

Factor Quadratic Expressions

Vocabulary

constant term
 decomposition
 difference of squares
 factored form of a quadratic function
 interval
 linear term
 perfect square trinomial
 quadratic equation
 root
 standard form of a quadratic function
 term
 vertex form of a quadratic function
 zero of a function

Curriculum Expectations

Quadratic Functions

By the end of this course, students will:

- 1.1** pose problems involving quadratic relations arising from real-world applications and represented by tables of values and graphs, and solve these and other such problems
- 1.2** represent situations using quadratic expressions in one variable, and expand and simplify quadratic expressions in one variable
- 1.3** factor quadratic expressions in one variable, including those for which $a \neq 1$, differences of squares, and perfect square trinomials, by selecting and applying an appropriate strategy
- 1.4** solve quadratic equations by selecting and applying a factoring strategy
- 1.5** determine, through investigation, and describe the connection between the factors used in solving a quadratic equation and the x -intercepts of the graph of the corresponding quadratic relation
- 2.4** explain any restrictions on the domain and the range of a quadratic function in contexts arising from real-world applications
- 2.7** express the equation of a quadratic function in the standard form $f(x) = ax^2 + bx + c$, given the vertex form $f(x) = a(x - h)^2 + k$, and verify, using graphing technology, that these forms are equivalent representations
- 2.9** sketch graphs of quadratic functions in the factored form $f(x) = a(x - r)(x - s)$ by using the x -intercepts to determine the vertex
- 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

Chapter 2 Planning Chart

Section	Suggested Timing	Student Text Page(s)	Materials and Technology Tools
Chapter 2 Opener	10–15 min	60–61	
Prerequisite Skills	75–110 min	62–63	<ul style="list-style-type: none"> • grid paper • algebra tiles • calculators or computers with Computer Algebra System (CAS) (optional)
2.1 Quadratic Functions: Exploring Forms	75 min	64–75	<ul style="list-style-type: none"> • grid paper • graphing calculators • algebra tiles (optional) • computers with graphing software (optional) • linking cubes or colour tiles (optional)
2.2 Quadratic Functions: Comparing Forms	75 min	76–85	<ul style="list-style-type: none"> • grid paper • graphing calculators • algebra tiles • computers with graphing software (optional) • overhead projector (optional)
Technology Extension: Model the Motion of a Projectile	75 min	86–87	<ul style="list-style-type: none"> • video camera, or digital camera with motion-picture playback capability • tennis balls • computers with <i>The Geometer's Sketchpad</i>® and video playback software • pre-made videos of projectiles (optional)
2.3 Factor Quadratic Expressions of the Form $ax^2 + bx + c$	75–150 min	88–97	<ul style="list-style-type: none"> • algebra tiles • calculators or computers with Computer Algebra System (CAS)
2.4 Select and Apply Factoring Strategies	75–150 min	98–107	<ul style="list-style-type: none"> • algebra tiles • calculators or computers with Computer Algebra System (CAS)
2.5 Solve Quadratic Equations by Factoring	75 min	108–113	<ul style="list-style-type: none"> • graph paper • algebra tiles • calculators or computers with Computer Algebra System (CAS)
Chapter 2 Review	75 min	114–115	<ul style="list-style-type: none"> • grid paper • algebra tiles • computers with graphing software (optional)
Chapter 2 Problem Wrap-Up	40 min	115	<ul style="list-style-type: none"> • computers with Internet access and/or <i>The Geometer's Sketchpad</i>® (optional)
Chapter 2 Practice Test	75 min	116–117	<ul style="list-style-type: none"> • grid paper • algebra tiles • computers with graphing software (optional) • colour tiles (optional)
Chapter 2 Task: Processor Fabrication	45–75 min	118–119	

