Unit 8: Quadratic Functions and Equations

Content Area: **Mathematics**
Course(s): **Algebra 8**
Time Period: **March**
Length: **4 weeks**
Status: **Published**

Transfer

Big Idea: Quadratic Functions & Equations

Essential Questions

How can you solve quadratic equations using concrete models, tables, graphs, and algebraic method?

What are the characteristics of quadratic functions?

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

Enduring Understandings

The family of quadratic functions has equations of the form $y = ax^2 + bx + c$, where $a \neq 0$. The graph of a quadratic function is a parabola.

You can solve quadratic equations using several methods.

To model a data set, choose a function that most closely matches the pattern in the data or graph.

Standards in Mathematics

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.

MA.A-SSE.B	Write expressions in equivalent forms to solve problems
MA.K-12.5	Use appropriate tools strategically.
MA.A-SSE.B.3a	Factor a quadratic expression to reveal the zeros of the function it defines.
MA.A-SSE.B.3b	Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
MA.K-12.7	Look for and make use of structure.
MA.F-IF.C	Analyze functions using different representations
MA.F-IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
MA.A-CED.A	Create equations that describe numbers or relationships
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-REI.B	Solve equations and inequalities in one variable
MA.A-REI.B.4a	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.
MA.A-REI.B.4b	Solve quadratic equations by inspection (e.g., for $x^2 = 49$), 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 $a \pm bi$ for real numbers a and b.
MA.A-REI.C	Solve systems of equations
MA.A-REI.C.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.

Critical Knowledge and Skills

Vocabulary

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Axis of Symmetry, Completing the Square, Discriminant, Minimum, Maximum, Parabola, Quadratic Function, Quadratic Equation, Quadratic Formula, Quadratic Parent Function, Root of an Equation, Standard Form of a Quadratic Equation, Standard Form of a Quadratic Function, Vertex, Zero of a Function, Zero Product Propert

Learning Objectives

Graph quadratic functions of the form $y = ax^2$ and $y = ax^2 + c$ (F.IF.7.a, A.CED.2)

Graph quadratic functions of the form $y = ax^2 + bx + c$ (F.IF.7.a, A.CED.2)

Solve quadratic equations by graphing and using square roots (A.REI.4.b)

Solve quadratic equations by factoring (A.REI.4.b, A.SSE.3.a)

Solve quadratic equations using the quadratic formula (A.REI.4.a,b)

Solve quadratic equations by completing the square (A.SSE.3.b, A.REI.4,a,b)

Find the number of solutions of a quadratic equation (A.REI.4.b)

Tranform a quadratic equation from standard form to vertex form (A.REI.4.a)

Solve systems of linear and quadratic equations (A.REI.7)

Resources

Desmos Quadratic Bundle

Khan Academy: Quadratics

3 Act Math: Will It Hit the Hoop

Desmos: Will It Hit the Hoop