MP4a-Solving Quadratic Equations

Content Area: **Math**
Course(s): **Algebra 1 Accelerated**
Time Period: **Marking Period 4**
Length: **enVision Chapter 9, 16 days**
Status: **Published**

Essential Questions

- How do you use quadratic equations to model situations and solve problems?

Big Ideas

- Use various methods to solve quadratic equations, systems with one linear and one quadratic equation, and nonlinear systems.
- Identify and graph quadratic functions.
- Solving linear quadratic systems of equations

CSDT 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

Interpreting Functions

F.IF.C7c Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.

F.IF.C8a Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. 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.

Creating Equations

A.CED.A1 [M] Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

- Solving Absolute-Value Equations

A.CED.A2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

A.CED.A3 [M] 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. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.

Reasoning with Equations & Inequalities

A.REI.B4 Solve quadratic equations in one variable.

A.REI.B4a[M] Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x – p)2 = q that has the same solutions. Derive the quadratic formula from this form.

- Completing the Square

A.REI.B4[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.

- Solving Quadratic Equations by Factoring
- Solving Quadratic Equations by Using Square Roots
- The Quadratic Formula and the Discriminant

A.REI.D11[M] Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

- Solving Quadratic Equations by Graphing

A.REI.C7 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.

- Nonlinear Systems

Seeing Structure in Expressions

A.SSE.A2 Use the structure of an expression to identify ways to rewrite it. For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2).

- Factors and the Greatest Common Factors
- Factoring by GCF
- Factoring x^2 + bx + c
- Factoring ax^2 + bx + c
- Factoring Special Products
- Choosing a Factoring Method

A.SSE.B3a Factor a quadratic expression to reveal the zeros of the function it defines.

- Using a Graph to Factor Polynomials (Lab)

Arithmetic with Polynomials and Rational Expressions

A.APR.B3 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.

The Real Number System

N.RN.A.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.

Mathematical Practices Focus

1. Make sense of problems and persevere in solving them. Pages 363, 376, 382, 397

2. Reason abstractly and quantitatively. Pages 370, 376, 382

3. Construct viable arguments and critique the reasoning of others. Pages 357, 370, 389

4. Model with mathematics. Pages 396

5. Use appropriate tools strategically. Pages 357, 397

6. Attend to precision. Pages 363, 389

7. Look for and make use of structure. Pages 357, 363, 370, 376, 382, 389, 397

8. Look for and express regularity in repeated reasoning.