematical problems. CC.2.1.HS.F.6 - Extend the knowledge of arithmetic operations and apply to complex numbers. CC.2.2.HS.D.1 - Interpret the structure of expressions to represent a quantity in terms of its context. CC.2.2.HS.D.3 - Extend the knowledge of arithmetic operations and apply to polynomials. CC.2.4.HS.B.3 - Analyze linear models to make interpretations based on the data.

Topic: 7 Probability and Statistics

Days: 15

Subject(s):

Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
probability odds combination permutation independent events dependent events	There are many ways to determine the number of possible outcomes of an event. Probability and Odds can be used to determine the likelihood of an outcome of an event.	CC.2.4.HS.B.4 - Recognize and evaluate random processes underlying statistical experiments. CC.2.4.HS.B.5 - Make inferences and justify conclusions based on sample surveys, experiments, and observational studies. CC.2.4.HS.B.6 - Use the concepts of independence and conditional probability to interpret data. CC.2.4.HS.B.7 - Apply the rules of probability to compute probabilities of compound events in a uniform probability model.

Topic: 8 Conic Sections

Subject(s):

Days: 15

Grade(s):

Know:	Understand:	Do:
Circle Ellipse Parabola Hyperbola	The conic sections can be quickly graphed by learning their equations. Given the characteristics of the graph of a conic section, its equation can be developed.	CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context. CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations. CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities. CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverse of functions. CC.2.2.HS.C.6 Interpret functions in terms of the situations they model. CC.2.2.HS.D.1 - Interpret the structure of expressions to represent a quantity in terms of its context. CC.2.2.HS.D.2 - Write expressions in equivalent forms to solve problems. CC.2.2.HS.D.7 - Create and graph equations or inequalities to describe numbers or relationships. CC.2.3.HS.A.10 - Translate between the geometric description and the equation for a conic section. CC.2.3.HS.A.1 - Use geometric figures and their properties to represent transformations in the plane.