Unit 1 Functions and Their Graphs, Quadratics

Content Area: **Math**
Course(s): **Accelerated PreCalculus, CP PreCalculus**
Time Period: **Marking Period 1**
Length: **2**
Status: **Published**

Unit Overview

This unit reviews functions, graphing, and solving quadratics. It includes a summer assignment, group work on more difficult related problems, and a focus on symmetry and piecewise-defined functions.

Enduring Understandings

- Students will understand different types of functions and their graphs.

Essential Questions

How do you locate points and find the distance and midpoint between two points in the Cartesian plane?

How do you identify intercepts and symmetry in order to sketch graphs of equations, including graphs of circles?

How do you find the slope of a line and use it to write an equation for the line?

What are the important defining characteristics and representations of a function?

How is the graph of a function used to determine the key elements of that function?

What are the characteristics of the most commonly used functions in algebra?

How do you write equations and draw graphs for the simple transformations of a parent function?

How do you combine two parent functions to form a new function?

What is the inverse of a function and how do you represent it graphically and algebraically?

How do you write equations to model real world data and identify different models of variation?

MA.F-IF.A	Understand the concept of a function and use function notation
MA.F-IF.A.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$.
MA.N-RN.A.1	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.
MA.F-IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
MA.N-RN.B.3	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
MA.F-IF.B.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.
MA.N-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
MA.F-IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
MA.N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
MA.F-IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
MA.F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
MA.N-CN.A.1	Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.
MA.F-IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
MA.F-IF.C.7b	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
MA.N-CN.A.2	Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
MA.N-CN.A.3	Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.
MA.F-IF.C.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
MA.F-IF.C.8a	Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
MA.F-IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
MA.N-CN.C.7	Solve quadratic equations with real coefficients that have complex solutions.
MA.F-BF.A.1	Write a function that describes a relationship between two quantities.

MA.F-BF.A.1b	Combine standard function types using arithmetic operations.
MA.F-BF.A.1c	Compose functions.
MA.F-BF.B	Build new functions from existing functions
MA.F-BF.B.4a	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.
MA.F-BF.B.4b	Verify by composition that one function is the inverse of another.
MA.F-BF.B.4c	Read values of an inverse function from a graph or a table, given that the function has an inverse.
MA.F-BF.B.4d	Produce an invertible function from a non-invertible function by restricting the domain.

Instructional Strategies & Learning Activities

- Provide access to online book
- Provide access to book pages and problems through Canvas
- Provide access to review keys
- Provide access to webassign as learning and reviewing tool
- Specific problems will be pulled out to to provide opportunities to extend their knowledge.
- Work on problem solving in a group setting

Formative Assessments
- Daily homework checks
- Quiz
- Chapter Test
- Exit Tickets
- Warm-ups

Summative Assessment
- Unit Test
- Unit Project

Alternate Assessments
- Modified homework
- Modified quizzes
- Modified tests

- Modified projects

Closure

- Low-Stakes Quizzes - Give a short quiz using technologies like Kahoot or a Google form.
- Have students write down three quiz questions (to ask at the beginning of the next class).
- Have students dramatize a real-life application of a skill.
- Ask a question. Give students ten seconds to confer with peers before you call on a random student to answer. Repeat.
- Have kids orally describe a concept, procedure, or skill in terms so simple that a child in first grade would get it.
- Direct kids to raise their hands if they can answer your questions. Classmates agree (thumbs up) or disagree (thumbs down) with the response.
- Have kids create a cheat sheet of information that would be useful for a quiz on the day's topic.
- Kids write notes to peers describing what they learned from them during class discussions.
- Have students fill out a checklist with the objectives for the day.
- Have students complete an exit ticket without putting their name on it. Hand back exit tickets the next day in class and have students correct as a warm up.
- Ask students to write what they learned, and any lingering questions on an "exit ticket". Before they leave class, have them put their exit tickets in a folder or bin labeled either "Got It," "More Practice, Please," or "I Need Some Help!"
- After writing down the learning outcome, ask students to take a card, circle one of the following options, and return the card to you before they leave: "Stop (I'm totally confused. Go (I'm ready to move on.)" or "Proceed with caution (I could use some clarification on . . .)"