5 Quadratic Relations II

Strand
Mathematical Models

Student Text Pages
230–291

Suggested Timing
10 min

Related Resources
BLM A-4 Presentation Checklist

Key Terms

axis of symmetry
differences of squares
intercept form
perfect square trinomial
standard form
zeros

Additional information and teaching materials for this chapter are available on the McGraw-Hill Ryerson Web-site at *www.mcgrawhill.ca/books/foundations11*. You will need your password to access this material.

Chapter Curriculum Specific Expectations

Investigating the Basic Properties of Quadratic Relations

In this chapter, students will

MM1.05 expand and simplify quadratic expressions in one variable involving multiplying binomials [e.g., $\left(\frac{1}{2}x + 1\right)(3x - 2)$] or squaring a binomial [e.g., $5(3x - 1)^2$], using a variety of tools (e.g., paper and pencil, algebra tiles, computer algebra systems)

MM1.06 express the equation of a quadratic relation in the standard form $y = ax^2 + bx + c$, given the vertex form $y = a(x - h)^2 + k$, and verify, using graphing technology, that these forms are equivalent representations

MM1.07 factor trinomials of the form $ax^2 + bx + c$, where $a = 1$ or where a is the common factor, by various methods

MM1.08 determine, through investigation, and describe the connection between the factors of a quadratic expression and the x-intercepts of the graph of the corresponding quadratic relation

MM1.09 solve problems, using an appropriate strategy (i.e., factoring, graphing), given equations of quadratic relations, including those that arise from real-world applications (e.g., break-even point)

Teaching Suggestions

Chapter Opener

- Ask students to think about interesting fountains they have seen. You may want to search the Internet for images of fountains. Discuss what factors should be considered when designing a fountain.
- Review some of the key terms with students. Which terms are they familiar with? Some of the new terms are specific to certain contexts. Class discussions around the specific contexts will help.
- Ensure students understand that the skills they will learn in this chapter have a wide variety of applications.

Career Profile

Have students discuss where parabolas may be found elsewhere in architecture. As an extension, have students compare the career of architectural technician to that of an architect, and present their findings to the class. You may wish to use **BLM A-4 Presentation Checklist** to assess students' presentations.

Using their research, have students discuss:

- What an architectural technician does.
- What type of education and training are needed for this career.
- How the careers of architectural technician and architect differ.
- The differences in the training and education required for these two careers.

You may wish to have students include their research in their portfolios. For more career resources for your students, see the McGraw-Hill Ryerson Web-site at *www.mcgrawhill.ca/books/foundations11*.

Chapter 5 Planning Chart

Section Suggested Timing	Student Text Page(s)	Teacher's Resource Blackline Masters	Assessment	Tools
Chapter 5 Opener • 10 min	230–231		• BLM A-4 Presentation Checklist	
Prerequisite Skills • 80 min	232–233	• BLM 5-1 Prerequisite Skills Practice • BLM G-3 Four Quadrant Grids	• BLM 5-2 Prerequisite Skills Self-Assessment Checklist	• algebra tiles • grid paper
5.1 Expand Binomials • 80 min	234–241	• BLM 5-3 Section 5.1 Expand Binomials • BLM T-5 CAS on the TI-89 Calculator		• algebra tiles • Computer Algebra Systems
5.2 Change Quadratic Relations From Vertex Form to Standard Form • 80 min	242–247	• BLM 5-4 Section 5.2 Change Quadratic Relations From Vertex Form to Standard Form • BLM G-3 Four Quadrant Grids	• BLM 5-5 Section 5.2 Achievement Check Rubric	• graphing calculators • grid paper
5.3 Factor Trinomials of the Form $x^2 + bx + c$ • 80 min	248–255	• BLM 5-6 Section 5.3 Factor Trinomials of the Form $x^2 + bx + c$	• BLM A-9 Communication General Scoring Rubric	• algebra tiles
5.4 Factor Trinomials of the Form $ax^2 + bx + c$ • 80 min	256–263	• BLM 5-7 Section 5.4 Factor Trinomials of the Form $ax^2 + bx + c$ • BLM G-3 Four Quadrant Grids	• BLM 5-8 Section 5.4 Achievement Check Rubric	• grid paper
5.5 The *x*-Intercepts of a Quadratic Relation • 80 min	264–275	• BLM 5-9 Section 5.5 The *x*-Intercepts of a Quadratic Relation • BLM 5-10 Section 5.5 Literacy Connect • BLM G-3 Four Quadrant Grids	• BLM A-10 Observation General Scoring Rubric • BLM A-18 Opinion Piece Checklist	• graphing calculators • grid paper
5.6 Solve Problems Involving Quadratic Relations • 80 min	276–285	• BLM 5-11 Section 5.6 Solve Problems Involving Quadratic Relations • BLM G-3 Four Quadrant Grids	• BLM 5-12 Section 5.6 Achievement Check Rubric	• graphing calculators • grid paper
Chapter 5 Review • 80 min	286–287	• BLM 5-13 Chapter 5 Review		
Chapter 5 Practice Test • 40–80 min	288–289		• BLM 5-14 Chapter 5 Practice Test • BLM 5-15 Chapter 5 Test	
Chapter 5 Problem Wrap-Up • 80 min	289		• BLM 5-16 Chapter 5 Problem Wrap-Up Rubric	
Chapter 5 Task: Design a Soccer Field • 80 min	290–291		• BLM 5-17 Task: Design a Soccer Field Rubric	

