

7.1

Multiply Two Binomials

Strand

Quadratic Relations of the Form $y = ax^2 + bx + c$

Student Text Pages

280–289

Suggested Timing

80 min

Tools

- algebra tiles
- Computer Algebra System (CAS)

Related Resources

BLM 7.1.1 Practice: Multiply Two Binomials

BLM T2 The Computer Algebra System (CAS) on the TI-89 Calculator

Specific Expectations Manipulating Quadratic Expressions

In this section, students will

QR1.01 expand and simplify second-degree polynomial expressions involving one variable that consist of the product of two binomials [e.g., $(2x + 3)(x + 4)$] or the square of a binomial [e.g., $(2x + 3)^2$], using a variety of tools (e.g., algebra tiles, diagrams, computer algebra systems, paper and pencil) and strategies (e.g., patterning)

Link to Get Ready

The Get Ready segment Algebraic Expressions provides the needed skills for this section. You may wish to have students complete questions 3 to 7 before proceeding with Section 7.1.

Warm-Up

1. Express each number as a binomial.

- | | |
|-------|-------|
| a) 45 | b) 36 |
| c) 52 | d) 74 |

2. Write each factor as a binomial, then find each product.

- | | |
|-------------------|-------------------|
| a) 23×13 | b) 45×62 |
| c) 51×82 | d) 73×92 |

3. Use algebra tiles to model each binomial.

- | | |
|-------------|-------------|
| a) $2x + 5$ | b) $3x + 4$ |
| c) $x + 3$ | d) $4x + 1$ |

4. Find the area of each rectangle.

- a) length = 3 cm, width = 7 cm
 b) length = 5 m, width = 1 m
 c) length = 6 ft, width = 2 ft

Warm-Up Answers

- | | | | |
|--------------------------|---------------------|-----------------------|-----------|
| 1. a) 40 + 5 | b) 30 + 6 | c) 50 + 2 | d) 70 + 4 |
| 2. a) 299 | b) 2790 | c) 4182 | d) 6716 |
| 3. a) | b) | c) | d) |
| 4. a) 21 cm ² | b) 5 m ² | c) 12 ft ² | |

Teaching Suggestions

Warm-Up

- Write the Warm-Up questions on the board or on an overhead. Have students complete the questions independently. Then, discuss the solutions as a class. (5–10 min)

Common Errors

- Some students may have trouble keeping track of the calculations when developing a quadratic expression. They often forget to multiply the “middle” terms.

R_x Have students use an area model to structure the process. This has the same effect as the FOIL multiplication pattern, but is a visual aid.



Ongoing Assessment

- While students are working on the Investigate questions, take the opportunity to circulate to see how well each works with a partner. This may be an opportunity to begin observing and recording the individual student’s learning skills: group work, work habits, organization, and initiative.
- This is a good section to use CAS to help students to master the concepts without the arithmetic errors getting in the way. Manipulatives such as algebra tiles could be used in an assessment of this section but should not be necessary by the end of this chapter.
- You may wish to have students work on Chapter Problem question 14 now, to build toward solving the Chapter Problem. This provides an opportunity to assess student progress. Alternatively, assign all Chapter Problem questions at the end of the chapter as a summative assessment.

Section Opener

- Discuss the opening paragraph with the class. Compare the distance between goal lines in the CFL and NFL football fields. You may also wish to mention that within the CFL, not all end zones are the same width but do have a 20 yd depth from the middle. By contrast, NFL end zones are the same rectangular shape, 10 yd deep.

Investigate

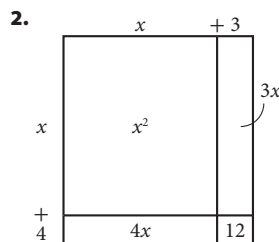
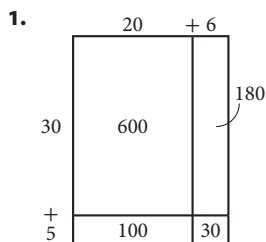
- Have students work in pairs to complete Investigate A.
- Prepare students for Investigate B by reviewing the binomials in Warm-Up question 2.
- Use **BLM 7.1.1 Practice: Multiply Two Binomials** for extra practice or remediation.
- You may wish to distribute copies of **BLM T2 The Computer Algebra System (CAS) on the TI-89 Calculator**.

