CHAPTER
6

Quadratic Relations

Student Text Pages
234–275

Suggested Timing
15–20 min

Related Resources
BLM 6.CO.1 Literacy Link: Circle, Wheel, and Spoke Diagrams
BLM A11 Presentation Checklist

Key Terms

axis of symmetry
first differences
maximum
minimum
parabola
quadratic relation
second differences
vertex
x-intercepts

Chapter Curriculum Specific Expectations
Identifying Characteristics of Quadratic Relations
In this chapter, students will

QR2.01 collect data that can be represented as a quadratic relation, from experiments using appropriate equipment and technology (e.g., concrete materials, scientific probes, calculators), or from secondary sources (e.g., the Internet, Statistics Canada); graph the data and draw a curve of best fit, if appropriate, with or without the use of technology

QR2.02 determine, through investigation using technology, that a quadratic relation of the form $y = ax^2 + bx + c$ $(a \neq 0)$ can be graphically represented as a parabola, and determine that the table of values yields a constant second difference

QR2.03 identify the key features of a graph of a parabola (i.e., the equation of the axis of symmetry, the coordinates of the vertex, the y-intercept, the zeros, and the maximum or minimum value), using a given graph or a graph generated with technology from its equation, and use the appropriate terminology to describe the features

Teaching Suggestions
Chapter Opener
• Ask students what objects they can think of with shapes that appear to be parabolic.
• Encourage students to research to find natural and man-made objects whose shape can be modelled by a parabola.

Literacy Link
• Have students begin a Circle, Wheel, and Spoke diagram. You may wish to have students use **BLM 6.CO.1 Literacy Link: Circle, Wheel, and Spoke Diagrams** for this activity. For more information on the Think Literacy program, visit http://www.edu.gov.on.ca/eng/studentsuccess/thinkliteracy.

Career Profile
• Courses on manufacturing technology are offered at Ontario community colleges. Have students research other careers that require the use of applied mathematics and present their findings to the class. You may wish to use **BLM A11 Presentation Checklist** to assess students' presentations.

Additional information and teaching materials for this chapter are available on the McGraw-Hill Ryerson web site at http://mcgrawhill.ca/books/foundations10. You will need your password to access this material.

Chapter 6 Planning Chart

Section Suggested Timing	Student Text Page(s)	Teacher's Resource Blackline Masters	Assessment	Tools
Chapter 6 Opener • 15–20 min	234–235	• BLM 6.CO.1 Literacy Link: Circle, Wheel, and Spoke Diagrams	• BLM A11 Presentation Checklist	
Get Ready! • 80–160 min	236–237	• BLM 6.GR.1 Practice: Get Ready • BLM G1 Grid Paper	• BLM 1.GR.2 Get Ready Self-Assessment Checklist	• graphing calculators • grid paper
6.1 Explore Non-Linear Relations • 80 min	238–244	• BLM 6.1.1 Practice: Explore Non-Linear Relations • BLM G1 Grid Paper	• BLM A3 Communication General Scoring Rubric	• grid paper
6.2 Model Quadratic Relations • 80 min	245–253	• BLM 6.2.1 Practice: Model Quadratic Relations • BLM G1 Grid Paper	• BLM 6.2.2 Achievement Check Rubric • BLM A10 Group Work Recording Sheet	• Calculator-Based Rangers (CBR™) • graphing calculators • grid paper
6.3 Key Features of Quadratic Relations • 80 min	254–263	• BLM 6.3.1 Practice: Key Features of Quadratic Relations • BLM G1 Grid Paper	• BLM 6.3.4 Achievement Check Rubric	• graphing calculators • grid paper
6.4 Rates of Change in Quadratic Relations • 80 min	264–271	• BLM 6.4.1 Practice: Rates of Change in Quadratic Relations • BLM G1 Grid Paper	• BLM 6.4.2 Achievement Check Rubric	• graphing calculators • grid paper
Chapter 6 Review • 80 min	272–273	• BLM 6.CR.1 Chapter 6 Review • BLM G1 Grid Paper		• graphing calculators • grid paper
Chapter 6 Practice Test • 80 min	274–275	• BLM 6.PT.1 Chapter 6 Practice Test • BLM G1 Grid Paper	• BLM 6.CT.1 Chapter 6 Test	• graphing calculators • grid paper
Chapter 6 Problem Wrap-Up • 80 min	275		• BLM 6.CP.1 Chapter 6 Problem Wrap-Up Rubric	

