

### Quadratic Functions, Equations

**MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question.

**Use the zero-factor property to solve the equation.**

1)  $x^2 + 2x - 15 = 0$  1) \_\_\_\_\_  
 A)  $\{-3, 5\}$                       B)  $\{-5, 3\}$                       C)  $\{5, 3\}$                       D)  $\{-5, -3\}$

2)  $2x^2 - 6x + 4 = 0$  2) \_\_\_\_\_  
 A)  $\{-2, -1\}$                       B)  $\{1, 2\}$                       C)  $\{-2, 1\}$                       D)  $\{-1, 2\}$

**Use the square root property to solve the equation.**

3)  $x^2 = 49$  3) \_\_\_\_\_  
 A)  $\{24.5\}$                       B)  $\{8, -8\}$                       C)  $\{7, -7\}$                       D)  $\{7\}$

4)  $8z^2 - 512 = 0$  4) \_\_\_\_\_  
 A)  $\{8\}$                       B)  $\{258\}$                       C)  $\{8, -8\}$                       D)  $\{9, -9\}$

5)  $y^2 = 18$  5) \_\_\_\_\_  
 A)  $\{3\sqrt{2}, -3\sqrt{2}\}$                       B)  $\{\sqrt{18}\}$                       C)  $\{324\}$                       D)  $\{9\}$

6)  $(x + 4)^2 = 25$  6) \_\_\_\_\_  
 A)  $\{1\}$                       B)  $\{-29\}$                       C)  $\{-9, 1\}$                       D)  $\{9, -1\}$

7)  $(3s + 8)^2 = 36$  7) \_\_\_\_\_  
 A)  $\left\{\frac{2}{3}, \frac{14}{3}\right\}$                       B)  $\left\{\frac{28}{3}\right\}$                       C)  $\left\{-\frac{2}{3}, 0\right\}$                       D)  $\left\{-\frac{2}{3}, -\frac{14}{3}\right\}$

**Solve the problem using Galileo's formula,  $d = 16t^2$ . Round your answer to the nearest tenth.**

8) Eric has a treehouse 28 ft above the ground. How long would it take a water balloon dropped from the treehouse to fall to the ground? 8) \_\_\_\_\_  
 A) 1.3 sec                      B) 12,544 sec                      C) 3.1 sec                      D) 5.3 sec

9) A young boy is delighted to drop various objects from a hotel balcony to the ground below. If he is 177 ft above the ground, how long does it take for one of the objects to fall to the ground? 9) \_\_\_\_\_  
 A) 177.0 sec                      B) 3.3 sec                      C) 11.1 sec                      D) 13.3 sec

**Solve the equation by completing the square.**

10)  $a^2 - 10a + 21 = 0$  10) \_\_\_\_\_  
 A)  $\{7, 3\}$                       B)  $\{18, 3\}$                       C)  $\{-7, -3\}$                       D)  $\{5, -5\}$

11)  $z^2 + 16z + 44 = 0$  11) \_\_\_\_\_  
 A)  $\{8 + 2\sqrt{11}, 8 - 2\sqrt{11}\}$                       B)  $\{-16 + 2\sqrt{11}\}$   
 C)  $\{8 + 2\sqrt{5}\}$                       D)  $\{-8 + 2\sqrt{5}, -8 - 2\sqrt{5}\}$

12)  $4x^2 - 3x - 7 = 0$

A)  $\left\{\frac{4}{7}, 0\right\}$

B)  $\left\{\frac{7}{4}, -1\right\}$

C)  $\left\{\frac{4}{7}, 1\right\}$

D)  $\left\{\frac{4}{7}, -1\right\}$

12) \_\_\_\_\_

Solve for x. Assume that a and b represent positive real numbers.

13)  $64x^2 = 169a$

A)  $\left\{\frac{-13a}{8}, \frac{13a}{8}\right\}$

B)  $\left\{\frac{-169\sqrt{a}}{64}, \frac{169\sqrt{a}}{64}\right\}$

C)  $\left\{\frac{-\sqrt{13a}}{8}, \frac{\sqrt{13a}}{8}\right\}$

D)  $\left\{\frac{-13\sqrt{a}}{8}, \frac{13\sqrt{a}}{8}\right\}$

13) \_\_\_\_\_

Use the quadratic formula to solve the equation. (All solutions are real numbers.)

