

**Concept and Vocabulary Check:**

1. An equation that can be written in the standard form  $ax^2 + bx + c = 0$ ,  $a \neq 0$ , is called a/an \_\_\_\_\_.
2. The zero-product principle states that if  $AB = 0$ , then \_\_\_\_\_.
3. The solutions of  $ax^2 + bx + c = 0$  correspond to the \_\_\_\_\_ for the graph of  $y = ax^2 + bx + c$ .

**Practice Exercises:**

In Exercises 1 - 65 odd, solve each equation. Check your solutions to 5, 9, 21, 33, 43, and 53.

1.  $x(x + 7) = 0$

7.  $10(x - 4)(2x + 9) = 0$

5.  $(x - 9)(5x + 4) = 0$

9.  $x^2 + 8x + 15 = 0$

**check:****check:**

13.  $x^2 - 4x = 21$

25.  $3x^2 = -5x$

15.  $x^2 + 9x = -8$

27.  $x^2 + 4x + 4 = 0$

21.  $x^2 = 4x$

33.  $2x^2 = 7x + 4$

**check:**

**check:**

$$35. 5x^2 = 18 - x$$

$$47. (x - 1)(x + 4) = 14$$

$$41. 81x^2 = 25$$

$$51. y(y + 8) = 16(y - 1)$$

$$43. x(x - 4) = 21$$

$$53. 4y^2 + 20y + 25 = 0$$

**check:**

**check:**

$$57. (x - 4)(x^2 + 5x + 6) = 0$$

$$65. (x - 2)^2 - 5(x - 2) + 6 = 0$$

**Applications:**

69. A ball is thrown straight up from a rooftop 300 feet high. The formula

$$h = -16t^2 + 20t + 300$$

describes the ball's height above the ground,  $h$ , in feet,  $t$  seconds after it was thrown. The ball misses the rooftop on its way down and eventually strikes the ground. The graph of the formula is shown in the text on page 472 with tick marks omitted along the horizontal axis.

Draw the graph from the book on page 472 and use the given formula to figure out when the ball's height will be 276 feet. Identify the solution as a point on the graph.

71. An explosion causes debris to rise vertically with an initial speed of 72 feet per second. The formula

$$h = -16t^2 + 72t$$

describes the height of the debris above the ground,  $h$ , in feet,  $t$  seconds after the explosion. When will the debris be 32 feet above the ground?

73. The formula

$$S = 2x^2 - 12x + 82$$

models spending by international travelers to the United States,  $S$ , in billions of dollars,  $x$  years after 2000. In which years did international travelers spend \$66 billion?

81. The formula

$$N = \frac{t^2 - t}{2}$$

describes the number of football games,  $N$ , that must be played in a league with  $t$  teams if each team is to play every other team once. If a league has 45 games scheduled, how many teams belong to the league, assuming that each team plays every other team once?

83. A rectangular parking lot has a length that is 3 yards greater than the width. The area of the parking lot is 180 square yards. Draw a picture and find the length and width.

87. As part of a landscaping project, you put in a flower bed measuring 10 feet by 12 feet. You plan to surround the bed with a uniform border of low-growing plants. Copy the picture from the book on page 473.

a. Write a polynomial that describes the area of the uniform border that surrounds your flower bed. Hint: The area of the border is the area of the large rectangle minus the area of the flower bed.

b. The low-growing plants surrounding the flower bed require 1 square foot each when mature. If you have 168 of these plants, how wide a strip around the flower bed should you prepare for the border?