

## Algebra 2

### Functions - Spiral throughout the curriculum

#### **Recognize Function vs. Non-Function**

- Vertical line test

#### **Notation**

- Using function notation in context of problem  
ex:  $C(t)$  = cost as a function of time

#### **Evaluate**

- Algebraically
- Graphically

#### **Multiple Representations**

- Mapping diagram, ordered pairs, words, graph, table, equation

#### **Domain & Range**

- Inequality notation
- Interval notation
- Discrete vs. continuous
- Identify from all representations

#### **Operations**

- Add, subtract functions
- Multiply functions (introduce FOILing)

#### **Increasing vs. Decreasing vs. Constant**

- Language

### Foundation Concepts--Revisit Linear

- Solving Linear Equations
- Solving Literal Equations
- Graphing Linear Functions (from diff. forms)
- Writing Linear Functions (using diff. forms)
- Slope (rate of change)
- Applications

### Foundation Concepts--Revisit Functions

- evaluating functions (from graph and equation)
- using function notation in context of problem  
ex:  $C(t)$  = cost as a function of time
- Composition (algebraically and graphically)
- Domain & Range

## **Absolute Value**

- Revisit Solving Linear Inequalities (simple & compound)
- Solving Absolute Value Equations
- Solving Absolute Value Inequalities
- Graph:  $f(x) = |x|$
- Absolute Value as a Piecewise Function (Just mention to make connection--address details of piecewise functions in Quadratics Unit)
- Domain & Range (inequality notation)
- Transformations
- Equation to Graph
- Graph to Equation
- Interval Notation

## **Quadratics**

**Linear vs. Non-Linear (toothpick activity)**

### **Spiral Function Topics**

- Function Notation
- Evaluating Functions (algebraically, graphically)
- Composition
- Domain & Range
- Operations

### **Graphing Quadratic Functions**

- Vertex Form (revisit transformations)
- Intercept Form
- Standard Form (y-int)
- Identify Vertex from Equation (all 3 forms)
- Writing Equations (from graph, vertex + point, x-ints. + point)

### **Changing Between Forms**

#### **Solving**

- Graphing
- Factoring
- Square Rooting
- Completing the Square
- Quadratic Formula
- Vocab: x-int, zeros, roots, solutions
- Simplifying Radicals, Radical Operations

#### **Imaginary Numbers**

- Imaginary solutions
- Nature of Solutions (discriminant, on graph)
- Complex number operations

#### **Piecewise Functions (revisit linear, introduce quadratic)**

- Notation
- Evaluate
- Equation to Graph
- Graph to Equation

## **Quadratics (continued)**

### **Applications**

- Modeling
- Velocity
- Min/Max, Zeros
- Area (with fence, garden against house, etc.)
- Area (borders)
- Regression
- Revenue
- "Find the Numbers"
- Piecewise Applications

### **Systems**

- Revisit Solving Linear Systems (3 methods + applications)
- Linear-Quadratic
- Quadratic-Quadratic

### **Quadratic Inequalities (1 variable)**

- Solving Graphically
- Solving Algebraically (test point)

### **Recursion**

- 2nd finite difference

## **Conics**

### **Recognize Function vs. Non-Function**

### **Distance & Midpoint**

### **Circles**

- Translated center

### **Ellipses**

- Translated center

### **Hyperbolas**

- Translated center

### **Systems**

### **Classifying Conics**

## **Exponents & Radicals**

- Properties of Integer Exponents
- Properties of Rational Exponents
- Converting between Exponent/Radical Notation

### **Simplifying Radicals (index >2)**

- Understand "2 of a kind" vs. "3 of kind" for simplifying (cubed root vs. square root)
- Rationalize Square Root & Cube Root only

### **Radical Operations**

- Addition, Subtraction

### **Graphing Square Roots & Cube Roots**

- Transformations

## **Exponents & Radicals (continued)**

### **Solving Equations**

- Common Base  $2^{x+1} = 8$
- Exponents  $> 2$
- Rational Exponents
- Equations with Radicals
- Extraneous Solutions
- Scientific Notation

### **Applications**

## **Polynomials**

### **Spiral Function Topics**

- Function Notation
- Evaluating Functions (algebraically, graphically)
- Composition
- Domain & Range
- Operations

### **Characteristics of Polynomials**

- Definition
- Standard Form
- Degree/Name (constant, cubic, quartic, etc.)
- Classify by # of terms

### **Polynomial Operations**

- Addition, Subtraction
- Multiplication
- Long Division
- Synthetic Division

### **Composition**

- Algebraic manipulations

### **Finding Zeros**

- Factoring
- Synthetic Division

### **Inequalities (1 variable)**

- Solving Graphically
- Solving Algebraically (test point)

### **Graphing Polynomials**

- End Behavior
- Transformations
- Multiplicity at Zeros
- Relative/absolute min. and max.
- Write Equation based on Graph
- Applications (including regression)

### **Fundamental Theorem of Algebra**

- Degree = # Zeros
- Imaginary Solutions occur in pairs

## **Rational Expressions & Equations**

### **Algebraic Manipulations**

- Simplifying Rational Expressions
- Multiplying & Dividing Rational Expressions
- Adding & Subtracting Rational Expressions
- Simplifying Complex Fractions
- Solving Rational Equations

### **Inverses**

- Introduce by talking about sideways parabola
- Graphic Relationship (reflect over  $y = x$ )
- Composition  $f(g(x)) = g(f(x)) = x$
- Algebraically finding Inverses
- Graphs of Square Root and Cube Roots
- Piecewise Functions

### **Matrices**

#### **Operations**

- Add, Subtract
- Multiply by a Scalar
- Matrix Multiplication (with applications)

#### **Inverse & Identity**

- Solving Equations

#### **Solving Systems**

- Applications

### **Sequences and Series**

#### **Introduction to Sequences & Series**

#### **Arithmetic Sequences & Series**

#### **Geometric Sequences & Series**

#### **Recursive rules for Sequences**