CC Algebra II - Regents Review

Unit 2: Functions as the Cornerstones of Algebra

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Based on Kirk Weiler's emathinstruction lessons

Unit 2: Video Overview

- Unit 2: Lesson Overview

- CCLS Associated with Unit 2

- Basic Terminology

- Notations for Domain and Range

- Identifying Functions

- Function Notation

- Function Composition

- One-to-One Functions

- Inverse Functions

- Key Features of Functions (3 Slides)

- Summary

Unit 2: Lesson Overview

- 2.1 Introduction to Functions

- 2.2 Function Notation

- 2.3 Function Composition

- 2.4 Domain and Range of a Function

- 2.5 One-to-One Functions

- 2.6 Inverse Functions   (F.BF.4)

- 2.7 Key Features of Functions   (F.IF.9 and F.IF.4)

CCLS Associated with Unit 2

❖ F.BF.4 - Find inverse functions.
  Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse.

❖ F.IF.4 - For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* Tasks may involve polynomial, exponential, logarithmic, and trigonometric functions.

❖ F.IF.9 - Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.* Tasks may involve polynomial, exponential, logarithmic, and trigonometric functions.

Basic Terminology

❖ **Function** - A function is any "rule" that assigns exactly one output value (y-value) for each input value (x-value). These rules can be expressed in different ways, the most common being equations, graphs, and tables of values. We call the input variable <u>independent</u> and output variable <u>dependent</u>.

❖ **Domain** - All possible input values (x-values).

❖ **Range** - All possible output values (y-values)

Notations for Domain and Range

- ❖ **All Real Numbers**

- ❖ **Set-Builder Notation**

- ❖ **Inequalities**

- ❖ **Interval Notation**

Identifying Functions

❖ **Vertical Line Test** (for Graphs)

❖ Examining a Table of Values

❖ Examining Equations

Function Notation

❖ **Proper Function Notation**

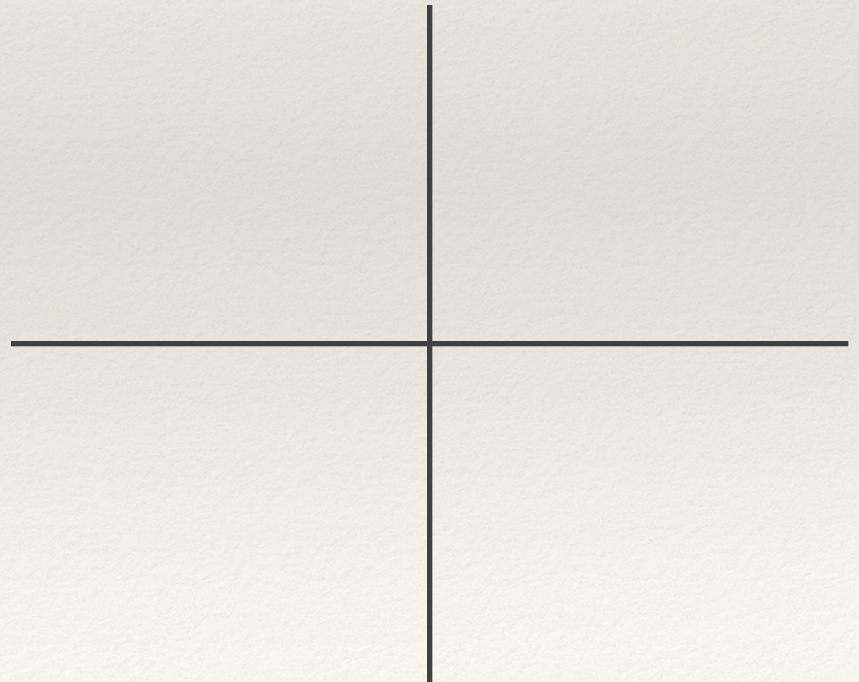❖ **Evaluating Functions**

Function Composition

❖ **Proper Function Composition Notation**

❖ **Evaluating Compositions of Functions**

One-to-One Functions

❖ **One-to-One Function** - A function $f(x)$ is called one-to-one if a ≠ b implies that $f(a) ≠ f(b)$.

