

GUIDED PRACTICE

Vocabulary Check ✓

Concept Check ✓

Skill Check ✓


- In the quadratic formula, what is the expression $b^2 - 4ac$ called?
- How many solutions does a quadratic equation have if its discriminant is positive? if its discriminant is zero? if its discriminant is negative?
- Describe a real-life situation in which you can use the model $h = -16t^2 + v_0t + h_0$ but not the model $h = -16t^2 + h_0$.

Use the quadratic formula to solve the equation.

- | | |
|------------------------|--------------------------------|
| 4. $x^2 - 4x + 3 = 0$ | 5. $x^2 + x - 1 = 0$ |
| 6. $2x^2 + 3x + 5 = 0$ | 7. $9x^2 + 6x - 1 = 0$ |
| 8. $-x^2 + 8x = 1$ | 9. $5x^2 - 2x + 37 = x^2 + 2x$ |

Find the discriminant of the quadratic equation and give the number and type of solutions of the equation.

- | | | |
|--------------------------|--------------------------|-------------------------|
| 10. $x^2 + 5x + 2 = 0$ | 11. $x^2 + 2x + 5 = 0$ | 12. $4x^2 - 4x + 1 = 0$ |
| 13. $-2x^2 + 3x - 7 = 0$ | 14. $9x^2 + 12x + 4 = 0$ | 15. $5x^2 - x - 13 = 0$ |

16.  **BASKETBALL** A basketball player passes the ball to a teammate who catches it 11 ft above the court, just above the rim of the basket, and slam-dunks it through the hoop. (This play is called an "alley-oop.") The first player releases the ball 5 ft above the court with an initial vertical velocity of 21 ft/sec. How long is the ball in the air before being caught, assuming it is caught as it rises?

PRACTICE AND APPLICATIONS

STUDENT HELP

Extra Practice
to help you master
skills is on p. 946.

EQUATIONS IN STANDARD FORM Use the quadratic formula to solve the equation.

- | | | |
|--------------------------|---------------------------|--------------------------|
| 17. $x^2 - 5x - 14 = 0$ | 18. $x^2 + 3x - 2 = 0$ | 19. $x^2 - 2x - 4 = 0$ |
| 20. $x^2 + 10x + 22 = 0$ | 21. $x^2 + 6x + 58 = 0$ | 22. $-x^2 + 7x - 19 = 0$ |
| 23. $5x^2 + 3x - 1 = 0$ | 24. $3x^2 - 11x - 4 = 0$ | 25. $2x^2 + x + 1 = 0$ |
| 26. $6p^2 - 8p + 3 = 0$ | 27. $-7q^2 + 2q + 9 = 0$ | 28. $8r^2 + 4r + 5 = 0$ |
| 29. $-4t^2 - 9t - 3 = 0$ | 30. $9u^2 - 12u + 85 = 0$ | 31. $10v^2 + 8v - 1 = 0$ |

EQUATIONS NOT IN STANDARD FORM Use the quadratic formula to solve the equation.

- | | |
|---------------------------------|--|
| 32. $x^2 + 4x = -20$ | 33. $x^2 - 2x = 99$ |
| 34. $x^2 + 14 = 10x$ | 35. $x^2 = 8x - 35$ |
| 36. $-x^2 - 3x = -7$ | 37. $-x^2 = 16x + 46$ |
| 38. $3x^2 + 6x = -2$ | 39. $8x^2 - 8x = 1$ |
| 40. $5x^2 + 9x = -x^2 + 5x + 1$ | 41. $40x - 7x^2 = 101 - 3x^2$ |
| 42. $-16k^2 = 20k^2 + 24k + 5$ | 43. $13n^2 + 11n - 9 = 4n^2 - n - 4$ |
| 44. $3(d - 1)^2 = 4d + 2$ | 45. $3.5y^2 + 2.6y - 8.2 = -0.4y^2 - 6.9y$ |

STUDENT HELP

HOMEWORK HELP

Examples 1–3: Exs. 17–55

Example 4: Exs. 56–64

Example 5: Exs. 74–80

SOLVING BY ANY METHOD Solve the equation by factoring, by finding square roots, or by using the quadratic formula.

