GUIDED PRACTICE

Vocabulary Check ✓

1. What is a zero of a function $y = f(x)$?

Concept Check ✓

2. In Example 2, how do you know that m and n must be *negative* factors of 10?

3. **ERROR ANALYSIS** A student solved $x^2 + 4x + 3 = 8$ as shown. Explain the student's mistake. Then solve the equation correctly.

$x^2 + 4x + 3 = 8$

$(x + 3)(x + 1) = 8$

$x + 3 = 8$ or $x + 1 = 8$

$x = 5$ or $x = 7$

Skill Check ✓

Factor the expression.

4. $x^2 - x - 2$
5. $2x^2 + x - 3$
6. $x^2 - 16$
7. $y^2 + 2y + 1$
8. $p^2 - 4p + 4$
9. $q^2 + q$

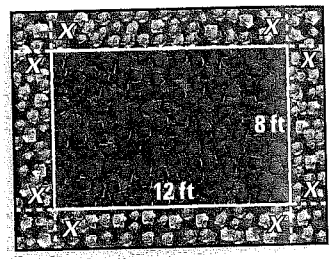
Solve the equation.

10. $(x + 3)(x - 1) = 0$
11. $x^2 - 2x - 8 = 0$
12. $3x^2 + 10x + 3 = 0$
13. $4u^2 - 1 = 0$
14. $v^2 - 14v = -49$
15. $5w^2 = 30w$

Write the quadratic function in intercept form and give the function's zeros.

16. $y = x^2 - 6x + 5$
17. $y = x^2 + 6x + 8$
18. $y = x^2 - 1$
19. $y = x^2 + 10x + 25$
20. $y = 2x^2 - 2x - 24$
21. $y = 3x^2 - 8x + 4$

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



PRACTICE AND APPLICATIONS

STUDENT HELP

Extra Practice to help you master skills is on p. 945.

FACTORING $x^2 + bx + c$ **Factor the trinomial. If the trinomial cannot be factored, say so.**

23. $x^2 + 5x + 4$
24. $x^2 + 9x + 14$
25. $x^2 + 13x + 40$
26. $x^2 - 4x + 3$
27. $x^2 - 8x + 12$
28. $x^2 - 16x + 51$
29. $a^2 + 3a - 10$
30. $b^2 + 6b - 27$
31. $c^2 + 2c - 80$
32. $p^2 - 5p - 6$
33. $q^2 - 7q - 10$
34. $r^2 - 14r - 72$

FACTORING $ax^2 + bx + c$ **Factor the trinomial. If the trinomial cannot be factored, say so.**

35. $2x^2 + 7x + 3$
36. $3x^2 + 17x + 10$
37. $8x^2 + 18x + 9$
38. $5x^2 - 7x + 2$
39. $6x^2 - 9x + 5$
40. $10x^2 - 19x + 6$
41. $3k^2 + 32k - 11$
42. $11m^2 + 14m - 16$
43. $18n^2 + 9n - 14$
44. $7u^2 - 4u - 3$
45. $12v^2 - 25v - 7$
46. $4w^2 - 13w - 27$

STUDENT HELP

HOMEWORK HELP

Example 1: Exs. 23–34
Example 2: Exs. 35–46
Example 3: Exs. 47–55
Example 4: Exs. 56–64
Example 5: Exs. 65–79
Example 6: Exs. 90, 91, 97, 98
Example 7: Exs. 80–88
Example 8: Exs. 99–101

FACTORING WITH SPECIAL PATTERNS **Factor the expression.**

47. $x^2 - 25$ **48.** $x^2 + 4x + 4$ **49.** $x^2 - 6x + 9$

50. $4r^2 - 4r + 1$ **51.** $9s^2 + 12s + 4$ **52.** $16t^2 - 9$

53. $49 - 100a^2$ **54.** $25b^2 - 60b + 36$ **55.** $81c^2 + 198c + 121$

FACTORING MONOMIALS FIRST **Factor the expression.**

56. $5x^2 + 5x - 10$ **57.** $18x^2 - 2$ **58.** $3x^2 + 54x + 243$

59. $8y^2 - 28y - 60$ **60.** $112a^2 - 168a + 63$ **61.** $u^2 + 7u$

62. $6t^2 - 36t$ **63.** $-v^2 + 2v - 1$ **64.** $2d^2 + 12d - 16$

EQUATIONS IN STANDARD FORM **Solve the equation.**

65. $x^2 - 3x - 4 = 0$ **66.** $x^2 + 19x + 88 = 0$ **67.** $5x^2 - 13x + 6 = 0$

68. $8x^2 - 6x - 5 = 0$ **69.** $k^2 + 24k + 144 = 0$ **70.** $9m^2 - 30m + 25 = 0$

71. $81n^2 - 16 = 0$ **72.** $40a^2 + 4a = 0$ **73.** $-3b^2 + 3b + 90 = 0$

EQUATIONS NOT IN STANDARD FORM **Solve the equation.**

74. $x^2 + 9x = -20$ **75.** $16x^2 = 8x - 1$

76. $5p^2 - 25 = 4p^2 + 24$ **77.** $2y^2 - 4y - 8 = -y^2 + y$

78. $2q^2 + 4q - 1 = 7q^2 - 7q + 1$ **79.** $(w + 6)^2 = 3(w + 12) - w^2$

FINDING ZEROS **Write the quadratic function in intercept form and give the function's zeros.**

80. $y = x^2 - 3x + 2$ **81.** $y = x^2 + 7x + 12$ **82.** $y = x^2 + 2x - 35$

83. $y = x^2 - 4$ **84.** $y = x^2 + 20x + 100$ **85.** $y = x^2 - 3x$

86. $y = 3x^2 - 12x - 15$ **87.** $y = -x^2 + 16x - 64$ **88.** $y = 2x^2 - 9x + 4$

89. LOGICAL REASONING Is there a formula for factoring the *sum* of two squares? You will investigate this question in parts (a) and (b).

a. Consider the sum of squares $x^2 + 9$. If this sum can be factored, then there are integers m and n such that $x^2 + 9 = (x + m)(x + n)$. Write two equations relating the sum and the product of m and n to the coefficients in $x^2 + 9$.

b. Show that there are no integers m and n that satisfy both equations you wrote in part (a). What can you conclude?

90. QUILTING You have made a quilt that is 4 feet by 5 feet. You want to use the remaining 10 square feet of fabric to add a decorative border of uniform width. What should the width of the border be?

91. CONSTRUCTION A high school wants to double the size of its parking lot by expanding the existing lot as shown. By what distance x should the lot be expanded?