14)  $a^2 + 14a + 40 = 0$

A)  $\{2\sqrt{10}, -2\sqrt{10}\}$

B)  $\{-20, -8\}$

C)  $\{-10, -4\}$

D)  $\{4, 10\}$

14) \_\_\_\_\_

15)  $7x^2 - 2x - 9 = 0$

A)  $\left\{\frac{7}{9}, -1\right\}$

B)  $\left\{\frac{9}{7}, -1\right\}$

C)  $\left\{\frac{7}{9}, 0\right\}$

D)  $\left\{\frac{7}{9}, 1\right\}$

15) \_\_\_\_\_

16)  $x^2 = 9 - 4x$

A)  $\{2 + \sqrt{13}\}$

B)  $\{-2 + \sqrt{13}, -2 - \sqrt{13}\}$

C)  $\{-1 + \sqrt{13}, -1 - \sqrt{13}\}$

D)  $\{-2 + 2\sqrt{13}, -2 - 2\sqrt{13}\}$

16) \_\_\_\_\_

Use the quadratic formula to solve the equation.

17)  $2x^2 = -5x - 7$

A)  $\left\{\frac{5 + \sqrt{31}}{4}, \frac{5 - \sqrt{31}}{4}\right\}$

B)  $\left\{\frac{-5 + i\sqrt{31}}{4}, \frac{-5 - i\sqrt{31}}{4}\right\}$

C)  $\left\{\frac{5 + i\sqrt{31}}{4}, \frac{5 - i\sqrt{31}}{4}\right\}$

D)  $\left\{\frac{-5 + \sqrt{31}}{4}, \frac{-5 - \sqrt{31}}{4}\right\}$

17) \_\_\_\_\_

Use the discriminant to determine whether the equation has two rational solutions, one rational solution, two irrational solutions, or two nonreal complex solutions. Do not actually solve.

18)  $s^2 + 3s - 4 = 0$

A) One rational solution

B) Two irrational solutions

C) Two nonreal complex solutions

D) Two rational solutions

18) \_\_\_\_\_

19)  $t^2 + 8t + 16 = 0$

A) Two irrational solutions

B) Two nonreal complex solutions

C) Two rational solutions

D) One rational solution

19) \_\_\_\_\_

20)  $v^2 + 7v - 2 = 0$

A) Two nonreal complex solutions

B) One rational solution

C) Two irrational solutions

D) Two rational solutions

20) \_\_\_\_\_

21)  $w^2 - 3w + 4 = 0$

- A) One rational solution  
C) Two nonreal complex solutions

- B) Two irrational solutions  
D) Two rational solutions

21) \_\_\_\_\_

**Find the value of k so that the equation will have exactly one rational solution.**

22)  $16x^2 + kx + 25 = 0$

- A) 40 or -40                      B) 20 or -20                      C) 40i or -40i                      D) None

22) \_\_\_\_\_

23)  $25x^2 - 10x + k = 0$

- A) None                                      B) 1                                      C) 0                                      D) -1

23) \_\_\_\_\_

**Solve the equation.**

24)  $x - 2 = \frac{3}{x}$

- A)  $\left\{1, \frac{1}{3}\right\}$                       B)  $\{-1, 3\}$                       C)  $\left\{-\frac{1}{3}, 1\right\}$                       D)  $\{-3, 1\}$

24) \_\_\_\_\_

25)  $\frac{18}{x-2} = 1 + \frac{20}{x+2}$

- A)  $\{-8, 10\}$                       B)  $\emptyset$                                       C)  $\{-20, 10\}$                       D)  $\{8, -10\}$

25) \_\_\_\_\_

26)  $s = 128 + 8\sqrt{s}$

- A)  $\{256\}$                                       B)  $\{128\}$                                       C)  $\{192\}$                                       D)  $\{512\}$

26) \_\_\_\_\_

27)  $16y = \sqrt{1 - 24y}$

- A)  $\left\{\frac{1}{16}\right\}$                       B)  $\left\{-\frac{1}{8}\right\}$                       C)  $\left\{\frac{1}{32}\right\}$                       D)  $\left\{\frac{1}{8}\right\}$

27) \_\_\_\_\_

28)  $\sqrt{14y - 21} = y + 2$

- A)  $\{5\}$                                       B)  $\{7\}$                                       C)  $\{-5\}$                                       D)  $\{-4\}$

