Quarter I

Unit I: Problem Solving

**Goal:** The student will demonstrate the ability to work collaboratively performing investigations to solve problems using Algebra

Objectives: The student will be able to:

a. Develop a problem-solving paradigm by gathering and organizing information from pictures, diagrams and graphs.

b. Solve linear equations and systems of equations represented in a real world context.

Unit II: Sequences

**Goal:** The student will demonstrate the ability to work collaboratively performing investigations to model solve using sequences.

Objectives: The student will be able to:

a. Use recursively defined sequences to model real world situations.

b. Use geometric sequences to model real-life situations of growth and decay

c. Examine the concept of limit by exploring long run values in sequences.

d. Recognize and use multiple representations of sequences.

Unit III: Linear Models and Systems

**Goal:** The student will demonstrate the ability to relate recursive formulas for arithmetic sequences to explicit formulas, linear equations, and systems of linear equations.

Objectives: The student will be able to:

a. Recognize connections between explicit and recursive formulas for arithmetic sequences

b. Deepen understanding of slope in arithmetic sequences and linear equations.

c. Determine lines of fit for data sets and use them to make predictions through interpolation and extrapolation.

d. Evaluate lines of fit using residuals and their root mean square error

e. Model real-world situations using system of equations.
Quarter 2

Unit IV: Functions Relations and Transformations

**Goal:** The student will demonstrate the ability to work collaboratively to perform investigations and solve problems modeled by linear and non-linear functions.

Objectives: The student will be able to:

- **Review**
  - Solve absolute value equations and inequalities using a graphing calculator.

  a. Describe a graph as discrete or continuous and identify the independent and dependent variables, the intercepts, and the rates of change.
  b. Draw a qualitative graph from a context scenario and create a context scenario given a qualitative graph.
  c. Distinguish conceptually and graphically between functions and relations.
  d. Analyze and graph translations and transformations of linear, quadratic, absolute value, square root, and semicircle families of functions modeled in a real-world context.
  e. Explore compositions of transformations of functions graphically and numerically in real-world contexts.

Unit V: Exponential, Power and Logarithmic Functions

**Goal:** The student will demonstrate the ability to work collaboratively to perform investigations to solve problems involving exponential, power, and logarithmic functions.

Objectives: The student will be able to:

- **Review**
  - Simplify square roots.
  - Use scientific notation to solve real-world problems.
  - Convert a number from standard form to scientific notation and vise versa.

  a. Write explicit equations for geometric sequences and generalize them for modeling real-world growth and decay.
  b. Solve exponential and power equations using the properties of exponents.
  c. Convert between radical and rational exponent form. In order to model and solve problems in a real-world context.
  d. Define and apply inverse functions graphically and algebraically to solve problems in real-world context.
  e. Use the properties of logarithms and exponents to solve equations modeled from real-world situations.
Quarter 3

Unit VI: Matrices and Linear Systems

Goal: The student will demonstrate the ability to work collaboratively to perform investigations and solve real-world problems using matrices, systems of linear equations, and systems of linear inequalities.

Objectives: The student will be able to:

a. Use matrices to represent transition diagrams, polygons, and transformations
b. Apply matrix operations to solve problems with probabilities and transformations
c. Solve systems of equations algebraically, by inverse matrices, and row reduction
d. Write and graph systems of inequalities to describe given real-world constraints
e. Use linear programming with two variables to optimize a function over a feasible region representing real-world situations

Unit VII: Quadratic and Other Polynomial Functions

Goal: The student will demonstrate the ability to work collaboratively to perform investigations solve problems modeled by quadratic and polynomial functions.

Objectives: The student will be able to:

Review
   ○ Add, subtract, and multiply polynomials.

a. Use finite differences and systems of equations to find a polynomial function that fits a data set
b. Understand the correspondence among the zeros of a polynomial, the x-intercepts of its graph, and the roots of an equation.
c. Find roots of polynomial equations from factored form, using the zero-product property.
d. Change quadratic polynomials from general form to vertex form by completing the square.
e. Determine, solve, and analyze real-world problems involving quadratic equations.
f. Define and use complex and imaginary numbers and conjugate pairs
g. Use graphs of polynomial equations to find the roots and write the equations in factored form.
h. Analyze relationships among the graphs of polynomial equations, functions, the number and types of roots, the possible degrees of the polynomial, and extreme values and end behavior.
i. Change Polynomials from general form to factored form using graphs, rational Root Theorem, long or synthetic division, and the quadratic formula.

Quarter 4

Unit VIII: Conic Sections and Rational Functions

Goal: The student will demonstrate the ability to work collaboratively to perform investigations to solve problems modeled by conic sections and rational functions.

Objectives: The student will be able to:
   a. Apply the distance and midpoint formulas to solve real-world problems.
   b. Derive equations of all four conic sections to model real-world problems. (Optional)
   c. Convert between a general quadratic equation and the standard form of the equation of a conic section. (Optional)
   d. Solve a system of quadratic equations in two variables by graphing or using algebraic techniques. (Optional)
   e. Graph and find the equations of transformations of the parent function of the rational equation.
   f. Identifying the vertical and horizontal asymptotes, holes, and x and y intercepts on the graphs of rational equations.
   g. Add, subtract, multiply and divide polynomial rational expressions.
   h. Simplify rational expression involving polynomials that can be factored.
   i. Solve rational equations and determine extraneous roots.
   j. Solve nonlinear systems of equations and inequalities algebraically and graphically.

Unit IX: Other Topics in Geometry

Goal: The student will demonstrate the ability to work collaboratively to perform investigations and solve problems modeled by Geometry.

Objectives: The student will be able to:
   Review
      o Use proportions to solve problems with similar figures.

   a. Apply the Pythagorean Theorem to explore properties of special right triangles.