Investigate Answers (pages 280–281)

Investigate A

- $x + 3; x + 2$
- Area = $(x + 3)(x + 2)$
-
- Area = $x^2 + 3x + 2x + 6$
= $x^2 + 5x + 6$

Investigate B



The area with electrical service is $x^2 + 7x + 12$.

Investigate C

- $x^2 + 7x + 12$
 - $y^2 + 15y + 56$
 - $a^2 + 5a - 14$
 - $-b^2 + 3b + 18$
- All the products have a term with the variable squared, a term with the variable, and a constant term. The numbers and variables in the products are different.
 - The coefficient on the variable term in each product is the sum of the constant terms of the binomial factors.
 - The constant term in each product is the product of the constant terms of the binomial factors.
- With algebra tiles and with the area model, each term in the first binomial multiplies each term in the second binomial, then the expression is simplified. The CAS performs the expansion in one step.

Accommodations

ESL—Review the Key Terms, creating a glossary in pictures, or in students' first language. You may also wish to have students write out the MathConnect on page 286 in their first language, as a study aid.

Gifted and Enrichment—Have a student contact the local municipal office to find out more about building regulations related to Apply the Concepts question 11. The student could then present this information to the class orally or in a form of media.

Have students translate Apply the Concepts question 12 to a real-life local situation. Have students create a model of a skateboard park in their area, representing the length and width with binomials.

Language/Perceptual/Visual—Have students manipulate the mathematical expressions using algebra tiles. Have students create a scale model or drawing to help them understand situations in the questions.

Examples

- Have students examine Example 1, then have pairs explain the methods to each other.
- Read the MathConnect on page 282 as a class, then draw the example on the board, labelling the green squares accordingly.
- Read the MathConnect on page 283 as a class, and demonstrate the FOIL method using pairs of numbers without a variable.
- When using algebra tiles to model the square of the binomial in Example 3, make sure students notice that the resulting tiles form a square.
- Add “perfect square trinomial” to the word wall that students started in Chapter 1.

Key Concepts

- Have students explain what *product* means.
- Have students work in pairs to create examples of the product of two binomials and the square of a binomial.
- Have students use the MathConnect on page 286 to write their own explanation of what these instructions mean.

Discuss the Concepts

- Have students prepare a list of methods that can be used to multiply binomials and have them explain each method with examples.

Discuss the Concepts Suggested Answers (page 286)

- D1.** When two binomials are multiplied, the constant term in the resulting trinomial is the product of the constant terms in the binomials. The coefficient of x in the trinomial is the sum of the constant terms in the binomials.
- D2.** Answers will vary.
- D3.** Students should describe one of the methods shown in Example 1, i.e., either the distributive property, multiplication pattern (e.g., FOIL), area model, algebra tiles, or CAS.

Practise the Concepts (A)

- Encourage students to refer back to the Examples before asking for assistance.
- Allow students to work in pairs to solve the questions.
- You may wish to have students use the multiplication method throughout this section.

Apply the Concepts (B)

- For area questions, have students use the area model to expand the product.
- Question 13 is a Literacy Connect. Literacy Connect questions offer the opportunity to explore literacy issues in the mathematics classroom and within the context of mathematics. This supports general Think Literacy strategies. For more information visit <http://www.edu.gov.on.ca/eng/studentssuccess/thinkliteracy>.
- Question 14 is a Chapter Problem. Remind students to keep the solution to this question handy as it may help them with the Chapter Problem Wrap-Up.

Extend the Concepts (C)

- Complete question 15 as an example, using the area model or algebra tiles.
- Assign question 16 for homework.
- Assign the Extend the Concepts questions to students who are not being challenged by questions in Apply the Concepts.
- Extend the Concepts questions can be used as a diagnostic assessment for those students considering a university-level course in grade 11.