5.3 Factor Trinomials of the Form $x^2 + bx + c$

Student Text Pages
248–255

Suggested Timing
80 min

Tools
- algebra tiles

Related Resources
BLM 5-6 Section 5.3 Factor Trinomials of the Form $x^2 + bx + c$
BLM A-9 Communication General Scoring Rubric

Link to Prerequisite Skills

Students should complete questions 10 to 14 before proceeding with this section.

Warm-Up

1. Expand.

a) $(x + 4)(x + 7)$ **b)** $(x - 8)(x + 5)$
c) $(x - 3)(x - 9)$ **d)** $(x + 15)^2$

Warm-Up Answers

1. a) $x^2 + 11x + 28$ **b)** $x^2 - 3x - 40$ **c)** $x^2 - 12x + 27$ **d)** $x^2 + 30x + 225$

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.

Section Opener

- Read the introduction aloud. Ask students for examples of actions that undo other actions.

Investigate

- You may want to have students complete **parts a)** to **c)** of **question 1**, then look for a pattern. They can confirm the pattern by completing **parts d)** to **f)**.

Investigate Answers (pages 248-249)

1. a) $x^2 + 7x + 6$ **b)** $x^2 + 10x + 25$ **c)** $x^2 + 5x + 6$
d) $x^2 - 3x - 28$ **e)** $x^2 + 3x - 4$ **f)** $x^2 - 10x + 16$

2. a) The constant term in the trinomial is the product of the constant terms in each pair of binomial factors.

b) The coefficient of x in the trinomial is the sum of the constants terms in each pair of binomial factors.

c) If the constants in each pair of binomial factors are of the same signs, then the constants in the trinomial will be positive, otherwise they are negative. If the signs of the constant terms in the binomial factors are different, then the sign of the constant term in the trinomial is negative.

3.

	Coefficient of x	Constant Term
a)	5	4
b)	8	12
c)	7	–8
d)	–8	15
e)	–6	–40
f)	–6	5

4. Find two numbers whose product is 12 and whose sum is 7. The two numbers are 3 and 4.

Examples

- In Example 1, there is only one way to form a rectangle with the algebra tiles. The length and width of the rectangle represent the factors of the trinomial.
- In Example 2, ensure students understand that they should list the factors of the product first, then check the sums of the pairs of factors.
- For Example 4, remind students that a difference of squares is equivalent to a trinomial of the form $x^2 + bx + c$ or $ax^2 + bx + c$ where $b = 0$.
- The problem in Example 5 is an application of the difference of squares pattern.

Key Concepts

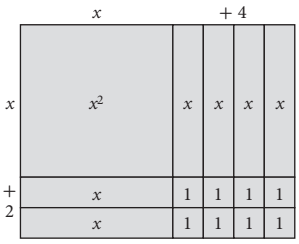
- Review the Key Concepts. Ensure students understand the different patterns and the processes used to factor each type.

Discuss the Concepts

- **Questions D1** and **D2** are good literacy questions, getting students to explain different factoring methods. Have students work in pairs to complete the questions.

Discuss the Concepts Suggested Answers (page 253)

D1. Arrange one x^2-tile, six x-tiles, and eight unit tiles to form a rectangle.



The dimensions of the rectangle are $(x + 4)$ by $(x + 2)$, so $x^2 + 6x + 8 = (x + 2)(x + 4)$.

D2. To factor $x^2 + 6x + 8$, find two numbers whose product is 8 and whose sum is 6.

$x^2 + 6x + 8 = (x + 2)(x + 4)$

D3. $x^2 - 9 = (x + 3)(x - 3)$

Practise (A)

- Encourage students to review the Investigate and the Examples before asking for assistance.
- Some students may wish to use algebra tiles to complete **question 2**.

Apply (B)

- For **question 9**, you may wish to have students use each trinomial to write a quadratic relation of the form $y = x^2 + bx + c$ and graph the relations. Students can use the graphs to predict which trinomials can be factored.
- **Question 10** is a Literacy Connect. Have students work in pairs to complete this question.
- **Question 13** links to the Chapter Problem. Remind students to keep the solution to this question handy as the methods they used may help them with the Chapter Problem Wrap-Up.
- For **question 14**, students should recognize that, since $A = lw$, the dimensions of the garden are the factors of $x^2 + 7x + 10$.

Common Errors

- Some students may forget about the negative sign when trying to factor an expression such as $x^2 - 13x - 30$.

R_x Have students use a table as in Example 2.

Accommodations

Visual—to help avoid copying errors, provide a worksheet for questions 2 through 9

Spatial—prepare a handout to help students organise the information in the Investigate

Gifted and Enrichment—encourage students to factor some expressions that follow the patterns but are slightly more complex, such as $64x^2 - \frac{1}{9}$

Extend (C)

- Assign the Extend question to students who are not being challenged by the Apply questions.

Literacy Connections

- Have students describe how to factor a trinomial of the form $x^2 + bx + c$.

Mathematical Process Expectations

Process Expectation	Questions
Problem Solving	11–13, 15
Reasoning and Proving	10
Reflecting	7
Selecting Tools and Computational Strategies	1–9, 11–15
Connecting	4, 5, 11–14
Representing	4, 5, 11–14
Communicating	10

Ongoing Assessment

- Use **BLM A-9 Communication General Scoring Rubric** to assess students' responses to the Discuss the Concepts questions.

Extra Practice

- Use **BLM 5-6 Section 5.3 Factor Trinomials of the Form $x^2 + bx + c$** for remediation or extra practice.