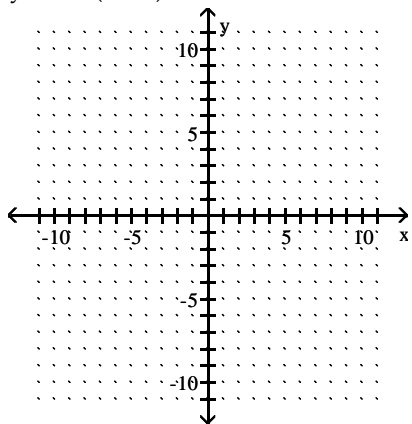Name_____

Sketch the graph of the quadratic function. Give the vertex and axis of symmetry.

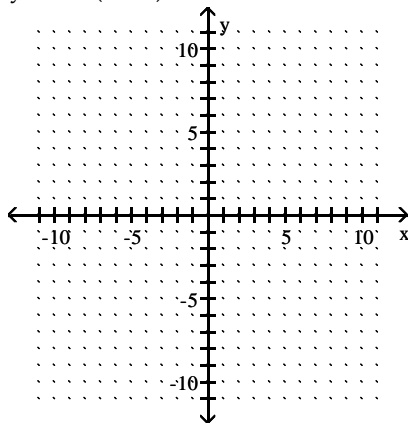1) $y + 4 = (x - 2)^2$

1) _____

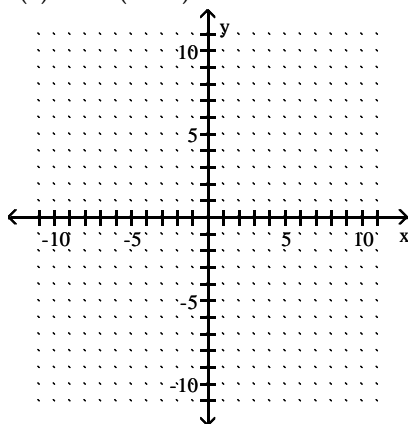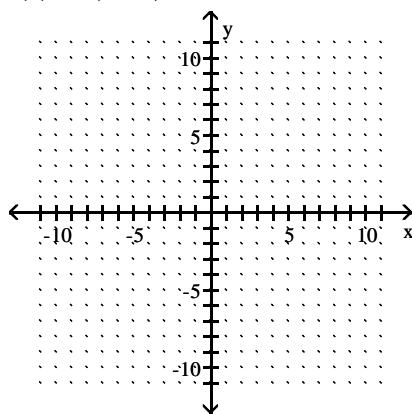2) $y + 9 = (x - 1)^2$

2) _____

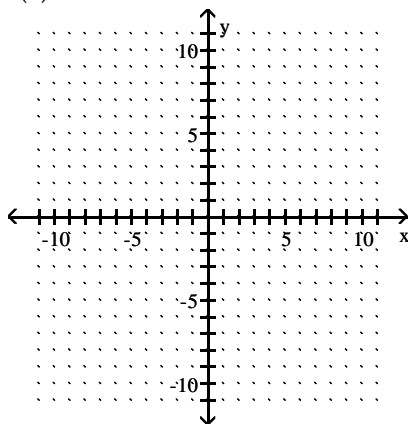3) $f(x) = 9 - (x + 3)^2$

3) _____

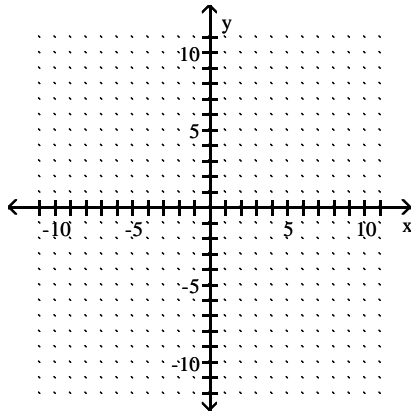4) $f(x) = 2(x + 5)^2 + 4$

4) _____

Sketch the graph of the quadratic function. Identify the vertex, intercepts, and the equation for the axis of symmetry.
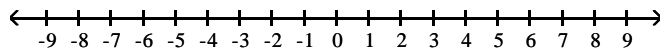
5) $f(x) = 2 + 3x + x^2$
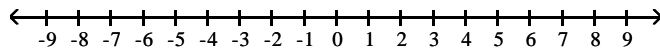
5) _____

