Mp3b-Quadratic Functions and Equations

Content Area: **Math**
Course(s): **Math 8 Algebra 1 Honors**
Time Period: **Marking Period 3**
Length: **MP3**
Status: **Published**

Essential Questions

- Why do we use different methods to solve math problems?

Big Ideas

- Write expressions in equivalent forms to solve problems.
- Solve equations and inequalities in one variable.
- Solve systems of equations.
- Understand the concept of a function and use function notation.
- Interpret functions that arise in applications in terms of the context.
- Analyze functions using different representations.
- Build new functions from existing functions.
- Construct and compare linear, quadratic, and exponential models and solve problems.
- Summarize, represent, and interpret data on two categorical and quantitative variables
- Solve systems of equations.

Technology Connection

8.1.8.DA.1 Organize and transform data collected using computational tools to make it usable for a specific purpose.

Enduring Understandings

Seeing Structure in Expressions

A.SSE.3b   Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

Reasoning with Equations & Inequalities

A.REI.4   Solve quadratic equations in one variable.

A.REI.4b [M] Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.

A.REI.7   Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line y = –3x and the circle x2 + y2 = 3.

Interpreting Functions

F.IF.4 [M]   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

F.IF.6 [M]   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.

F.IF.7a   Graph linear and quadratic functions and show intercepts, maxima, and minima.

F.IF.7b   Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

F.IF.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.

Building Functions

F.BF.3   Identify the effect on the graph of replacing f(x) by f(x) + k, k f(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. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

Linear, Quadratic, & Exponential Models

F.LE.1   Distinguish between situations that can be modeled with linear functions and with exponential functions.

F.LE.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).

Interpreting Categorical & Quantitative Data

S.ID.6a   Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.

Reasoning with Equations & Inequalities

A.REI.7   Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line y = –3x and the circle x2 + y2 = 3.

Mathematical Practices Focus

1. Make sense of problems and persevere in solving them. Lessons 0-1, 1-8, 2-4, 3-4, 4-5, 5-4, 6-4, 7-5, 8-8, 9-3, 10-5, 11-1, 12-4

2. Reason abstractly and quantitatively. Lessons 1-3, 2-1, 3-3, 4-1, 5-1, 6-5, 7-2, 8-5, 9-1, 10-3, 11-8, 12-2

3. Construct viable arguments and critique the reasoning of others. Lessons 1-3, 2-5, 3-5, 4-2, 5-5, 6-1, 7-4, 8-1, 9-2, 10-4, 11-2, 12-1

4. Model with mathematics. Lessons 1-1, 2-9, 3-2, 4-5, 5-1, 6-5, 7-6, 8-7, 9-7, 10-4, 11-7, 12-5

5. Use appropriate tools strategically. Lessons 1-7, 2-4, 3-2, 4-4, 5-6, 6-1, 7-5, 8-2, 9-6, 10-6, 11-8, 12-3

6. Attend to precision. Lessons 1-3, 2-8, 3-4, 4-5, 5-2, 6-6, 7-4, 8-9, 9-5, 10-1, 11-6, 12-2

7. Look for and make use of structure. Lessons 1-2, 2-5, 3-6, 4-1, 5-5, 6-3, 7-7, 8-6, 9-6, 10-2, 11-2, 12-8

8. Look for and express regularity in repeated reasoning. Lessons 1-4, 2-7, 3-1, 4-1, 5-4, 6-1, 7-1, 8-4, 9-3, 10-2, 11-5, 12-6