46. $6x^2 - 12 = 0$

48. $x^2 + 4x + 29 = 0$

50. $4x^2 + 28x = -49$

52. $-2u^2 + 5 = 3u^2 - 10u$

54. $-9v^2 + 35v - 30 = 1 - v$

47. $x^2 - 3x - 15 = 0$

49. $x^2 - 18x + 32 = 0$

51. $3(x + 4)^2 = -27$

53. $11m^2 - 1 = 7m^2 + 2$

55. $20p^2 + 6p = 6p^2 - 13p + 3$

USING THE DISCRIMINANT Find the discriminant of the quadratic equation and give the number and type of solutions of the equation.

56. $x^2 - 4x + 10 = 0$

57. $x^2 + 3x - 6 = 0$

58. $x^2 + 14x + 49 = 0$

59. $3x^2 - 10x - 5 = 0$

60. $64x^2 - 16x + 1 = 0$

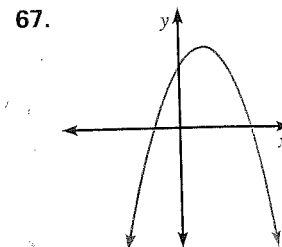
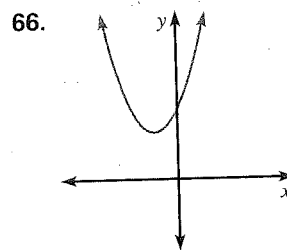
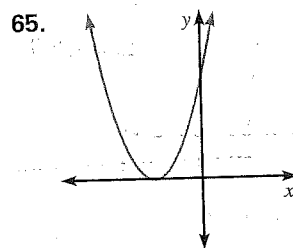
61. $-2x^2 - 5x - 4 = 0$

62. $7r^2 - 3 = 0$

63. $s^2\sqrt{5} + s + \sqrt{5} = 0$

64. $-4t^2 + 20t - 25 = 0$

VISUAL THINKING In Exercises 65–67, the graph of a quadratic function $y = ax^2 + bx + c$ is shown. Tell whether the discriminant of $ax^2 + bx + c = 0$ is positive, negative, or zero.



THE CONSTANT TERM Find all values of c for which the equation has (a) two real solutions, (b) one real solution, and (c) two imaginary solutions.

68. $x^2 - 2x + c = 0$

69. $x^2 + 4x + c = 0$

70. $x^2 + 10x + c = 0$

71. $x^2 - 8x + c = 0$

72. $x^2 + 6x + c = 0$

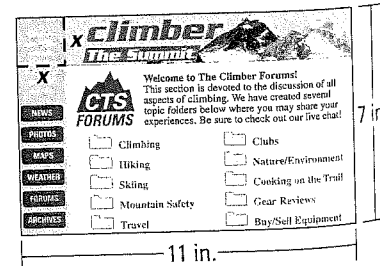
73. $x^2 - 12x + c = 0$

74. **CRITICAL THINKING** Explain why the height model $h = -16t^2 + v_0t + h_0$ applies not only to launched or thrown objects, but to dropped objects as well. (Hint: What is the initial vertical velocity of a dropped object?)

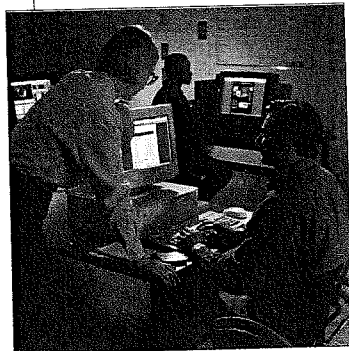
75. **DIVING** In July of 1997, the first Cliff Diving World Championships were held in Brontallo, Switzerland. Participants performed acrobatic dives from heights of up to 92 feet. Suppose a cliff diver jumps from this height with an initial upward velocity of 5 feet per second. How much time does the diver have to perform acrobatic maneuvers before hitting the water?

► Source: World High Diving Federation

76. **WORLD WIDE WEB** A Web developer is creating a Web site devoted to mountain climbing. Each page on the Web site will have frames along its top and left sides showing the name of the site and links to different parts of the site. These frames will take up one third of the computer screen. What will the width x of the frames be on the screen shown?



FOCUS ON CAREERS



WEB DEVELOPER

Web developers use *hypertext markup language* (HTML) to create electronic pages for the World Wide Web. A *Web browser* translates HTML into pages that can be viewed on a computer screen.



CAREER LINK

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