6) $f(x) = 4x^2 + 24x + 40$

6) _____

Solve the polynomial inequality and graph the solution set on a number line.
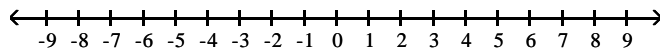
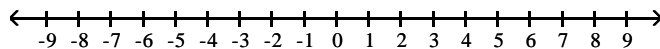7) $x^2 + 12x + 35 > 0$

7) _____

8) $(x + 1)(x - 4) < 0$

8) _____

9) $x^2 - 2x - 8 \le 0$

9) _____

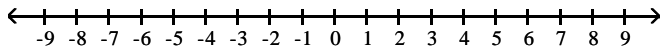

10) $x^2 - 4x \ge -3$

10) _____

11) $(x - 7)(x + 1) > 0$

11) _____
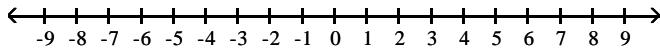
```
←--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--→
   -9 -8 -7 -6 -5 -4 -3 -2 -1  0  1  2  3  4  5  6  7  8  9
```

12) $x^2 + 12x + 36 > 0$

12) _____

```
←--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--→
   -9 -8 -7 -6 -5 -4 -3 -2 -1  0  1  2  3  4  5  6  7  8  9
```

13) $3x^2 + 5x - 12 \leq 0$

13) _____

```
←--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--→
   -9 -8 -7 -6 -5 -4 -3 -2 -1  0  1  2  3  4  5  6  7  8  9
```

14) $2x^2 - 3x - 5 \geq 0$

14) _____

```
←--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--→
   -9 -8 -7 -6 -5 -4 -3 -2 -1  0  1  2  3  4  5  6  7  8  9
```

15) $3x^2 + 2x - 1 < 0$

15) _____

```
←--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--→
   -9 -8 -7 -6 -5 -4 -3 -2 -1  0  1  2  3  4  5  6  7  8  9
```

16) $-5x^2 + 6x \geq 0$

16) _____

```
←--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--→
   -7 -6 -5 -4 -3 -2 -1  0  1  2  3  4  5  6  7
```

17) $x^2 + 6x \geq 0$ 17) _____

```
←—+——+——+——+——+——+——+——+——+——+——+——+——+——+——+——+——+——+——→
  -9 -8 -7 -6 -5 -4 -3 -2 -1  0  1  2  3  4  5  6  7  8  9
```

18) $x^2 - 18x + 81 < 0$ 18) _____

```
←—+——+——+——+——+——+——+——+——+——+——+——+——+——+——+——+——+——+——→
  -9 -8 -7 -6 -5 -4 -3 -2 -1  0  1  2  3  4  5  6  7  8  9
```
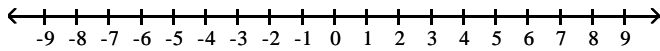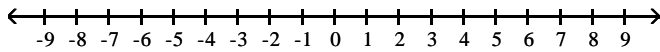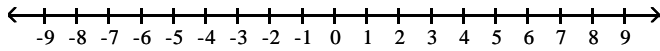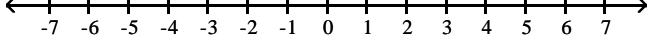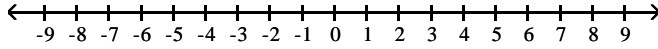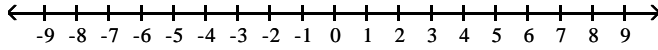
Solve.