Chapter 2 Blackline Masters Checklist

	BLM	Title	Purpose
Prerequisite Skills			
	BLM G-1	Grid Paper	Student Support
	BLM G-5	Second Differences Tables	Student Support
	BLM 2-1	Prerequisite Skills	Practice
	BLM 2-2	Prerequisite Skills Self-Assessment Checklist	Student Self-Assessment
2.1 Quadratic Functions: Exploring Forms			
	BLM G-1	Grid Paper	Student Support
	BLM 2-3	Section 2.1 Quadratic Functions: Exploring Forms	Practice
2.2 Quadratic Functions: Comparing Forms			
	BLM G-1	Grid Paper	Student Support
	BLM 2-4	Section 2.2 Quadratic Functions: Comparing Forms	Practice
	BLM 2-5	Section 2.2 Achievement Check Rubric	Assessment
2.3 Factor Quadratic Expressions of the Form $ax^2 + bx + c$			
	BLM 2-6	Section 2.3 Factor Quadratic Expressions of the Form $ax^2 + bx + c$	Practice
2.4 Select and Apply Factoring Strategies			
	BLM 2-7	Section 2.4 Select and Apply Factoring Strategies	Practice
2.5 Solve Quadratic Equations by Factoring			
	BLM 2-8	Section 2.5 Solve Quadratic Equations by Factoring	Practice
	BLM 2-9	Section 2.5 Achievement Check Rubric	Assessment
Chapter 2 Review			
	BLM G-1	Grid Paper	Student Support
	BLM A-13	Self-Assessment Recording Sheet	Assessment
	BLM 2-10	Chapter 2 Review	Practice
Chapter 2 Problem Wrap-Up			
	BLM 2-11	Chapter 2 Problem Wrap-Up Rubric	Summative Assessment
Chapter 2 Practice Test			
	BLM G-1	Grid Paper	Student Support
	BLM 2-12	Chapter 2 Practice Test	Diagnostic Assessment
	BLM 2-13	Chapter 2 Test	Summative Assessment
	BLM 2-14	Chapter 2 Practice Test Achievement Check Rubric	Assessment
Chapter 2 Task: Processor Fabrication			
	BLM A-17	Learning Skills Checklist	Assessment
	BLM 2-15	Chapter 2 Task Rubric	Assessment
	BLM 2-16	Chapter 2 BLM Answers	Answers

Prerequisite Skills

Student Text Pages

62–63

Suggested Timing

75–110 min

Materials and Technology Tools

- grid paper
- algebra tiles
- calculators or computers with Computer Algebra System (CAS) (optional)

Related Resources

- BLM G-1 Grid Paper
- BLM G-5 Second Differences Tables
- BLM 2-1 Prerequisite Skills
- BLM 2-2 Prerequisite Skills Self-Assessment Checklist

Common Errors

- Some students may multiply incorrectly when applying the distributive property, particularly when integers are involved.
- R_x** Have students review integer operations. Provide algebra tiles as needed to assist students in understanding the distributive property.
- Some students may have difficulty identifying factors of binomials and trinomials.
- R_x** Have students construct area models using algebra tiles to make connections between the polynomial (representing the area of the rectangle) and its factors (representing the length and width of the rectangle).

Accommodations

Motor—provide students with copies of **BLM G-5 Second Differences Tables**; have students use technology for graphing

Teaching Suggestions

- Students can check their answers **questions 1 and 3** using graphing technology.
- Algebra tiles are needed for the problems involving expanding and simplifying algebraic expressions and factoring polynomials.
- A Computer Algebra System (CAS) is recommended for **question 14**.
- Use **BLM 2-1 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 is 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 2-2 Prerequisite Skills Self-Assessment Checklist** as a self-assessment for students.
- Remedial action can be taken in small groups or in a whole-class skills review.

Chapter Problem

- The Chapter Problem is introduced in the Chapter 2 opener. Have students discuss where they may see examples of parabolas in architecture or in manufactured items. 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 2 Problem Wrap-Up at the end of the Chapter 2 Review.
- Alternatively, you may wish to assign the Chapter Problem when students have completed the chapter. The Chapter Problem can be used as a summative assessment.