

A Practice by Example

Example 1
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Copy and fill in each blank.

1. $(5a + 2)(6a - 1) = \blacksquare a^2 + 7a - 2$ 2. $(3c - 7)(2c - 5) = 6c^2 - 29c + \blacksquare$

3. $(z - 4)(2z + 1) = 2z^2 - \blacksquare z - 4$ 4. $(2x + 9)(x + 2) = 2x^2 + \blacksquare x + 18$

Simplify each product using the Distributive Property.

5. $(x + 2)(x + 5)$

6. $(h + 3)(h + 4)$

7. $(k + 7)(k - 6)$

8. $(a - 8)(a - 9)$

9. $(2x - 1)(x + 2)$

10. $(2y + 5)(y - 3)$

Example 2
(page 468)

Simplify each product using FOIL.

11. $(r + 6)(r - 4)$

12. $(y + 4)(5y - 8)$

13. $(x + 6)(x - 7)$

14. $(m - 6)(m - 9)$

15. $(4b - 2)(b + 3)$

16. $(8w + 2)(w + 5)$

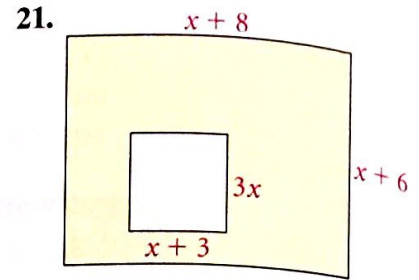
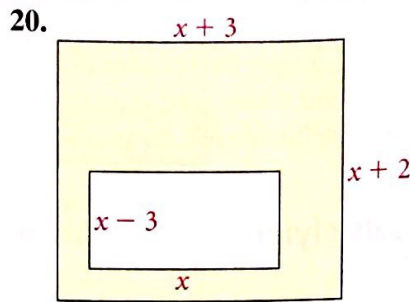
17. $(x - 7)(x + 9)$

18. $(a + 11)(a + 5)$

19. $(p - 1)(p + 10)$

Example 3
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Geometry Find the area of each shaded region. Simplify.



Example 4
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Simplify. Use the vertical method.

22. $(x + 9)(x^2 - 4x + 1)$

24. $(g - 3)(2g^2 + 3g + 3)$

23. $(a - 4)(a^2 - 2a + 1)$

25. $(k + 8)(3k^2 - 5k + 7)$

Simplify. Use the horizontal method.

26. $(x^2 + 2x + 1)(9x - 3)$

28. $(7p^2 + 5p - 1)(8p + 9)$

27. $(t^2 - 6t + 3)(2t - 5)$

29. $(12w^2 - w - 1)(4w - 2)$

B Apply Your Skills

Simplify each product. Write in standard form.

30. $(p - 7)(p + 8)$

31. $(-7 + p)(8 + p)$

32. $(p^2 - 7)(p + 8)$

33. $(5c - 9)(5c + 1)$

34. $(n^2 + 3)(n + 11)$

35. $(3k^2 + 2)(k + 5k^2)$

36. $(6h - 1)(4h^2 + h + 3)$

37. $(9y^2 + 2)(y^2 - y - 1)$

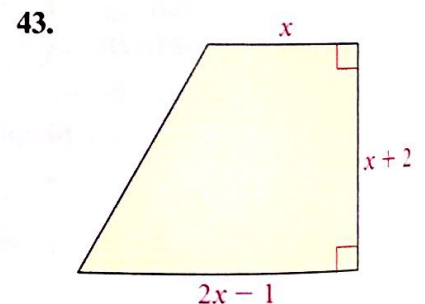
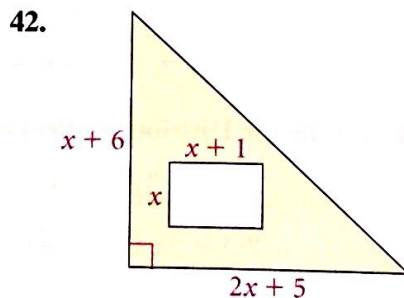
38. $(8q - 4)(6q^2 + q + 1)$

39. **Construction** You are planning a rectangular garden. Its length is twice its width. You want a walkway 2 ft wide around the garden.
 a. Write an expression for the area of the garden and walk.
 b. Write an expression for the area of the walk only.
 c. You have enough gravel to cover 76 ft² and want to use it all on the walk. How big should you make the garden?