28) \_\_\_\_\_

29)  $\sqrt{x+3} = x - 3$

- A)  $\{6\}$                                       B)  $\{1, 13\}$                                       C)  $\{6, 13\}$                                       D)  $\{1, 6\}$

29) \_\_\_\_\_

30)  $(3m - 7)^2 + 3(3m - 7) - 18 = 0$

- A)  $\left\{\frac{13}{3}, -\frac{4}{3}\right\}$                       B)  $\left\{\frac{1}{3}, \frac{10}{3}\right\}$                       C)  $\left\{\frac{1}{3}, -\frac{10}{3}\right\}$                       D)  $\left\{-\frac{13}{7}, \frac{4}{3}\right\}$

30) \_\_\_\_\_

31)  $(3p - 9)^2 = -2(3p - 9) + 15$

- A)  $\left\{-\frac{4}{3}, -4\right\}$                       B)  $\left\{\frac{4}{3}, 4\right\}$                       C)  $\{-5, 3\}$                       D)  $\left\{-\frac{14}{3}, -2\right\}$

31) \_\_\_\_\_

32)  $(m - 2)^{2/3} - 5(m - 2)^{1/3} + 4 = 0$

- A)  $\{-3, 66\}$                                       B)  $\{3, 6\}$                                       C)  $\{-3, 0\}$                                       D)  $\{3, 66\}$

32) \_\_\_\_\_

**Solve the equation for the indicated variable. (Leave  $\pm$  in your answer, when appropriate.)**

33)  $E = mc^2$  for  $c$  33) \_\_\_\_\_  
 A)  $c = \frac{E}{m}$       B)  $c = Em$       C)  $c = \pm \frac{\sqrt{Em}}{m}$       D)  $c = \pm \sqrt{Em}$

34)  $A = \frac{1}{3}\pi r^2$  for  $r$  34) \_\_\_\_\_  
 A)  $r = 3\sqrt{A\pi}$       B)  $r = \pm \frac{\sqrt{3A\pi}}{3\pi}$       C)  $r = \frac{3\pi}{A}$       D)  $r = \pm \frac{\sqrt{3A\pi}}{\pi}$

35)  $r = \sqrt{\frac{A}{2\pi}}$  for  $A$  35) \_\_\_\_\_  
 A)  $A = \pm 2\pi\sqrt{r}$       B)  $A = 2\pi r^2$       C)  $A = 2\pi r$       D)  $A = \pm \sqrt{2\pi r}$

**Solve the problem.**

36) Two cars leave an intersection. One car travels north; the other east. When the car traveling north had gone 12 mi, the distance between the cars was 4 mi more than the distance traveled by the car heading east. How far had the eastbound car traveled? 36) \_\_\_\_\_  
 A) 24 mi      B) 20 mi      C) 12 mi      D) 16 mi

37) A ladder is resting against a wall. The top of the ladder touches the wall at a height of 18 ft. Find the length of the ladder if the length is 6 ft more than its distance from the wall. 37) \_\_\_\_\_  
 A) 30 ft      B) 36 ft      C) 18 ft      D) 24 ft

**Solve the problem, if possible. Round your answer to the nearest tenth, when appropriate.**

38) The length of a rectangle is 4 in. more than its width. If 2 in. are taken from the length and added to the width, the figure becomes a square with an area of  $192 \text{ in.}^2$ . What are the dimensions of the original figure? 38) \_\_\_\_\_  
 A) 12.9 in. by 16.9 in.  
 B) 10.9 in. by 14.9 in.  
 C) 11.9 in. by 15.9 in.  
 D) Cannot be determined without additional information

**Solve the problem. Round your answer to the nearest tenth, when appropriate.**

39) A ball is thrown downward from a window in a tall building. Its position at time  $t$  in seconds is given by  $s(t) = 16t^2 + 32t$ , where  $s$  is in feet. How long will it take the ball to fall 236 ft? 39) \_\_\_\_\_  
 A) 2.8 sec      B) 9.0 sec      C) 3.0 sec      D) 3.8 sec

40) A rock falls from a tower that is 102.9 m high. As it is falling, its height is given by the formula  $h = 102.9 - 4.9t^2$ . How many seconds will it take for the rock to hit the ground ( $h=0$ )? 40) \_\_\_\_\_  
 A) 4.6 sec      B) 2160.9 sec      C) 9.9 sec      D) 10.1 sec

