Algebra II Honors

GOALS: Students will develop skills and understanding in:

1. The basic concepts of Algebra.
2. The properties of functions and relations.
3. Solving linear equations.
4. Solving systems of linear equations and inequalities by graphing, substitution, linear combination, and matrices.
5. Solving quadratic equations by square roots, graphing, completing the square, and the quadratic formula.
6. The properties of exponential and logarithmic functions.
7. Graphing and exploring rational algebraic functions and equations.
8. The fifth operation of Algebra, taking n^{th} roots.
9. Quadratic relations and systems.
10. Properties of trigonometric and circular functions.

Goal 1. The basic concepts of algebra (Objective numbers refer to *Algebra and Trigonometry-Functions and Applications*, Paul A Foerster)

OBJECTIVES: Students will be able to:

1.1 Identify, classify, and order real numbers using the number line.
1.2 Use the field axioms.
1.3 Evaluate algebraic expressions.
1.4 Solve a linear equation.
1.5 Solve a simple and compound inequality.
1.6 Solve absolute value equations and inequalities.

Goal 2. The properties of functions and relations:

OBJECTIVES: Students will be able to:

2.1 Sketch a graph of a function.
2.2 Given a set of data, sketch a reasonable graph.
2.3 Identify graphs of functions and relations.

Goal 3. Solving linear equations:

OBJECTIVES: Students will be able to:

3.1 Sketch a graph using a table of values
3.2 Write the equation of a line in slope-intercept form, point slope form, intercept form, standard form..
3.3 Use linear functions as mathematical models to predict real world values.

Goal 4. Solving systems of linear equations and inequalities by graphing, substitution, linear combination, and matrices:

OBJECTIVES: Students will be able to:

4.1. Graph and solve a system of linear equations.
4.2. Solve a linear system by algebraic methods.
4.3. Organize data into a matrix and find the determinant.
4.4. Use Cramer's Rule to solve a linear system.
4.5. Write and use linear systems to model real-life problems.
4.6. Graph a system of linear inequalities to find the solution to the system.
4.7. Solve a linear programming problem.
4.8. Solve a system of linear equations in three variables algebraically and by Cramer's Rule.

Goal 5. Solving quadratic equations by square roots, graphing, completing the square, and the quadratic formula:

OBJECTIVES: Students will be able to:

5.1 Solve a quadratic equation by find the square root.
5.2 Calculate the location of the vertex, and use this information to sketch a graph of a quadratic function.
5.3 Solve a quadratic equation by completing the square.
5.4 Use the quadratic formula to solve quadratic equations.
5.5 Identify, add, subtract, multiply and divide complex numbers.
5.6 Solve quadratic equations including those having complex solutions.
5.7 Use the general quadratic and linear functions as mathematical models for real world situations.

Goal 6. The properties of exponential and logarithmic functions:

OBJECTIVES: Students will be able to:

6.1 Use properties of exponents to evaluate and simplify exponential expressions.
6.2 Evaluate nth roots of real numbers using radical notation and rational exponent notation.
6.3 Use the properties of roots to evaluate and simplify expressions containing radicals and rational exponents.
6.4 Solve equations that include radicals and rational expressions.
6.5 Given an equation of a function, find its inverse and graph the function and the inverse.
6.6 Graph exponential functions and evaluate exponential expressions.
6.7 Transform numbers to and from scientific notation.
6.8 Evaluate logarithmic expressions and graph logarithmic functions.
6.9 Use properties of logarithms.
6.10 Given a real world situation relating two variables, use an exponential, linear or quadratic function as a mathematical model.

Goal 7. Graphing and exploring rational algebraic functions

OBJECTIVES: Students will be able to:

7.1 Graph a rational function using asymptotes. (7.1,7.2)
7.2 Add, subtract and multiply polynomials.
7.3 Factor polynomial expressions and equations.
7.4 Divide polynomials using long division and synthetic division and relate the quotient to the Remainder Theorem and the Factor Theorem.
7.5 Find the rational zeroes of a polynomial function.
7.6 Multiply and divide rational expressions.
7.7 Solve equations that contain rational expressions.
7.8 Add and subtract rational expressions and simplify complex fractions.
7.9 Divide a rational expression into partial fractions.
7.10 Use joint and inverse variation as reasonable mathematical models for real world situations. (7.11)

Goal 8. The fifth operation of Algebra, taking the nth root

OBJECTIVES: Students will be able to:

10.1 Plot the graph of an irrational algebraic function.(8.2)
10.2 Simplify expressions containing radicals.(8.3)
10.3 Find the solution set of a radical equation discarding extraneous roots.(8.4)

10.4 Solve variation problems with non integer exponents and with more than two variables using real world models.(8.5,8.6)
10.5 Find the solution set of equations with imaginary solutions.(10.1, 10.2)

Goal 9. Quadratic relations and systems

OBJECTIVES: Students will be able to:

9.1 Write the equation of a circle and sketch its graph.
9.2 Write the equation of an ellipse and sketch its graph.
9.3 Write the equation of a hyperbola and sketch its graph using asymptotes.
9.4 Write the equation of a parabola and sketch its graph.
9.5 Given the geometrical definition of a set of points, derive an equation relating x and y identifying the graph as a circle, ellipse, hyperbola or parabola.
9.6 Classify a conic section from its equation.
9.7 Graph and algebraically solve a system of quadratic equations.

Goal 10. Evaluating trigonometric functions:

OBJECTIVES: Students will be able to:

10.1 Use trigonometric relationships to evaluate the trigonometric functions of acute angles.
10.2 Measure angles in standard position using degree measure and radian measure.
10.3 Evaluate trigonometric functions of any angle.
10.4 Evaluate inverse trigonometric functions.
10.5 Sketch the graphs of the six trigonometric functions.
10.6 Graph vertical and horizontal shifts and reflections of the graphs of the sine and cosine functions.
10.7 Use trigonometric identities to simplify trigonometric expressions and verify the identities.
10.8 Solve trigonometric equations.
10.9 Use the sum and difference formulas to evaluate trigonometric functions of the sum or difference.
10.10 Use double or half angle formulas.
10.11 Given a real world relationship in which variables vary sinusoidally, derive an equation and use it as a mathematical model.
10.12 Draw the graphs of the inverse trigonometric functions.
10.13 Simplify and evaluate inverse trigonometric expressions.