19) The daily number of requests, $f(x)$, for a song that a local radio station receives can be modeled by the formula $f(x) = x^2 - 5x + 9$, where x is the number of days after the song has been released. During which time period will the daily number of requests be below 5?   19) _____

20) An arrow is fired straight up from the ground with an initial velocity of 144 feet per second. Its height, $s(t)$, in feet at any time t is given by the function $s(t) = -16t^2 + 144t$. Find the interval of time for which the height of the arrow is greater than 180 feet.   20) _____

21) The total profit function $P(x)$ for a company producing x thousand units is given by $P(x) = -3x^2 + 57x - 210$. Find the values of x for which the company makes a profit. [Hint: The company makes a profit when $P(x) > 0$.]   21) _____
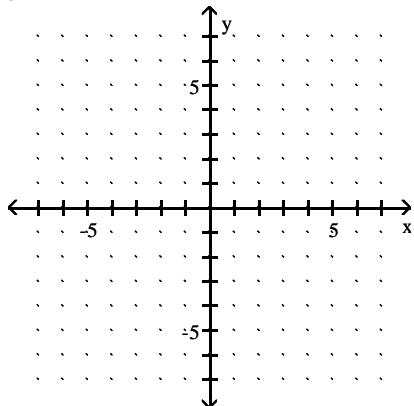
22) The perimeter of a rectangle is 62 feet. Describe the possible length of a side if the area of the rectangle is not to exceed 198 square feet.   22) _____
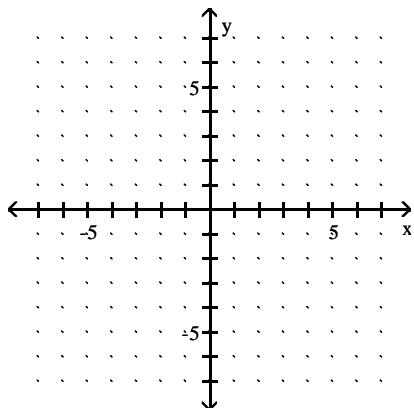
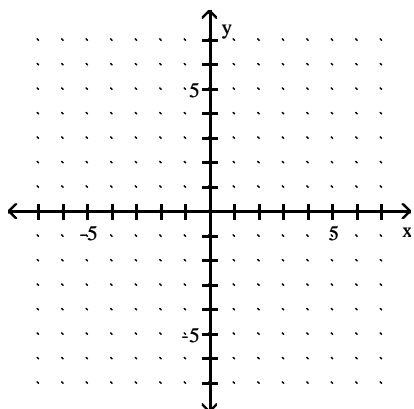**Sketch the graph of the given function.**

