

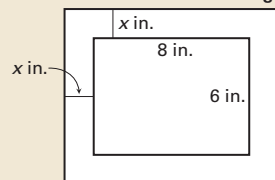
**EXAMPLE 6** Standardized Test Practice**Extra Example 6**

A rectangle has dimensions $x + 3$ and $x + 5$. Which expression shows the area of the rectangle? **C**

- (A) $x^2 + 15$
- (B) $x^2 + 3x + 15$
- (C) $x^2 + 8x + 1$
- (D) $x^2 + 8x$

Extra Example 7

A rectangular trivet has a ceramic center and a wooden border. The dimensions of the center and border are shown in the diagram.



- Write a polynomial that represents the total area of the trivet. **$48 + 28x + 4x^2$**
- What is the total area of the trivet if the width of the border is 2 inches? **120 in.^2**

Closing the Lesson

Have students summarize the major points of the lesson and answer the Essential Question: How do you multiply polynomials?

- Use the distributive property to multiply polynomials.
- Use the FOIL pattern to multiply binomials.

To use the distributive property, multiply each term of one polynomial by each term of the other, using properties of exponents if necessary. Then combine like terms. To use the FOIL pattern, multiply the two First terms of each binomial, the two Outer terms, the two Inner terms, the two Last terms, and then combine like terms.

ELIMINATE CHOICES

When you multiply $x + 3$ and $x + 2$, the product will have a constant term of $3 \cdot 2 = 6$. So, you can eliminate choice D.

The dimensions of a rectangle are $x + 3$ and $x + 2$. Which expression represents the area of the rectangle?

- (A) $x^2 + 6$
- (B) $x^2 + 5x + 6$
- (C) $x^2 + 6x + 6$
- (D) $x^2 + 6x$

Solution

$$\text{Area} = \text{length} \cdot \text{width}$$

$$= (x + 3)(x + 2)$$

$$= x^2 + 2x + 3x + 6$$

$$= x^2 + 5x + 6$$

Formula for area of a rectangle

Substitute for length and width.

Multiply binomials.

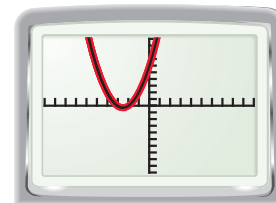
Combine like terms.

► The correct answer is B. (A) (B) (C) (D)

CHECK

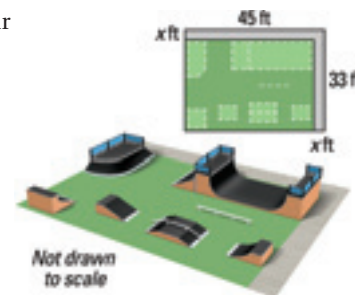
You can use a graph to check your answer.

Use a graphing calculator to display the graphs of $y_1 = (x + 3)(x + 2)$ and $y_2 = x^2 + 5x + 6$ in the same viewing window. Because the graphs coincide, you know that the product of $x + 3$ and $x + 2$ is $x^2 + 5x + 6$.

**EXAMPLE 7** Solve a multi-step problem

SKATEBOARDING You are designing a rectangular skateboard park on a lot that is on the corner of a city block. The park will have a walkway along two sides. The dimensions of the lot and the walkway are shown in the diagram.

- Write a polynomial that represents the area of the skateboard park.
- What is the area of the park if the walkway is 3 feet wide?

**Solution**

STEP 1 Write a polynomial using the formula for the area of a rectangle.

The length is $45 - x$. The width is $33 - x$.

$$\text{Area} = \text{length} \cdot \text{width}$$

$$= (45 - x)(33 - x)$$

$$= 1485 - 45x - 33x + x^2$$

$$= 1485 - 78x + x^2$$

Formula for area of a rectangle

Substitute for length and width.

Multiply binomials.

Combine like terms.

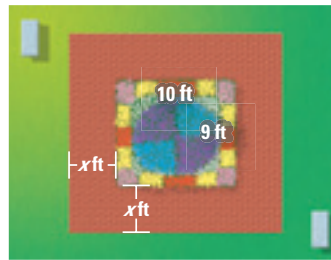
STEP 2 Substitute 3 for x and evaluate.

$$\text{Area} = 1485 - 78(3) + (3)^2 = 1260$$

► The area of the park is 1260 square feet.

7. The dimensions of a rectangle are $x + 5$ and $x + 9$. Which expression represents the area of the rectangle? **C**
- (A) $x^2 + 45x$ (B) $x^2 + 45$
 (C) $x^2 + 14x + 45$ (D) $x^2 + 45x + 45$

8. **GARDEN DESIGN** You are planning to build a walkway that surrounds a rectangular garden, as shown. The width of the walkway around the garden is the same on every side.



