

Unit 7: Quadratic Functions and Equations

Algebra 1 Honors

11 Class Meetings

Revised May 2026

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?

Enduring Understandings with Unit Goals

EU 1: Quadratic equations can be solved by a variety of methods.

- Solve a quadratic equation through graphing estimating the solutions
- Solve quadratic equations by graphing and finding square roots.
- Solve quadratic equations by factoring.
- Solve quadratic equations by using the quadratic formula.

EU 2: Functions can be used to model and solve real-world problems.

- Solve real-world problems using linear and quadratic equations.
- Determine the solution to a system of linear and quadratic equations by graphing.
- Use the elimination method, substitution method, and graphing technology to determine the solution to a system of linear and quadratic equations.

Standards

Common Core State Standards/College and Career Readiness Anchor Standards :

- **HS.A.SSE.B.3.A:** Factor a quadratic expression to reveal the zeros of the function it defines.
- **HS.A.REI.B.4:** Solve quadratic equations in one variable.
- **HS.A.REI.B.4.B:** Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, the quadratic formula, and factoring, as appropriate to the initial form of the equation.
- **HS.A.REI.C.7:** Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.
- **HS.F.IF.C.7.A:** Graph linear and quadratic functions and show intercepts, maxima, and minima.

ISAAC Vision of the Graduate Competencies

Competency 1: Write effectively for a variety of purposes.

Competency 2: Speak to diverse audiences in an accountable manner.

Competency 3: Develop the behaviors needed to interact and contribute with others on a team.

Competency 4: Analyze and solve problems independently and collaboratively.

Competency 5: Be responsible, creative, and empathetic members of the community.

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Unit Content Overview

1. Quadratic Graphs and Their Properties

- Find the Standard Form of a Quadratic Function
- Identify a Vertex
- Graph $y = ax^2$
- Graph $y = ax^2 + c$
- Vocabulary: Ordered pair, point, coordinate plane, x-axis, y-axis, y-intercept, parabola, vertex, axes of symmetry, symmetry, quadratic, trinomial, function, standard form, exponent, coefficient, leading coefficient, term

2. Quadratic Functions

- Graph of a Quadratic Function
- Graph $ax^2 + bx + c$
- Vocabulary: Ordered pair, point, coordinate plane, x-axis, y-axis, y-intercept, parabola, vertex, axes of symmetry, symmetry, quadratic, trinomial, function, standard form, exponent, coefficient, leading coefficient, term

3. Solving Quadratic Equations

- Standard Form of a Quadratic Equation
- Solve a Quadratic Equation by Graphing
- Solve a Quadratic Equation by Using Square Roots
- Vocabulary: Quadratic, trinomial, function, standard form, exponent, coefficient, leading coefficient, term, radical, square root

4. Factoring to Solve Quadratic Equations

- Solve a Quadratic Equation using the Zero-Product Property
- Vocabulary: Quadratic, trinomial, function, standard form, exponent, coefficient, leading coefficient, term, radical, square root

5. The Quadratic Formula and the Discriminant

- Use the Quadratic Formula to Solve a Quadratic Equation approximating its solution
- Find the Discriminant and use the discriminant to determine the properties of the roots
- Determine and apply the best method to solve a Quadratic Equation
- Vocabulary: Quadratic, trinomial, function, standard form, exponent, coefficient, leading coefficient, term, radical, square root, discriminant

6. Systems of Linear and Quadratic Equations

- Solve a system of linear and quadratic equations through Graphing
- Solve a system of linear and quadratic equations through Elimination
- Solve a system of linear and quadratic equations through Substitution
- Solve a system of linear and quadratic equations using a Graphing Calculator
- Vocabulary: Quadratic, trinomial, function, standard form, exponent, coefficient, leading coefficient, multiplicative inverse, additive inverse, an intersection point

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Interdisciplinary Connection:

- Language Arts- Accountable Talk, Word Problems, Claim-Evidence-Reasoning (CER), and Think-Write-Pair-Share (TWPS)

Daily Learning Objectives with *TWPS* Activities

Students will be able to...

- Graph quadratic functions of the form $y = ax^2$ and $y = ax^2 + c$
 - *TWPS – What is a quadratic function? What are some characteristics of quadratic functions?*
- Graph quadratic functions of the form $y = ax^2 + bx + c$
 - *TWPS – How is graphing a quadratic function similar and different from graphing a linear function?*
- Solve quadratic equations by graphing and using square roots
 - *TWPS – Which of the following quadratic equations does not belong with the others? Explain.*
- Solve quadratic equations by factoring
 - *TWPS – What is the one new step you have to take to solve a quadratic equation after factoring?*
- Solve quadratic equations by using Square Root Property and Completing the Square
 - *TWPS – What is the error made by the student when graphing the quadratic function?*
- Find the number of solutions of a quadratic equation
 - *TWPS – How can you quickly identify how many solutions a quadratic function has? What characteristics do you need to focus on?*
- Solve quadratic equations by using the quadratic formula
 - *TWPS – When do you have to use the quadratic formula? Do you always have to use the formula? Can you always use the formula?*
- Solve systems of linear and quadratic equations
 - *TWPS – Which of the following systems does not belong with the rest? Explain.*

Instructional Strategies/Differentiated Instruction

- Whole-Group Instruction
- Creating Authentic Connections for Students
- Rephrasing and Restatement of Information and Concepts
- Guided Notes
- Interactive Notebooks
- Spiral Review
- Student-Led Instruction
- Small Group Instruction
- Independent Problem-Solving
- Collaborative Problem-Solving
- Cross-Curricular Problem Solving (Independent and Collaborative)
- Accountable Talk
- Cumulative Homework

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EL DIFFERENTIATED INSTRUCTION:

- Word Walls with Visuals
- TWPS (Think-Write-Pair-Share)
- Pre-Reading Strategies
- Culturally Responsive Teaching
- Explicit Modeling
- Key Vocabulary
- Graphic Organizers
- Non-Verbal Assessments
- Strategic Grouping

Assessments

FORMATIVE ASSESSMENTS:

- Accountable Talk Discussions
- Daily Think-Write-Pair Share (TWPS)
- Claim-Evidence-Reasoning (CER)
- Whiteboards
- Mid-Class Check-Ins
- Exit Slips
- Student-Led Instruction
- Cumulative Homework
- Performance Task – Smartphone Profit
 - Summative Performance Task Assessment Rubric

SUMMATIVE ASSESSMENTS:

- Unit 13 Quiz (EU 1)
- Unit 13 Test (EU 1 and EU 2)
- Performance Task - Smartphone Profit

Unit Task

Unit Task Name: Smart Phone Profit

Description: Students will use information learned during this unit about the key features of the graphs of quadratic equations, how to solve quadratic equations using several different methods (EU 2), and how to use quadratics to model real-world situations (EU 3) compare and contrast profit functions for different companies selling smartphones. Students will be given information about each company in different forms (tables, graphs, etc.) and will be asked to write equations and sketch graphs for each of the profit functions. Students will use these equations and graphs to describe the long-term trend in profit for each of the companies. They will use their data to choose a company that they would invest in. Students will finally

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write a reflection on the assignment describing which company has the best future and which method of solving and graphing they like the best.

Evaluation: Summative Performance Task Assessment Rubric

Unit Resources

- Worksheets
- Calculator
- Laptops
- SBAC Prep Online
- Pear Assessment
- Blooket
- Quizizz
- Jeopardy Labs
- Task Cards
- Partner/Group Games
- Online Resources: Math Stations