❖ **Horizontal Line Test**

Inverse Functions

❖ **Existence of an Inverse Function** - A function has an inverse that is a function if it is a one-to-one function.

❖ How to find an inverse function - Switch the x and y variables, then solve for y.

❖ **Proper Inverse Function Notation**

❖ **Domain and Range** of Inverse Functions

❖ **Graphs** of Inverse Functions - Reflection through the $y = x$ line

Key Features of Functions and Their Graphs - Slide 1

- ❖ *x*-intercepts

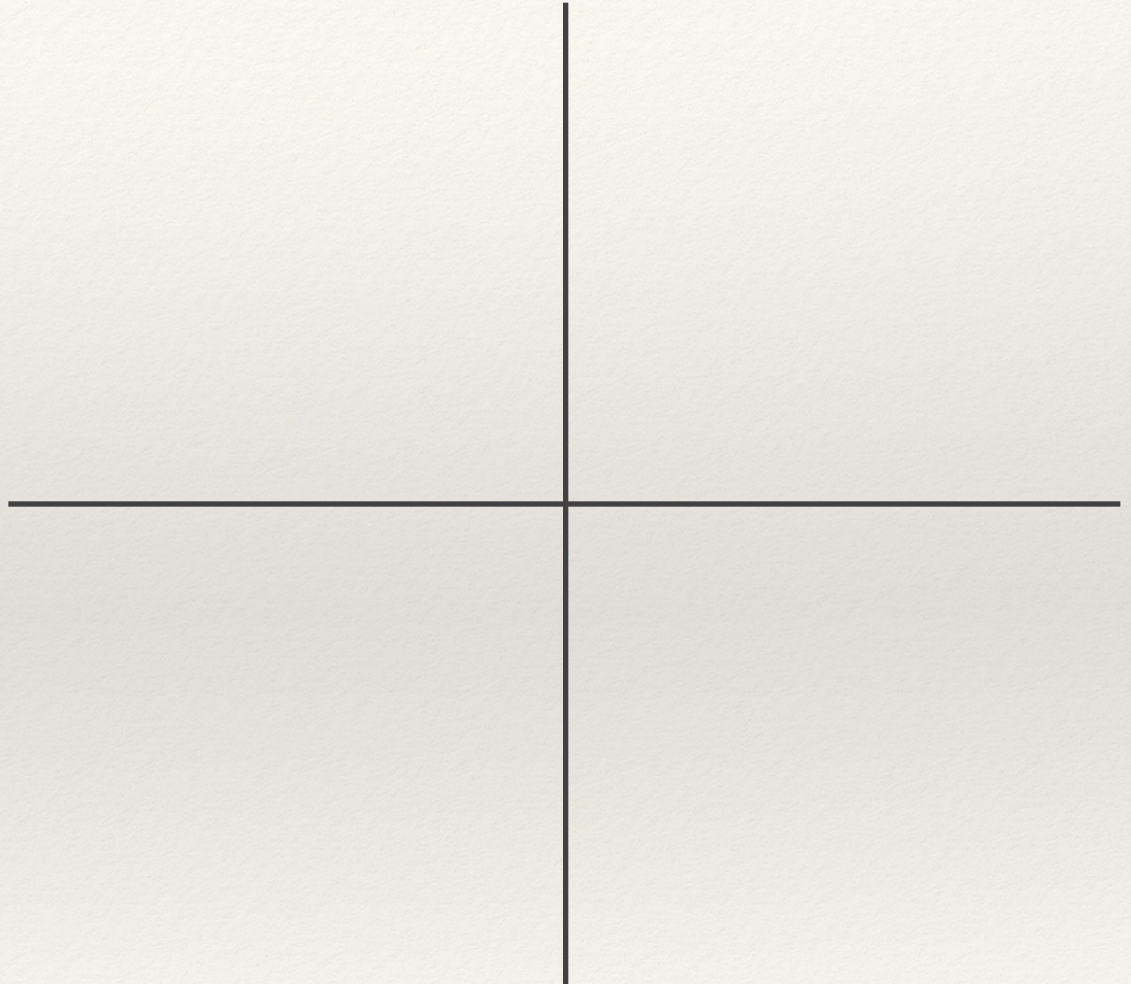- ❖ *y*-intercepts

- ❖ **Zeroes or Roots**
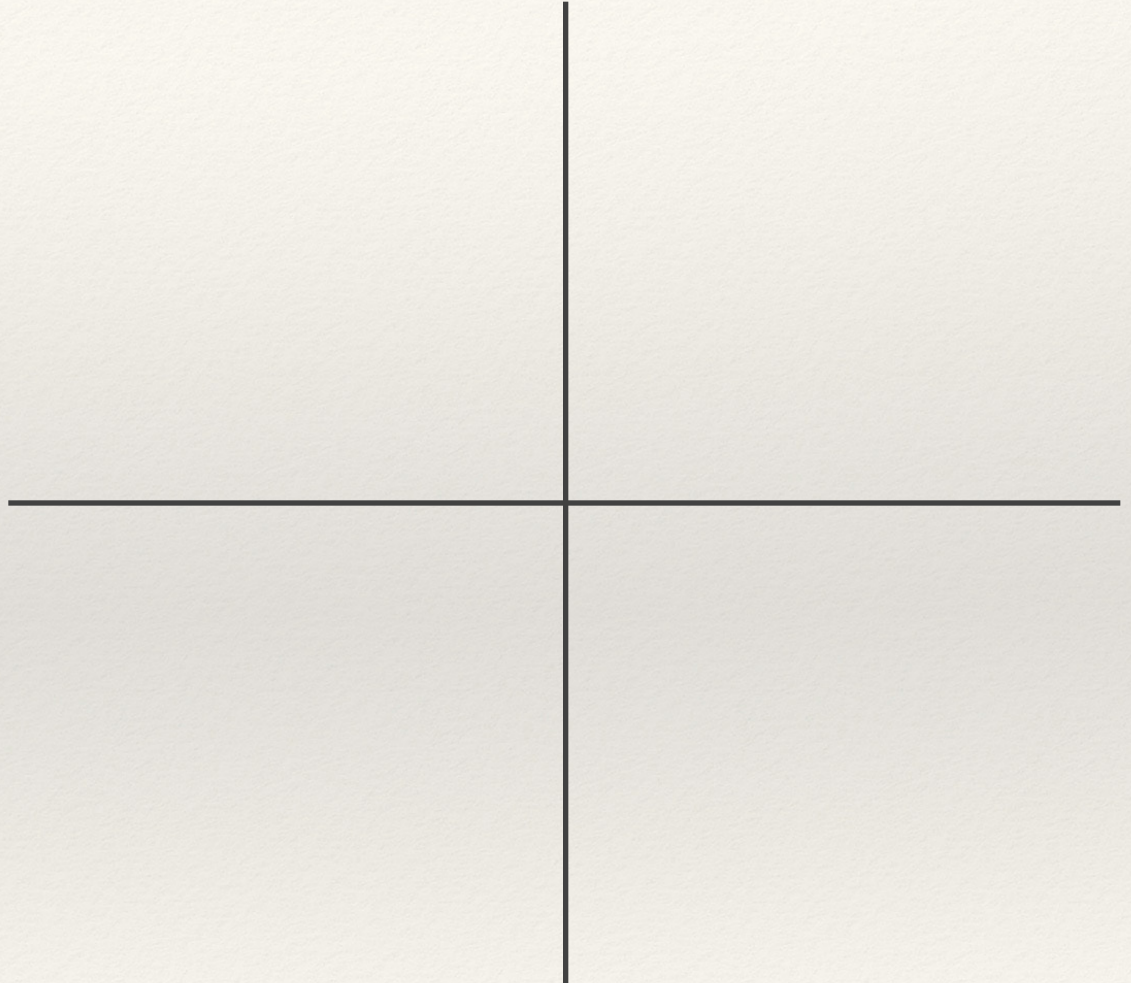
Key Features of Functions and Their Graphs - Slide 2