**Identify the vertex of the given parabola.**

41)  $f(x) = (x + 3)^2 + 3$  41) \_\_\_\_\_  
 A) (3, 0)      B) (0, 3)      C) (-3, -3)      D) (-3, 3)

42)  $f(x) = -(x + 2)^2 - 2$  42) \_\_\_\_\_  
 A) (2, 2)      B) (2, -2)      C) (-2, -2)      D) (-2, 2)

43)  $f(x) = x^2 - 5$

A) (1, 0)

B) (5, 0)

C) (0, 5)

D) (0, -5)

43) \_\_\_\_\_

**Find the vertex of the parabola.**

44)  $f(x) = 2x^2 - 20x + 48$

A) (5, -2)

B) (-2, 5)

C) (2, -5)

D) (-5, 2)

44) \_\_\_\_\_

45)  $f(x) = 3x^2 + 12x + 16$

A) (2, -4)

B) (4, -2)

C) (-2, 4)

D) (-4, 2)

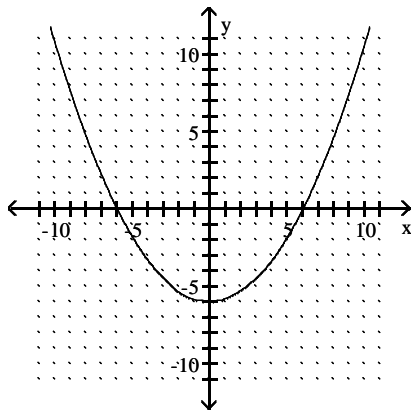
45) \_\_\_\_\_

**Sketch the graph of the parabola.**

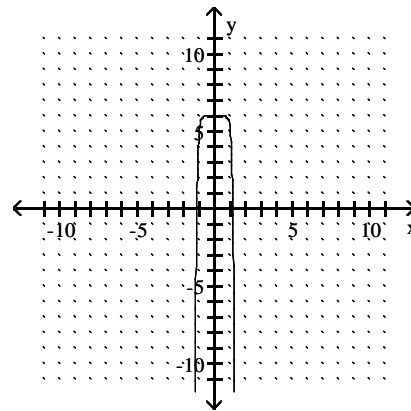
46)  $y = 6x^2 + 6$

46) \_\_\_\_\_

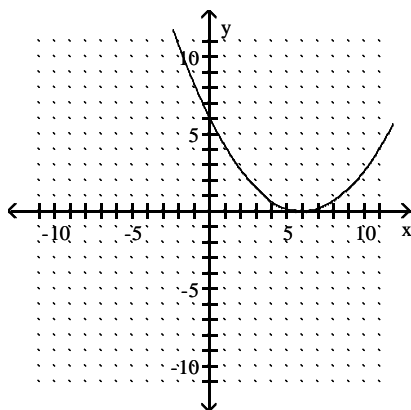
A)



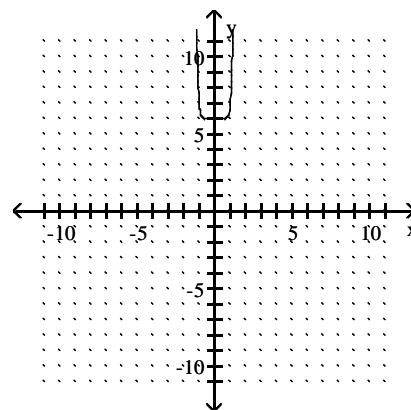
B)



C)



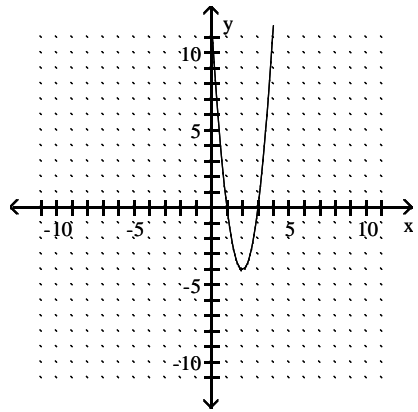
D)



