Unit 7 Quadratic Functions and Equations

Content Area: **Math**
Course(s): **CP Algebra 1, Accelerated Algebra I, Accelerated Algebra I**
Time Period: **Marking Period 4**
Length: **4**
Status: **Published**

Unit Overview

This unit allows students to master quadratic functions. Students will be able to create, reason, and interpret quadratic equations.

Link to optional Desmos Curriculum resource:
https://teacher.desmos.com/collection/61bcc95700581818dff1d4d7?intro-banner-expanded=true

Enduring Understandings

- The family of quadratic functions models certain situations where the rate of change is not constant. These functions are graphed by a symmetric curve with a highest, or lowest, point corresponding to a max or min.
- In the quadratic function y = ax^2 + bx + c, the value of b translates the position of the axis of symmetry.
- Quadratic equations can be solved by a variety of methods, including graphing and finding the square root, using the Zero-Product Property, writing the equation in the form m^2 = n, or using the Quadratic Formula
- Systems of linear and quadratic functions can be solved graphically and algebraically This type of system can have two solutions, one solution, or no solutions.
- Linear, quadratic, or exponential functions can be used to model various sets of data.

Essential Questions

What are the characteristics of quadratic functions?

How can you solve a quadratic equation?

How can you use functions to model real-world situations?

New Jersey Student Learning Standards (No CCS)

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.S-ID.B.6a	Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data.
MA.F-IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
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.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.A-APR.B.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
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.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
MA.A-CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
MA.F-BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.
MA.A-CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
MA.F-LE.A.1b	Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
MA.F-LE.A.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
MA.F-LE.A.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

Interdisciplinary Connections

LA.W.9-10.6	Use technology, including the Internet, to produce, share, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
SCI.HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.

Technology Standards

TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.

21st Century Themes/Careers

CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.

Instructional Strategies & Learning Activities

- Use graphing calculator to explore tables.
- Spend time with modeling problems.
- Use problems and activities from book involving modeling problems.
- ~~Provide access to online book~~
- Provide ~~access to~~ book pages and problems through Canvas
- Provide access to review keys
- Use ~~Pearson~~ Quizzes to review and reinforce.
- ~~Provide access to Pearson Review.~~
- ~~Examview~~ Quizzes to assess HW.
- Desmos
- Delta Math

Formative Assessments

- Daily homework checks
- Quiz
- ~~Chapter~~ Unit Test
- ~~Exam View~~ HW Checks
- Warm-ups
- Desmos
- Delta Math

Summative Assessment

- Unit Test
- Dropped and Thrown Objects Project - Modeling thrown and dropped objects using quadratic equations. (Optional)