

Upon completion of Algebra Academic Pre-Calculus with Trigonometry, students will be able to:

## A. Linear Functions and Models

1. Midpoint formula
2. Distance formula
3. Linear functions
  - a. definition
  - b. graphs
  - c. slopes
4. Linear models
  - a. writing equations for lines
  - b. line of best fit
5. Solving systems algebraically and demonstrate graphically

## B. Polynomial Functions and Models

1. Quadratic functions
  - a. definition
  - b. evaluating quadratic functions
  - c. graphs of quadratic functions
2. Solving quadratic equations
  - a. real and complex solutions - using the discriminant
  - b. solving by factoring
  - c. solving by using the quadratic formula
  - d. solving by completing the square
  - e. using substitution to solve equations in quadratic form
  - f. solving by using graphing technology
  - g. rational root theorem
  - h. writing equations from zeros
3. Modeling data with quadratic equations
4. Complex numbers
  - a. definition
  - b. simplifying square roots of negative numbers
  - c. operations with complex numbers
    - 1) addition
    - 2) subtraction
    - 3) multiplication
    - 4) division

## C. Equations and Inequalities

1. Logic underlying the solving of inequalities
2. Solving inequalities with technology
3. Test point method to solve inequalities
4. Solving quadratic inequalities
5. Solving absolute value equations and inequalities
6. Solving systems of inequalities
  - a. linear
  - b. non-linear
7. Linear programming

#### **D. Operations with Functions**

1. Graphing functions
  - a. definition of a function
  - b. using an automatic grapher
2. Features of functions
  - a. domain and range
  - b. one-to-one functions
  - c. evaluating for specific values
  - d. zeros
  - e. symmetry - even or odd functions
  - f. periodicity
  - g. intervals where positive or negative
3. Analyzing classes of functions, including their graphs
  - a. polynomial functions
  - b. exponential functions
  - c. logarithmic functions
  - d. power functions
  - e. rational functions
  - f. absolute value functions
  - g. greatest integer function
4. Transformations and graphs of functions
  - a. translations of parent graphs
  - b. scale changes of parent graphs
  - c. writing functions given transformations
5. Inverses of functions
  - a. graphs of functions and their inverses and noting they are reflection images over  $y = x$
  - b. proofs that two functions are inverses
  - c. writing an inverse function/equation

6. Arithmetic operations on functions
  - a. addition of functions
  - b. subtraction of functions
  - c. multiplication of functions
  - d. division of functions
7. Composition of functions
8. Graphing the sum and difference of functions using addition and subtraction of ordinates

## **E. Power, Exponential, and Logarithmic Functions and Models**

1. Nth root functions
  - a. definition
  - b. radical notation and rational exponent notation
  - c. evaluating nth roots
  - d. graphs of nth root functions
2. Power functions
  - a. evaluating  $b^{m/n}$  for  $b > 0$
  - b. integer power functions
  - c. rational power functions
  - d. graphs of power functions
3. Exponential functions
  - a. definition
  - b. evaluating exponential functions
  - c. graphs of exponential functions
4. Logarithmic functions
  - a. definition
  - b. evaluating logarithmic functions
  - c. natural logarithmic functions
  - d. common logarithmic functions
  - e. properties of logarithms
  - f. graphs of logarithmic functions
5. Solving exponential equations
6. Solving logarithmic equations
7. Modeling data
  - a. with power functions
  - b. with exponential functions
  - c. with logarithmic functions
  - d. choosing the most appropriate model for a given set of data

## **F. Quadratic Relations**

1. Circle
  - a. distance definition
  - b. equation in standard form
  - c. identify
    - 1) center
    - 2) radius
  - d. semicircles
  - e. graph equations and inequalities
2. Ellipse
  - a. distance definition
  - b. equation in "h-k" form
  - c. identify
    - 1) major/minor axes
    - 2) vertices/intercepts
  - d. graph equations and inequalities
3. Parabola
  - a. distance definition
  - b. equation in standard form
  - c. identify
    - 1) vertex
    - 2) axis of symmetry
    - 3) focus
    - 4) directrix
  - d. graph equations and inequalities
4. Hyperbola
  - a. distance definition
  - b. equation in "h-k" form
  - c. identify
    - 1) vertices
    - 2) major axis
    - 3) foci
    - 4) asymptotes
  - d. graph equation and inequalities
5. Translation in the plan
6. Solving systems of equations and inequalities
  - a. quadratic-linear
  - b. quadratic-quadratic
7. Analytic geometry proofs (as time permits)