# Multiply Two Binomials

**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)** $23 \times 13$      **b)** $45 \times 62$
   **c)** $51 \times 82$      **d)** $73 \times 92$

**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)

## 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.
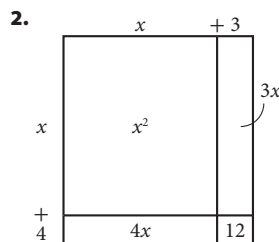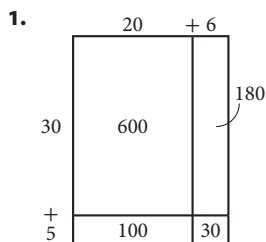
## Investigate

- 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**

**1.** $x + 3$; $x + 2$

**2.** Area $= (x + 3)(x + 2)$

**3.**



**4.** Area $= x^2 + 3x + 2x + 6$
$= x^2 + 5x + 6$

**Investigate B**

**1.**



**2.**



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

**Investigate C**

**1. a)** $x^2 + 7x + 12$
**b)** $y^2 + 15y + 56$
**c)** $a^2 + 5a - 14$
**d)** $-b^2 + 3b + 18$

**2. a)** 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.
**b)** The coefficient on the variable term in each product is the sum of the constant terms of the binomial factors.
**c)** The constant term in each product is the product of the constant terms of the binomial factors.

**3.** 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.

## 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/studentsuccess/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.