

ALGEBRA 2

Course Description

Algebra 2 will focus on linear, quadratic, polynomial, rational, radical, logarithmic, and exponential equations and inequalities. Students will learn how to solve, graph, and analyze transformations for each type of equation or inequality. Algebra 2 students will also be introduced to trigonometric functions, conic sections and arithmetic & geometric sequences and series. The study of statistics and probability will include statistical graphs and computations, the normal distribution, and advanced probability techniques. A Semester 1 Final Exam is given following the completion of the units on Linear & Quadratic Functions. The Semester 2 Final Exam is given in late April following the completion of all remaining units except the study of Trigonometry.

Unit: Linear Functions & Systems (9 weeks)

Topic: Linear Functions (4 weeks)

Students will:

- Determine the number of significant digits in a measurement and round the resulting calculation to the correct number of significant digits
- add, subtract, & multiply matrices
- state the definition of a function and determine whether a given relation is a function
- find the solution of one-variable equations
- determine the slope and intercepts of a line from its graph or equation.
- write the equation of a line using given information or a graph
- graph equations with the base functions x , $|x|$, & $[x]$ using the transformation rules
- using a given set of data, construct a scatter plot and find a linear regression function using a graphing calculator

Topic: Inequalities & Absolute Value (2 weeks)

Students will:

- solve inequalities in one and two variables
- solve absolute value equations and inequalities
- solve inequalities in which the variable is multiplied or divided by testing points

Topic: Systems of Equations (3 weeks)

Students will:

- solve systems of equations in two variables using substitution, elimination, matrix equations, Cramer's rule, and graphing by calculator
- solve systems of equations in three variables by elimination, Cramer's rule, and matrix equations.
- solve systems of equations of any number of variables using a calculator
- solve systems of inequalities by graphing
- set up and solve linear programming problems

Unit: Quadratic Relations (7 weeks)

Topic: Square Roots & Complex Numbers (1 week)

Students will:

- simplify square roots
- add, subtract, multiply, and divide expressions with square roots
- define imaginary and complex numbers
- find the value of an imaginary number raised to a power
- add, subtract, multiply, and divide complex numbers

Topic: Quadratic Functions (3 weeks)

Students will:

- identify the vertex and x-intercepts of a parabola given the graph of a quadratic function
- determine the vertex, line of symmetry, direction, and vertical stretch of a parabola in vertex, standard, and intercept form
- write the equation of a quadratic function given its graph or two sets of coordinates
- solve quadratic equations by graphing, factoring, completing the square, and the quadratic formula
- apply knowledge of quadratic relations to solve real world problems

Topic: Conic Sections (3 weeks)

Students will:

- name, find and graph the key parts of the four conic sections
- convert the equations of conic sections to standard form by completing the square
- solve quadratic systems of equations using substitution, elimination, and graphing technology
- apply knowledge of the conic sections to solve real world problems

Unit: Function Operations, Polynomials, Rational Functions (4 weeks)

Topic: Polynomials, Function Operations, & Inverse Functions (2 weeks)

Students will:

- Perform arithmetic operations with polynomials including long and synthetic division
- Factor polynomials
- Give basic descriptions about the graphs of polynomials including zeros, end behavior, and relative & absolute extrema
- Perform operations on functions including addition, subtraction, multiplication, & division
- Find compositions of functions
- Given an equation or a graph, find the inverse of a function

Topic: Rational Functions (2 weeks)

Students will:

- Simplify rational expressions and complex fractions
- Solve rational equations and apply these skills to solve real world applications
- Graph and transform graphs of $y=1/x$ and $y=1/x^2$

Unit: Exponential & Logarithmic Functions (5 weeks)

Topic: Exponents & Roots (2 weeks)

Students will:

- Simplify expressions and solve equations involving positive, negative, & rational exponents
- Simplify expressions and solve equations involving roots and radicals
- Graph functions containing powers & roots by hand and with a graphing calculator (including power regression)
- Perform computations using scientific notation

Topic: Exponential & Logarithmic Functions (3 weeks)

Students will:

- Use rules of exponents to simplify exponential & logarithmic expressions
- Solve exponential equations using common bases
- Apply properties of logarithms to solve logarithmic and exponential equations
- Graph and transform graphs of exponential & logarithmic functions
- Apply problem solving techniques to real world applications

Unit: Additional Topics in Mathematics (9 weeks)

Topic: Statistics (3 weeks)

Students will:

- Calculate the measures of central tendency (mean, median & mode) by hand and with a graphing calculator using a standard set of data or grouped data
- Calculate measures of variation (range, IQR, & standard deviation) by hand and with a graphing calculator
- Calculate a z-score
- Find probability of a real world event using z-scores and the normal distribution

Topic: Probability (3 weeks)

Students will:

- Use permutations and combinations to determine the number of ways to perform an event
- Calculate probability and odds of a single event
- Determine the appropriate method and calculate the probability of independent/dependent events and mutually inclusive/exclusive events
- Expand a binomial raised to a power
- Calculate binomial probability
- Build a probability tree and use it to calculate conditional probability

Topic: Sequences & Series (1 week)

Students will:

- Determine whether a sequence is arithmetic, geometric, or other
- Find the n th term of arithmetic & geometric sequences
- Find the sum of arithmetic and geometric series in both sequence form and summation notation
- Find the sum of an infinite geometric series

Topic: Trigonometry (3 weeks)

Students will:

- Calculate coterminal angles
- Define the six trig functions in terms of the sides of a right triangle
- Identify the quadrants where each trig function is positive
- Solve right triangle problems
- Convert angles between degrees and radians
- Find the special angle values of the six trig functions using both degrees and radians
- Simplify expressions using the 8 fundamental trig identities