CHAPTER

3

Represent Quadratic Functions

Vocabulary

completing the square
discriminant
quadratic formula

Curriculum Expectations

Quadratic Functions

By the end of this course, students will:

1.6 explore the algebraic development of the quadratic formula, and apply the formula to solve quadratic equations, using technology

1.7 relate the real roots of a quadratic equation to the x-intercepts of the corresponding graph, and connect the number of real roots to the value of the discriminant

1.8 determine the real roots of a variety of quadratic equations, and describe the advantages and disadvantages of each strategy (i.e. graphing; factoring; using the quadratic formula)

2.8 express the equation of a quadratic function in the vertex form $f(x) = a(x - h)^2 + k$, given the standard form $f(x) = ax^2 + bx + c$, by completing the square, including cases where $\frac{b}{a}$ is a simple rational number, and verify, using graphing technology, that these forms are equivalent representations

2.10 describe the information that can be obtained by inspecting the standard form $f(x) = ax^2 + bx + c$, the vertex form $f(x) = a(x - h)^2 + k$, and the factored form $f(x) = a(x - r)(x - s)$ of a quadratic function

2.11 sketch the graph of a quadratic function whose equation is given in the standard form $f(x) = ax^2 + bx + c$ by using a suitable strategy, and identify the key features of the graph

3.2 determine, through investigation using a variety of strategies, the equation of the quadratic function that best models a suitable data set graphed on a scatter plot, and compare this equation to the equation of a curve of best fit generated with technology

3.3 solve problems arising from real-world applications given the algebraic representation of a quadratic function

Chapter 3 Planning Chart

Section	Suggested Timing	Student Text Page(s)	Materials and TechnologyTools
Chapter 3 Opener	10–15 min	120–121	
Prerequisite Skills	80 min	122–123	• grid paper
3.1 Complete the Square	80–160 min	124–134	• algebra tiles • graphing calculators • grid paper
3.2 The Quadratic Formula	80 min	135–144	• grid paper • graphing calculators (optional)
3.3 Real Roots of Quadratic Equations	80 min	145–152	• grid paper • graphing calculators (optional)
3.4 Multiple Forms of Quadratic Functions	160 min	153–163	• graphing calculators • grid paper
3.5 Model With Quadratic Equations	80 min	164–173	• graphing calculators • grid paper • computers with spreadsheet software or *Fathom*™ (optional)
Chapter 3 Review	80 min	174–175	• graphing calculators • grid paper
Chapter 3 Problem Wrap-Up	40 min	175	• computers with Internet access
Chapter 3 Practice Test	80 min	176–177	• grid paper
Chapter 3 Task: Design a Roller Coaster	80 min	178–179	• graphing calculators • grid paper
Chapters 1 to 3 Review	80 min	180–181	• grid paper • graphing calculators • algebra tiles