23) $y = 2^x$

23) _____

24) $y = 5^x$

24) _____
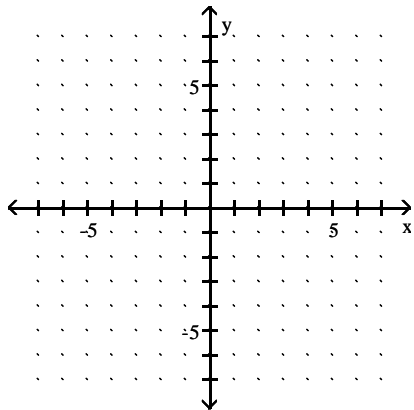
25) $y = 3^x$

25) _____
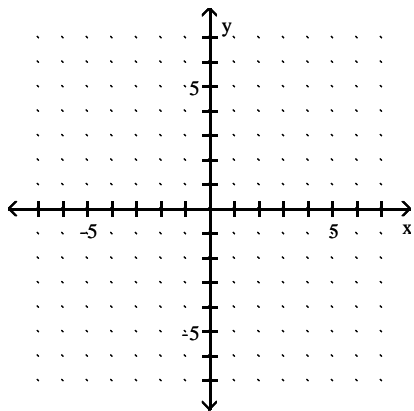
26) $y = (\frac{1}{2})^x$

26) _____
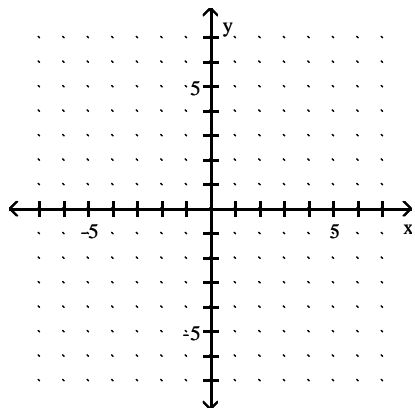
27) $y = (\frac{1}{3})^x$
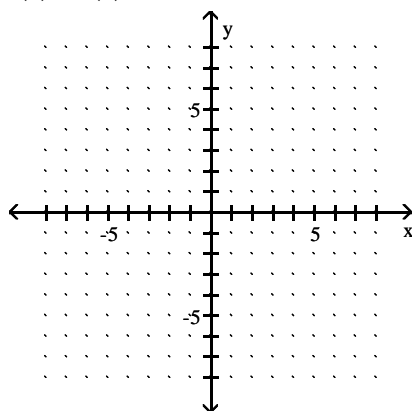
27) _____

28) $y = \left(\dfrac{1}{4}\right)^{x}$

28) _____

Sketch the graph of the given function, its inverse, and y = x on the same set of axes. Graph the function with a solid line, and graph y = x and the function's inverse using dotted lines.
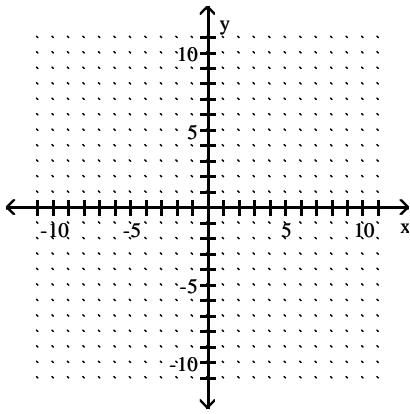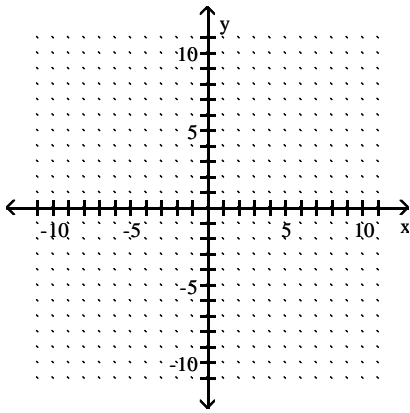
29) $f(x) = 5(8)^{x}$

29) _____

30) f(x) = 3x

31) f(x) = -2x + 2

32) f(x) = $\frac{1}{2}$x + 3
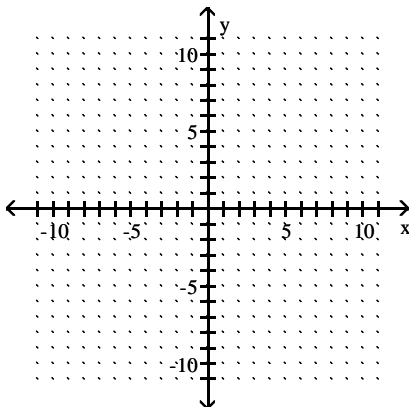
33) $f(x) = 5(\frac{1}{9})^x$

33) _____
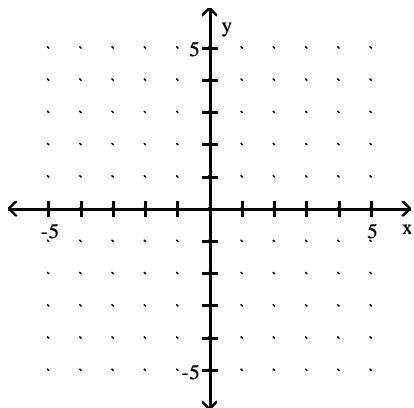
Find the inverse of the given function.