40. **Open-Ended** Write a binomial and a trinomial. Find their product.

41. **Writing** Which method do you prefer for multiplying a binomial and a trinomial? Explain.

Geometry Write an expression for the area of each shaded region. Write your answer in simplest form.



44. a. Simplify each pair of products.

i. $(x + 1)(x + 1)$
 $11 \cdot 11$

ii. $(x + 1)(x + 2)$
 $11 \cdot 12$

iii. $(x + 1)(x + 3)$
 $11 \cdot 13$

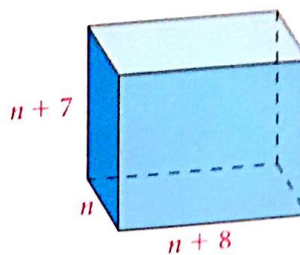
b. **Critical Thinking** What are the similarities between the two answers in each pair of products?



Reading Math

For help with Exercise 42, go to page 473.

45. **Geometry** Use the formula $V = \ell wh$ to write a polynomial in standard form for the volume of the box.



46. If n represents an even number, write an expression that represents the product of the next two even numbers. Simplify.

Challenge

For Exercises 47–49, each expression represents the side length of a cube. Write an expression in standard form for the surface area of each cube.

47. $x + 3$ 48. $4t + 1$ 49. $2w^2 + 7$

50. a. **Vegetable Consumption** Multiply the expressions on the right side of each equation to create a model for the total number of pounds of fresh vegetables $V(t)$ consumed in a year in the United States.

$C(t) = 2.7t + 165$ the U.S. annual per capita consumption of fresh vegetables, in pounds, from 1990 to 1997

$P(t) = 2.6t + 248$ the U.S. population, in millions, from 1990 to 1997

- b. Evaluate the equation you found in part (a) with $t = 5$ to find the total vegetable consumption for 1995. ($t = 0$ corresponds to the year 1990.)

51. **Financial Planning** Suppose you deposit \$2000 for college in a savings account that has an annual interest rate r . At the end of three years, the value of your account will be $2000(1 + r)^3$ dollars.

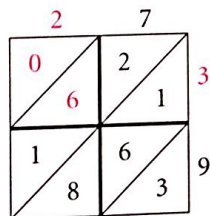
- a. Rewrite the expression $2000(1 + r)^3$ by finding the product $2000(1 + r)(1 + r)(1 + r)$. Write your answer in standard form.
b. Find the amount of money in the account if the interest rate is 3%.

For Exercises 52–54, each expression represents the radius of a circle. Write an expression in standard form for the area of each circle.

52. $g + 2$ 53. $4k + 5$ 54. $3x + 1$

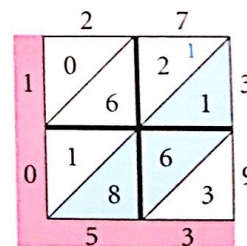
For Exercises 55–58, find each product using lattice multiplication, which is explained below.

Lattice multiplication probably originated in India in the twelfth century. It came into use in Italy in the fourteenth century.



This example shows $27 \cdot 39$. Each number is treated as a binomial. The four products are placed in the small, diagonally split squares. The product of 2 and 3, shown in red, is 6. The first square shows 0/6, which indicates 6. The product of 7 and 3 is 21. The second square shows 2/1.

The products are totaled diagonally. For the diagonal shaded blue, the tens place of the sum $1 + 6 + 8$ is carried into the diagonal above and added into that diagonal: $1 + (2 + 6 + 1)$. The product 1053 appears down the left side of the lattice and across the bottom.



55. $14 \cdot 72$ 56. $53 \cdot 87$
57. $91 \cdot 64$ 58. $38 \cdot 64$



Real-World Connection
In 2000, the U.S. consumption of fresh tomatoes was 17.8 lb per person.