Chapter 3 Blackline Masters Checklist

	BLM	Title	Purpose
Prerequisite Skills			
	BLM G–1	Grid Paper	Student Support
	BLM 3–1	Prerequisite Skills	Practice
	BLM 3–2	Prerequisite Skills Self-Assessment Checklist	Student Self-Assessment
3.1 Complete the Square			
	BLM G–1	Grid Paper	Student Support
	BLM 3–3	Section 3.1 Complete the Square	Practice
	BLM 3–4	Section 3.1 Achievement Check Rubric	Assessment
3.2 The Quadratic Formula			
	BLM G–1	Grid Paper	Student Support
	BLM A–8	Application General Scoring Rubric	Assessment
	BLM 3–5	Section 3.2 The Quadratic Formula	Practice
3.3 Real Roots of Quadratic Equations			
	BLM G–1	Grid Paper	Student Support
	BLM A–9	Communication General Scoring Rubric	Assessment
	BLM 3–6	Section 3.3 Real Roots of Quadratic Equations	Practice
3.4 Multiple Forms of Quadratic Functions			
	BLM G–1	Grid Paper	Student Support
	BLM 3–7	Section 3.4 Multiple Forms of Quadratic Functions	Practice
	BLM 3–8	Section 3.4 Achievement Check Rubric	Assessment
3.5 Model With Quadratic Equations			
	BLM G–1	Grid Paper	Student Support
	BLM A–4	Presentation Checklist	Assessment
	BLM A–10	Observation General Scoring Rubric	Assessment
	BLM 3–9	Section 3.5 Model With Quadratic Equations	Practice
Chapter 3 Review			
	BLM G–1	Grid Paper	Student Support
	BLM 3–10	Chapter 3 Review	Practice
Chapter 3 Problem Wrap-Up			
	BLM 3–11	Chapter 3 Problem Wrap-Up Rubric	Assessment
Chapter 3 Practice Test			
	BLM G–1	Grid Paper	Student Support
	BLM 3–12	Chapter 3 Practice Test	Diagnostic Assessment
	BLM 3–13	Chapter 3 Test	Summative Assessment
	BLM 3–14	Chapter 3 Practice Test Achievement Check Rubric	Assessment
Chapter 3 Task: Design a Roller Coaster			
	BLM G–1	Grid Paper	Student Support
	BLM 3–15	Chapter 3 Task Rubric	Assessment
Chapters 1 to 3 Review			
	BLM G–1	Grid Paper	Student Support
	BLM A–13	Self-Assessment Recording Sheet	Student Self-Assessment
	BLM A–14	Self-Assessment Checklist	Student Self-Assessment
	BLM 3–16	Chapter 3 BLM Answers	Answers

Prerequisite Skills

Student Text Pages
122–123

Suggested Timing
80 min

Materials and Technology Tools
- grid paper

Related Resources
- BLM G–1 Grid Paper
- BLM 3–1 Prerequisite Skills
- BLM 3–2 Prerequisite Skills Self-Assessment Checklist

Common Errors

- Some students may have difficulty with the algebraic manipulation of fractions.

R_x Have students practice adding, subtracting, multiplying, and dividing fractions. If available, some students may benefit from working with fraction circle manipulatives.

- Some students may have difficulty with Evaluating Expressions and Factoring Quadratic Expressions**.**

R_x Consolidate students' understanding of BEDMAS by following each step carefully and highlighting which operation comes next. Students may need to review Chapter 2 for a refresher on factoring.

Accommodations

Visual–some students may benefit from using graphing calculators to check their answers to **questions 9 and 10**

Perceptual–have algebra tiles available to help students factor quadratic expressions

Memory–for **questions 3 and 4**, have students identify all the operations and use BEDMAS to determine the order in which the operations should be performed

Teaching Suggestions

- You may wish to assign the Prerequisite Skills for home study after an evaluation and spend some time in class the next day taking up some questions.
- Assign select questions as diagnostic assessments to gauge students' abilities.
- Have copies of **BLM G–1 Grid Paper** available for students to use.
- Use **BLM 3–1 Prerequisite Skills** for remediation or extra practice. To further reinforce the concepts, you may wish to refer students to specific skills in the **Prerequisite Skills Appendix** on student text pages 420–435.

Assessment

- Assess student readiness to proceed by informal observation as students are working on the questions. A formal test would be inappropriate since this material is not part of the curriculum to be covered by this chapter.
- Student self-assessment is also an effective technique; students can place a checkmark beside topics in the Prerequisite Skills in which they feel confident with the necessary skills. Use **BLM 3–2 Prerequisite Skills Self-Assessment Checklist** as a self-assessment for students.
- Remedial action can be taken in small groups or with a whole-class skills review.

Chapter Problem

- The Chapter Problem is introduced in the Chapter 3 opener. Have students discuss their understanding of the topic. You may wish to have students complete the Chapter Problem revisits that occur throughout the chapter. These questions are designed to help students move toward the Chapter 3 Problem Wrap-Up at the end of the Chapter 3 Review.
- Alternatively, you may wish to assign the Chapter Problem when students have completed the chapter. The Chapter Problem is a summative assessment.