

4.4 EXERCISES

HOMEWORK KEY

○ = WORKED-OUT SOLUTIONS
on p. WS8 for Exs. 27, 39, and 63

★ = STANDARDIZED TEST PRACTICE
Exs. 2, 12, 64, 65, and 67

SKILL PRACTICE

- VOCABULARY** What is the greatest common monomial factor of the terms of the expression $12x^2 + 8x + 20$?
- ★ WRITING** Explain how the values of a and c in $ax^2 + bx + c$ help you determine whether you can use a perfect square trinomial factoring pattern.

FACTORING Factor the expression. If the expression cannot be factored, say so.

- | | | |
|--------------------|---------------------|-----------------------|
| 3. $2x^2 + 5x + 3$ | 4. $3n^2 + 7n + 4$ | 5. $4r^2 + 5r + 1$ |
| 6. $6p^2 + 5p + 1$ | 7. $11z^2 + 2z - 9$ | 8. $15x^2 - 2x - 8$ |
| 9. $4y^2 - 5y - 4$ | 10. $14m^2 + m - 3$ | 11. $9d^2 - 13d - 10$ |

- ★ MULTIPLE CHOICE** Which factorization of $5x^2 + 14x - 3$ is correct?

- (A) $(5x - 3)(x + 1)$ (B) $(5x + 1)(x - 3)$
 (C) $5(x - 1)(x + 3)$ (D) $(5x - 1)(x + 3)$

FACTORING WITH SPECIAL PATTERNS Factor the expression.

- | | | |
|----------------------|------------------------|-------------------------|
| 13. $9x^2 - 1$ | 14. $4r^2 - 25$ | 15. $49n^2 - 16$ |
| 16. $16s^2 + 8s + 1$ | 17. $49x^2 + 70x + 25$ | 18. $64w^2 + 144w + 81$ |
| 19. $9p^2 - 12p + 4$ | 20. $25t^2 - 30t + 9$ | 21. $36x^2 - 84x + 49$ |

FACTORING MONOMIALS FIRST Factor the expression.

- | | | |
|------------------------|-------------------------|--------------------------------|
| 22. $12x^2 - 4x - 40$ | 23. $18z^2 + 36z + 16$ | 24. $32v^2 - 2$ |
| 25. $6u^2 - 24u$ | 26. $12m^2 - 36m + 27$ | 27. $20x^2 + 124x + 24$ |
| 28. $21x^2 - 77x - 28$ | 29. $-36n^2 + 48n - 15$ | 30. $-8y^2 + 28y - 60$ |

- ERROR ANALYSIS** Describe and correct the error in factoring the expression.

$$\begin{aligned}
 4x^2 - 36 &= 4(x^2 - 36) \\
 &= 4(x + 6)(x - 6)
 \end{aligned}$$

SOLVING EQUATIONS Solve the equation.

- | | | |
|--------------------------|--------------------------------|----------------------------|
| 32. $16x^2 - 1 = 0$ | 33. $11q^2 - 44 = 0$ | 34. $14s^2 - 21s = 0$ |
| 35. $45n^2 + 10n = 0$ | 36. $4x^2 - 20x + 25 = 0$ | 37. $4p^2 + 12p + 9 = 0$ |
| 38. $15x^2 + 7x - 2 = 0$ | 39. $6r^2 - 7r - 5 = 0$ | 40. $36z^2 + 96z + 15 = 0$ |

FINDING ZEROS Find the zeros of the function by rewriting the function in intercept form.

- | | | |
|---------------------------|----------------------------|-----------------------------|
| 41. $y = 4x^2 - 19x - 5$ | 42. $g(x) = 3x^2 - 8x + 5$ | 43. $y = 5x^2 - 27x - 18$ |
| 44. $f(x) = 3x^2 - 3x$ | 45. $y = 11x^2 - 19x - 6$ | 46. $y = 16x^2 - 2x - 5$ |
| 47. $y = 15x^2 - 5x - 20$ | 48. $y = 18x^2 - 6x - 4$ | 49. $g(x) = 12x^2 + 5x - 7$ |

EXAMPLES 1 and 2

on p. 259
for Exs. 3-12

EXAMPLE 3

on p. 260
for Exs. 13-21

EXAMPLE 4

on p. 260
for Exs. 22-31

EXAMPLE 5

on p. 261
for Exs. 32-40

EXAMPLE 7

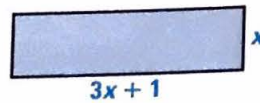
on p. 262
for Exs. 41-49

GEOMETRY Find the value of x .

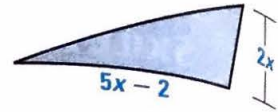
50. Area of square = 36



51. Area of rectangle = 30



52. Area of triangle = 115



SOLVING EQUATIONS Solve the equation.

53. $2x^2 - 4x - 8 = -x^2 + x$

54. $24x^2 + 8x + 2 = 5 - 6x$

55. $18x^2 - 22x = 28$

56. $13x^2 + 21x = -5x^2 + 22$

57. $x = 4x^2 - 15x$

58. $(x + 8)^2 = 16 - x^2 + 9x$

CHALLENGE Factor the expression.