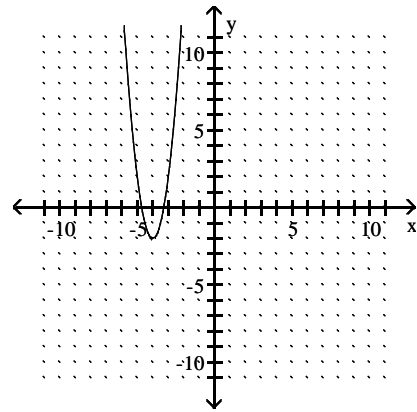
47)  $y = 4(x - 4)^2 - 2$

47) \_\_\_\_\_

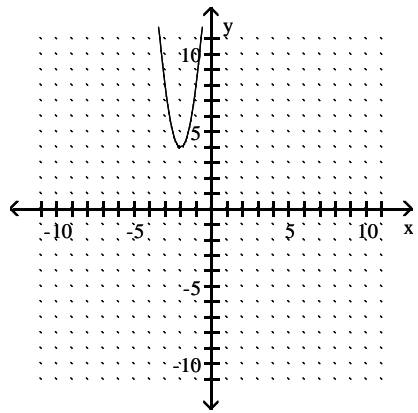
A)



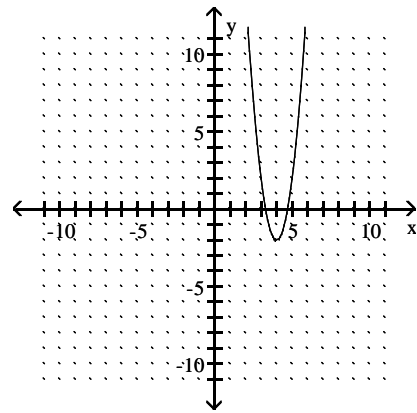
B)



C)



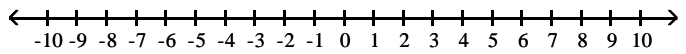
D)



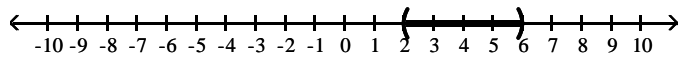
Solve the inequality, and graph the solution set.

48)  $p^2 - 8p + 12 > 0$

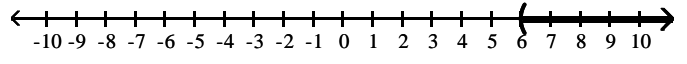
48) \_\_\_\_\_



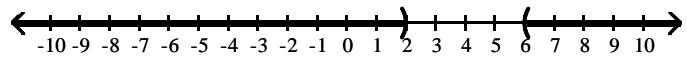
A) (2, 6)



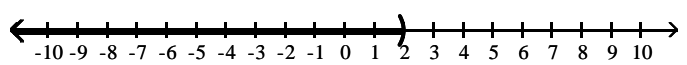
B) (6, ∞)



C)  $(-\infty, 2) \cup (6, \infty)$

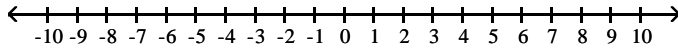


D)  $(-\infty, 2)$

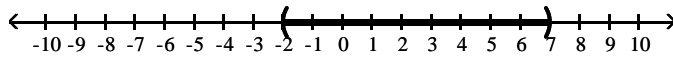


49)  $s^2 - 5s - 14 < 0$

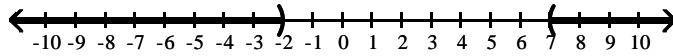
49) \_\_\_\_\_



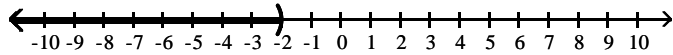
A)  $(-2, 7)$



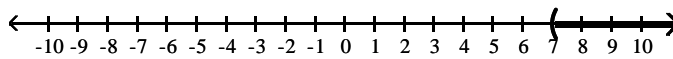
B)  $(-\infty, -2) \cup (7, \infty)$



C)  $(-\infty, -2)$



D)  $(7, \infty)$



**Solve the problem, if possible. Round your answer to the nearest tenth, when appropriate.**

50) The area of a square is  $81 \text{ cm}^2$ . If the same amount is added to one dimension and removed from the other, the resulting rectangle has an area  $9 \text{ cm}^2$  less than the area of the square. How much is added and subtracted?

50) \_\_\_\_\_

- A) 9 cm
- B) 3 cm
- C) 4 cm
- D) Cannot be determined without additional information