Chapter 5 Blackline Masters Checklist

	Title		Purpose
Chapter 7 Opener			
	BLM A-4	Presentation Checklist	Assessment
Prerequisite Skills			
	BLM 5-1	Prerequisite Skills	Practice
	BLM 5-2	Prerequisite Skills Self-Assessment Checklist	Self-Assessment
	BLM G-3	Four Quadrant Grids	Student Support
5.1 Expand Binomials			
	BLM 5-3	Section 5.1 Expand Binomials	Practice
	BLM T-5	CAS on the TI-89 Calculator	Technology Support
5.2 Change Quadratic Relations From Vertex Form to Standard Form			
	BLM 5-4	Section 5.2 Change Quadratic Relations From Vertex Form to Standard Form	Practice
	BLM 5-5	Section 5.2 Achievement Check Rubric	Assessment
	BLM G-3	Four Quadrant Grids	Student Support
5.3 Factor Trinomials of the Form $x^2 + bx + c$			
	BLM 5-6	Section 5.3 Factor Trinomials of the Form $x^2 + bx + c$	Practice
	BLM A-9	Communication General Scoring Rubric	Assessment
5.4 Factor Trinomials of the Form $ax^2 + bx + c$			
	BLM 5-7	Section 5.4 Factor Trinomials of the Form $ax^2 + bx + c$	Practice
	BLM 5-8	Section 5.4 Achievement Check Rubric	Assessment
	BLM G-3	Four Quadrant Grids	Student Support
5.5 The x-Intercepts of a Quadratic Relation			
	BLM 5-9	Section 5.5 The *x*-Intercepts of a Quadratic Relation	Practice
	BLM 5-10	Section 5.5 Literacy Connect	Literacy
	BLM A-10	Observation General Scoring Rubric	Assessment
	BLM A-18	Opinion Piece Checklist	Literacy
	BLM G-3	Four Quadrant Grids	Student Support
5.6 Solve Problems Involving Quadratic Relations			
	BLM 5-11	Section 5.6 Solve Problems Involving Quadratic Relations	Practice
	BLM 5-12	Section 5.6 Achievement Check Rubric	Assessment
	BLM G-3	Four Quadrant Grids	Student Support
Chapter 5 Review			
	BLM 5-13	Chapter 5 Review	Review
Chapter 5 Practice Test			
	BLM 5-14	Chapter 5 Practice Test	Diagnostic Assessment
	BLM 5-15	Chapter 5 Test	Summative Assessment
Chapter 5 Problem Wrap-Up			
	BLM 5-16	Chapter 5 Problem Wrap-Up Rubric	Summative Assessment
Task: Design a Soccer Field			
	BLM 5-17	Task: Design a Soccer Field Rubric	Summative Assessment

Prerequisite Skills

Student Text Pages
232–233

Suggested Timing
80 min

Tools
- algebra tiles
- grid paper

Related Resources
BLM 5-1 Prerequisite Skills
BLM 5-2 Prerequisite Skills Self-Assessment Checklist
BLM G-3 Four Quadrant Grids

Common Errors

- Some students may have trouble drawing graphs given the relation.

R_x Have students review how to make a table of values from the equation of the relation.

- Some students may have difficulty factoring a trinomial.

R_x Have students expand binomial products to remind themselves of the pattern. Then have students review finding pairs of numbers whose sum is b and whose product is c, given a trinomial of the form $ax^2 + bx + c$.

Accommodations

Visual—allow students to use technology to graph relations

Perceptual—provide students with algebra tiles

Teaching Suggestions

- As these topics have been covered in previous lessons, a diagnostic approach can be taken. Ask students to write down how much they remember about each topic. Go over their lists and discuss the key concepts before assigning the exercise. Take up questions every few minutes to give immediate feedback.
- Stronger students may only need to do a few parts of each question. Students who are having difficulty may benefit from the additional practice of completing all the questions.
- Distribute copies of **BLM G-3 Four Quadrant Grids**.
- All BLMs referred to throughout this chapter can be found on the *Foundations for College Mathematics 11 Teacher's Resource* CD-ROM.

Assessment

- Assess student readiness to proceed by informal observation as students are working on the questions. A formal test is inappropriate since this material is not part of the grade 11 curriculum for 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 5-2 Prerequisite Skills Self-Assessment Checklist** as a self-assessment for students.

Extra Practice

- Use **BLM 5-1 Prerequisite Skills** for extra practice or remediation.

Chapter Problem

- The Chapter Problem is introduced on page 233. 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 5 Problem Wrap-Up on page 289.
- Alternatively, you may wish to assign the Chapter Problem questions and Chapter Problem Wrap-Up when students have complete the chapter, as part of a summative assessment.