59. $2x^3 - 5x^2 + 3x$

60. $8x^4 - 8x^3 - 6x^2$

61. $9x^3 - 4x$

PROBLEM SOLVING

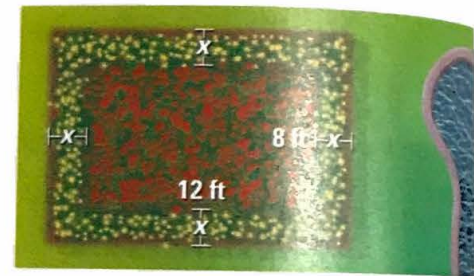
EXAMPLE 6

on p. 261
for Exs. 62–63

62. **ARTS AND CRAFTS** You have a rectangular stained glass window that measures 2 feet by 1 foot. You have 4 square feet of glass with which to make a border of uniform width around the window. What should the width of the border be?

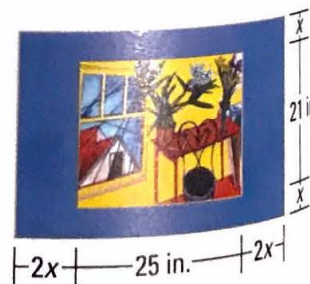
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63. **URBAN PLANNING** You have just planted a rectangular flower bed of red roses in a city park. You want to plant a border of yellow roses around the flower bed as shown. Because you bought the same number of red and yellow roses, the areas of the border and flower bed will be equal. What should the width of the border of yellow roses be?

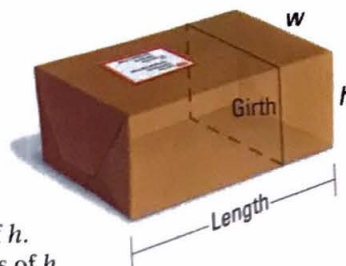


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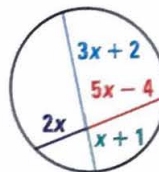
64. **★ MULTIPLE CHOICE** A surfboard shop sells 45 surfboards per month when it charges \$500 per surfboard. For each \$20 decrease in price, the store sells 5 more surfboards per month. How much should the shop charge per surfboard in order to maximize monthly revenue?
- (A) \$340 (B) \$492 (C) \$508 (D) \$660
65. **★ SHORT RESPONSE** A restaurant sells about 330 sandwiches each day at a price of \$6 each. For each \$.25 decrease in price, 15 more sandwiches are sold per day. How much should the restaurant charge to maximize daily revenue? Explain each step of your solution. What is the maximum daily revenue?
66. **PAINTINGS** You place a mat around a 25 inch by 21 inch painting as shown. The mat is twice as wide at the left and right of the painting as it is at the top and bottom of the painting. The area of the mat is 714 square inches. How wide is the mat at the left and right of the painting? at the top and bottom of the painting?



67. **★ EXTENDED RESPONSE** A U.S. Postal Service guideline states that for a rectangular package like the one shown, the sum of the length and the girth cannot exceed 108 inches. Suppose that for one such package, the length is 36 inches and the girth is as large as possible.



- What is the girth of the package?
 - Write an expression for the package's width w in terms of h .
Write an equation giving the package's volume V in terms of h .
 - What height and width maximize the volume of the package?
What is the maximum volume? *Explain* how you found it.
68. **CHALLENGE** Recall from geometry the theorem about the products of the lengths of segments of two chords that intersect in the interior of a circle. Use this theorem to find the value of x in the diagram.



MISSOURI MIXED REVIEW

TEST PRACTICE at classzone.com

69. A pizza is divided into 12 equal slices as shown. The diameter of the pizza is 16 inches. What is the approximate area of one slice of pizza?



- (A) 15.47 in.² (B) 16.76 in.²
 (C) 21.21 in.² (D) 67.02 in.²
70. While shopping at Store A, Sam finds a television on sale for \$210. His friend tells him that the same television at Store B is on sale for \$161. About what percent of the cost of the television at Store A does Sam save by buying the television at Store B?
- (A) 20% (B) 23% (C) 30% (D) 77%

QUIZ for Lessons 4.1–4.4

Graph the function. Label the vertex and axis of symmetry. (p. 236)

1. $y = x^2 - 6x + 14$ 2. $y = 2x^2 + 8x + 15$ 3. $f(x) = -3x^2 + 6x - 5$

Write the quadratic function in standard form. (p. 245)

4. $y = (x - 4)(x - 8)$ 5. $g(x) = -2(x + 3)(x - 7)$ 6. $y = 5(x + 6)^2 - 2$

Solve the equation.

7. $x^2 + 9x + 20 = 0$ (p. 252) 8. $n^2 - 11n + 24 = 0$ (p. 252) 9. $z^2 - 3z - 40 = 0$ (p. 252)
 10. $5s^2 - 14s - 3 = 0$ (p. 259) 11. $7a^2 - 30a + 8 = 0$ (p. 259) 12. $4x^2 + 20x + 25 = 0$ (p. 259)

13. **DVD PLAYERS** A store sells about 50 of a new model of DVD player per month at a price of \$140 each. For each \$10 decrease in price, about 5 more DVD players per month are sold. How much should the store charge in order to maximize monthly revenue? What is the maximum monthly revenue? (p. 259)