Chapter 6 Blackline Masters Checklist

		Title	Purpose
Chapter 6 Opener			
	BLM 6.CO.1	Literacy Link: Circle, Wheel, and Spoke Diagrams	Literacy
	BLM A11	Presentation Checklist	Assessment
Get Ready!			
	BLM 6.GR.1	Practice: Get Ready	Practice
	BLM 6.GR.2	Get Ready Self-Assessment Checklist	Student Self-Assessment
	BLM G1	Grid Paper	Student Support
6.1 Explore Non-Linear Relations			
	BLM 6.1.1	Practice: Explore Non-Linear Relations	Practice
	BLM A3	Communication General Scoring Rubric	Assessment
	BLM G1	Grid Paper	Student Support
6.2 Model Quadratic Relations			
	BLM 6.2.1	Practice: Model Quadratic Relations	Practice
	BLM 6.2.2	Achievement Check Rubric	Assessment
	BLM A10	Group Work Recording Sheet	Assessment
	BLM G1	Grid Paper	Student Support
6.3 Key Features of Quadratic Relations			
	BLM 6.3.1	Practice: Key Features of Quadratic Relations	Practice
	BLM 6.3.2	Achievement Check Rubric	Assessment
	BLM G1	Grid Paper	Student Support
6.4 Rates of Change in Quadratic Relations			
	BLM 6.4.1	Practice: Rates of Change in Quadratic Relations	Practice
	BLM 6.4.2	Achievement Check Rubric	Assessment
	BLM G1	Grid Paper	Student Support
Chapter 6 Review			
	BLM 6.CR.1	Chapter 6 Review	Review
	BLM G1	Grid Paper	Student Support
Chapter 6 Practice Test			
	BLM 6.PT.1	Chapter 6 Practice Test	Diagnostic Assessment
	BLM 6.CT.1	Chapter 6 Test	Summative Assessment
	BLM G1	Grid Paper	Student Support
Chapter 6 Problem Wrap-Up			
	BLM 6.CP.1	Chapter 6 Problem Wrap-Up Rubric	Summative Assessment

Get Ready!

Suggested Timing
80–160 min

Tools
• graphing calculators
• grid paper

Related Resources
BLM 6.GR.1 Practice: Get Ready
BLM 1.GR.2 Get Ready Self-
    Assessment Checklist
BLM G1 Grid Paper

Common Errors

• Some students may refer to intercepts incorrectly (e.g., when asked for the x-intercept, they may say (5, 0) instead of 5).

R_x Remind students that the x-intercept refers to the x-coordinate(s) of the point(s) where the relation intersects the x-axis. Similarly, the y-intercept refers to the point where the relation intersects the y-axis.

Accommodations

Memory—Encourage students to review the steps required to use technology.

Motor—Provide students with enlarged grid paper for graphing.

Teaching Suggestions
• You may wish to use **BLM G1 Grid Paper** for question 2.
• Students' levels of ability and their experience with the graphing calculator may vary greatly.
• For question 3, you may wish to pair students who are competent using a graphing calculator with those with less experience.
• Students will use graphing calculators extensively throughout this chapter.
• Spend some time here to refresh their graphing calculator skills.
• In question 5, students identify the lines of symmetry of objects. The concept of line symmetry will be revisited in Section 6.3 when students find the equation of the axis of symmetry for a parabola.
• Use **BLM 6.GR.1 Practice: Get Ready** for extra practice or remediation.

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 grade 11 curriculum for this chapter.
• Student self-assessment is also an effective technique; students can place a checkmark beside topics in the Get Ready in which they feel confident with the necessary skills. You may wish to use **BLM 1.GR.2 Get Ready 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 deals with archaeology. Similar situations may arise in forensics. The problem provides an opportunity for students to research the math used in archaeology or forensic sciences.
• 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 Problem Wrap-Up. Alternatively, you may wish to assign the Chapter Problem questions and Chapter Problem Wrap-Up when students have completed the chapter, as part of a summative assessment.