Solve each equation by using the Quadratic Formula. Round to the nearest tenth if necessary.

1. $x^2 - 2x - 15 = 0$

ANSWER:

$-3, 5$

3. $x^2 - 8x = -10$

ANSWER:

6.4, 1.6

5. $10x^2 - 31x + 15 = 0$

ANSWER:

0.6, 2.5

Solve each equation. State which method you used.

7. $2x^2 + 11x - 6 = 0$

ANSWER:

$-6, \dfrac{1}{2}$

9. $9x^2 = 25$

ANSWER:

$\pm \dfrac{5}{3}$

State the value of the discriminant for each equation. Then determine the number of real solutions of the equation.

11. $x^2 - 9x + 21 = 0$

ANSWER:

-3; no real solutions

13. $9x^2 + 24x = -16$

ANSWER:

0; one real solution

15. **TRAMPOLINE** Eva springs from a trampoline to dunk a basketball. Her height h in feet can be modeled by the equation $h = -16t^2 + 22.3t + 2$, where t is time in seconds. Use the discriminant to determine if Eva will reach a height of 10 feet. Explain.

ANSWER:

The discriminant is -14.91, so the equation has no real solutions. Thus, Eva will not reach a height of 10 feet.

2-5 Solving Quadratic Equations by Using the Quadratic Formula

Solve each equation by using the Quadratic Formula. Round to the nearest tenth if necessary.

17. $x^2 + 16 = 0$

ANSWER:

ø

19. $5x^2 - 8x = 6$

ANSWER:

2.2, −0.6

21. $5x^2 + 21x = -18$

ANSWER:

$-3, -\dfrac{6}{5}$

23. $8x^2 + 12x = 8$

ANSWER:

0.5, −2

25. $10x^2 = -7x + 6$

ANSWER:

0.5, −1.2

27. $2x^2 = 12x - 18$

ANSWER:

3

Solve each equation. State which method you used.

29. $2x^2 - 8x = 12$

ANSWER:

−1.2, 5.2

31. $x^2 - 3x = 10$

ANSWER:

−2, 5

33. $x^2 = -7x - 5$

ANSWER:

−6.2, −0.8

State the value of the discriminant for each equation. Then determine the number of real solutions of the equation.

35. $0.2x^2 - 1.5x + 2.9 = 0$

ANSWER:

−0.07; no real solution

37. $x^2 - \dfrac{4}{5}x = 3$

ANSWER:

12.64; two real solutions

39. $2.25x^2 - 3x = -1$

ANSWER:

0; one real solution

41. **CCSS MODELING** The percent of U.S. households with high-speed Internet h can be estimated by $h = -0.2n^2 + 7.2n + 1.5$, where n is the number of years since 1990.

a. Use the Quadratic Formula to determine when 20% of the population will have high-speed Internet.

b. Is a quadratic equation a good model for this information? Explain.

ANSWER:

a. in 1993 and 2023

b. Sample answer: No; the parabola has a maximum at about 66, meaning only 66% of the population would ever have high-speed Internet.

Without graphing, determine the number of x-intercepts of the graph of the related function for each function.

43. $4.25x + 3 = -3x^2$

ANSWER:

0

45. $0.25x^2 + x = -1$

ANSWER:

1

Solve each equation by using the Quadratic Formula. Round to the nearest tenth if necessary.

47. $2.3x^2 - 1.4x = 6.8$

ANSWER:

−1.4, 2.1

49. **POSTER** Bartolo is making a poster for the dance. He wants to cover three fourths of the area with text.

    a. Write an equation for the area of the section with text.
    b. Solve the equation by using the Quadratic Formula.
    c. What should be the margins of the poster?

    ANSWER:

    a. $(20 - 2x)(25 - 7x) = 375$
    b. about 12.9, 0.7
    c. about 0.7 in. on the sides, 2.8 in. on the top, and 2.1 in. on the bottom

51. **CHALLENGE** Find all values of k such that $2x^2 - 3x + 5k = 0$ has two solutions.

    ANSWER:

$$k < \frac{9}{40}$$

    CCSS STRUCTURE **Determine whether there are *two*, *one*, or *no* real solutions.**

53. The graph of a quadratic function does not have an x-intercept.

    ANSWER:
    none

55. The graph of a quadratic function intersects the x-axis twice.

    ANSWER:
    two

57. **WRITING IN MATH** Why can the discriminant be used to confirm the number of real solutions of a quadratic equation?

    ANSWER:
    Sample answer: If the discriminant is positive, the Quadratic Formula will result in two real solutions because you are adding and subtracting the square root of a positive number in the numerator of the expression. If the discriminant is zero, there will be one real solution because you are adding and subtracting the square root of zero. If the discriminant is negative, there will be no real solutions because you are adding and subtracting the square root of a negative number in the numerator of the expression.

59. If n is an even integer, which expression represents the product of three consecutive even integers?

   A $n(n + 1)(n + 2)$
   B $(n + 1)(n + 2)(n + 3)$
   C $3n + 2$
   D $n(n + 2)(n + 4)$

   ANSWER:
   D

61. Which statement best describes the graph of $x = 5$?

   F It is parallel to the x-axis.
   G It is parallel to the y-axis.
   H It passes through the point (2, 5).
   J It has a y-intercept of 5.

   ANSWER:
   G

Solve each equation by completing the square. Round to the nearest tenth if necessary.

63. $6x^2 - 17x + 12 = 0$

   ANSWER:

   $\dfrac{4}{3}, \dfrac{3}{2}$

65. $4x^2 = 20x - 25$

   ANSWER:

   $\dfrac{5}{2}$

Describe the transformations needed to obtain the graph of $g(x)$ from the graph of $f(x)$.
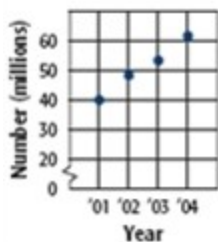
67. $f(x) = x^2 + 5$
   $g(x) = x^2 - 1$

   ANSWER:
   Translate down 6.

Determine whether each graph shows a *positive correlation* **, a** *negative correlation* **, or** *no correlation* **. If there is a positive or negative correlation, describe its meaning in the situation.**

69.

ANSWER:

Positive; as time goes on, more people use electronic tax returns.

71. **ENTERTAINMENT** Coach Washington wants to take her softball team out for pizza and soft drinks after the last game of the season. A large pizza costs $12, and a pitcher of a soft drink costs $3. She does not want to spend more than $60. Write an inequality that represents this situation, and graph the solution set.

ANSWER:

$12x + 3y \leq 60$
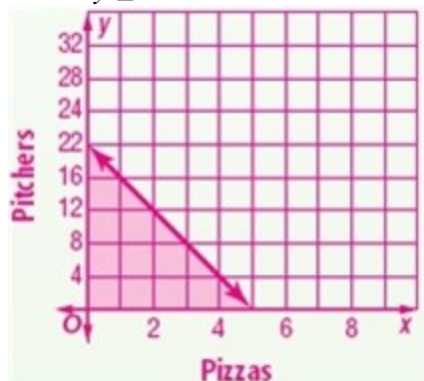
Determine whether each sequence is arithmetic, geometric, or neither. Explain.

73. 1000, 950, 900, ...

ANSWER:

Arithmetic; the common difference is –50.

75. 6, 18, 54, …

ANSWER:

Geometric; the common ratio is 3.

77. 8, –4, 2 …

ANSWER:

Geometric; the common ratio is $-\frac{1}{2}$.