- ❖ **Maximum**

- ❖ **Minimum**
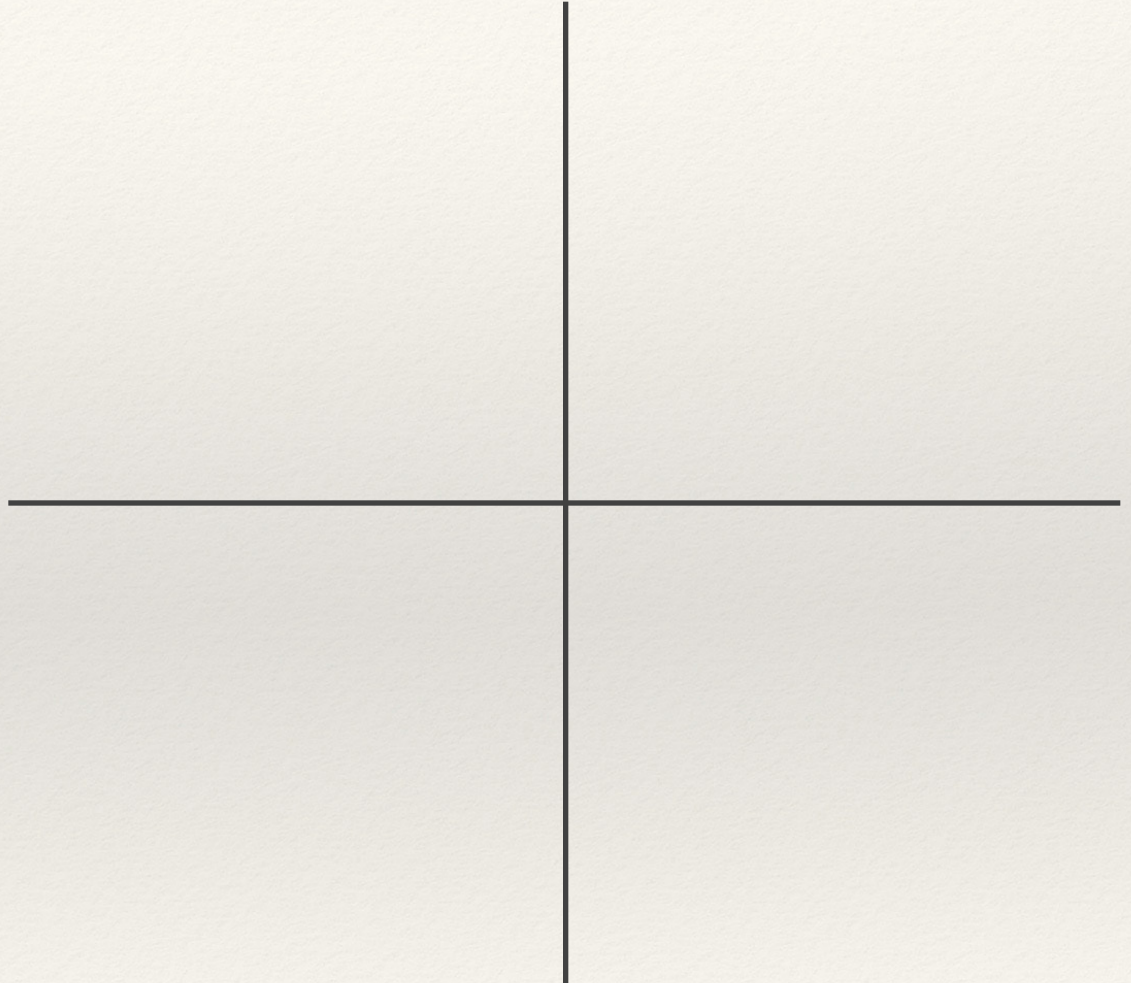
- ❖ **Increasing**

- ❖ **Decreasing**

Key Features of Functions and Their Graphs - Slide 3

❖ *f(x) > 0*

❖ *f(x) < 0*

❖ *f(x) = 0*

Summary of the Most Important Information

* Students should be able to:

    * Determine whether a given relationship is a function.

    * Determine if a function is one-to-one.

    * Use proper function notation to state the equation of a function, its inverse, or a composition of functions.

    * Evaluate functions and compositions of functions.

    * Find the equation of an inverse function.

    * State the domain and range of a function or its inverse.

    * Find the x-intercepts, y-interecept, zeroes, roots, maximums and minimums of a function based on its graph or equation.

    * Find the x-values for when a function's value is positive, negative, or zero.