- a. Write a polynomial that represents the combined area of the garden and the walkway. **$4x^2 + 38x + 90$**
- b. Find the combined area when the width of the walkway is 4 feet. **306 ft^2**

9.2 EXERCISES

HOMWORK KEY

- = **WORKED-OUT SOLUTIONS**
on p. WS1 for Exs. 23 and 51
- ★ = **STANDARDIZED TEST PRACTICE**
Exs. 2, 26, 44, 52, and 53

SKILL PRACTICE

- A** 1. **VOCABULARY** Copy and complete: The FOIL pattern can be used to multiply any two ? **binomials**
2. ★ **WRITING** Explain how the letters of the word FOIL can help you multiply polynomials. **See margin.**

EXAMPLE 1
on p. 562
for Exs. 3–8

MULTIPLYING POLYNOMIALS Find the product.

3. $x(2x^2 - 3x + 9)$ **$2x^3 - 3x^2 + 9x$** 4. $4y(-y^3 - 2y - 1)$ **$-4y^4 - 8y^2 - 4y$** 5. $z^2(4z^4 + z^3 - 11z^2 - 6)$ **$4z^6 + z^5 - 11z^4 - 6z^2$**
6. $3c^3(8c^4 - c^2 - 3c + 5)$ **$24c^7 - 3c^5 - 9c^4 + 15c^3$** 7. $-a^5(-9a^2 + 5a + 13)$ **$9a^7 - 5a^6 - 13a^5$** 8. $-5b^3(4b^5 - 2b^3 + b - 11)$ **$-20b^8 + 10b^6 - 5b^4 + 55b^3$**

EXAMPLE 2
on p. 562
for Exs. 9–15

USING TABLES Use a table to find the product.

9. $(x + 2)(x - 3)$ **$x^2 - x - 6$** 10. $(y - 5)(2y + 3)$ **$2y^2 - 7y - 15$** 11. $(4b - 3)(b - 7)$ **$4b^2 - 31b + 21$**
12. $(5s + 2)(s + 8)$ **$5s^2 + 42s + 16$** 13. $(3k - 1)(4k + 9)$ **$12k^2 + 23k - 9$** 14. $(8n - 5)(3n - 6)$ **$24n^2 - 63n + 30$**

EXAMPLES 3 and 4
on p. 563
for Exs. 16–26

ERROR ANALYSIS Describe and correct the error in finding the product of the polynomials.

15.

	$3x$	1	
x	$3x^2$	x	✗
5	$15x$	5	

$(x - 5)(3x + 1) = 3x^2 + 16x + 5$

16.

	$2x^2 - 3x - 4$	
\times	$x + 7$	
	$14x^2 - 21x - 28$	✗
	$2x^3 - 3x^2 - 4x$	
	$2x^3 + 11x^2 - 25x^2 - 28$	

When combining like terms, the exponents on the variables should stay the same, rather than being added together; **$2x^3 + 11x^2 - 25x - 28$** .

15. The second term of the first binomial is -5 , not 5 , so the entries in the second row of the diagram should be $-15x$ and -5 ; $3x^2 - 14x - 5$.

4 PRACTICE AND APPLY

Assignment Guide

Answer Transparencies available for all exercises

Basic:

Day 1: pp. 565–568
Exs. 1, 2, 4–14 even, 15, 16, 17–39 odd, 49–52, 56–66 even

Average:

Day 1: pp. 565–568
Exs. 1, 2, 3–43 odd, 45, 46, 49–53, 56, 59, 62, 65

Advanced:

Day 1: pp. 565–568
Exs. 1, 2, 7, 8, 14, 21–26, 30–32, 33–41 odd, 43–54*, 60, 63, 66

Block:

pp. 565–568
Exs. 1, 2, 3–43 odd, 45, 46, 49–53, 56, 59, 62, 65 (with 9.1)

Differentiated Instruction

See *Algebra 1 Best Practices Toolkit* for suggestions on addressing the needs of a diverse classroom.

Homework Check

For a quick check of student understanding of key concepts, go over the following exercises:

Basic: 6, 19, 28, 38, 49

Average: 11, 22, 30, 40, 50

Advanced: 14, 24, 31, 41, 50

Extra Practice

- Student Edition, p. 946
- Chapter 9 Resource Book: Practice levels A, B, C, pp. 18–20

Practice Worksheet

An easily-readable reduced practice page (with answers) for this lesson can be found on p. 552C.

2. The letters of the word FOIL remind you to find the sum of the products of these terms: **First terms of each binomial, Outer terms of each binomial, Inner terms of each binomial, Last terms of each binomial.**