34) $f(x) = x + 9$

34) _____

35) $f(x) = x - 2$

35) _____

36) $f(x) = -7x$

36) _____

37) $f(x) = 4(x - 9)$

37) _____

38) $f(x) = x^3 + 6$

38) _____

39) $f(x) = x^3 + 2$

39) _____

1) vertex: (2, – 4)
   axis of symmetry: x = 2
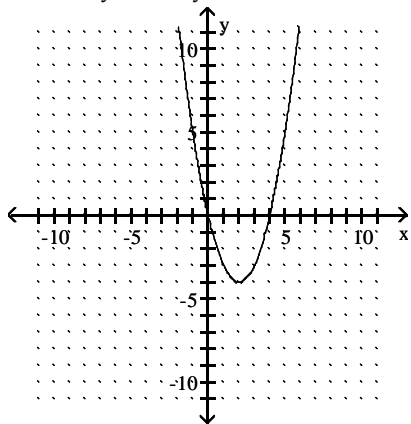
2) vertex: (1, – 9)
   axis of symmetry: x = 1
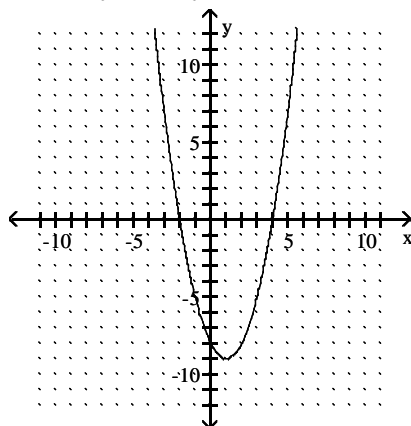
3) vertex: (– 3, 9)
   axis of symmetry: x = – 3
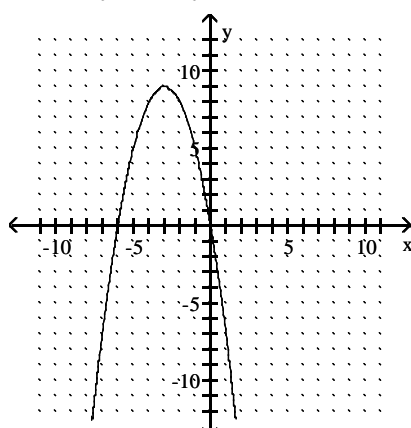
4) vertex: (−5, 4)
   axis of symmetry: x = −5
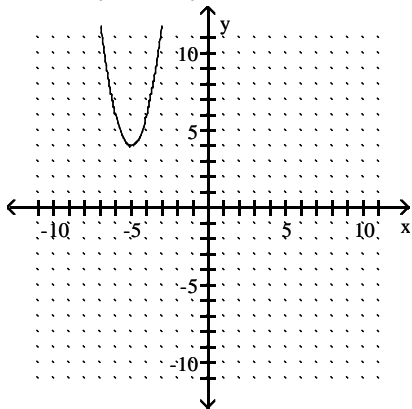
5) vertex: $\left(-\dfrac{3}{2}, -\dfrac{1}{4}\right)$
   x–intercepts: (−1, 0) and (−2, 0)
   y–intercept: (0, 2)
   axis of symmetry: $x = -\dfrac{3}{2}$
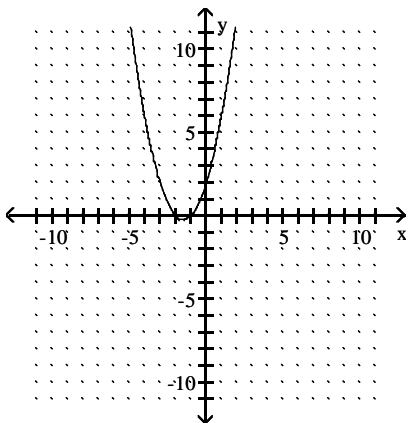
6) vertex: (−3, 4)
   x–intercepts: none
   y–intercept: (0, 40)
   axis of symmetry: x = −3

12 of 10
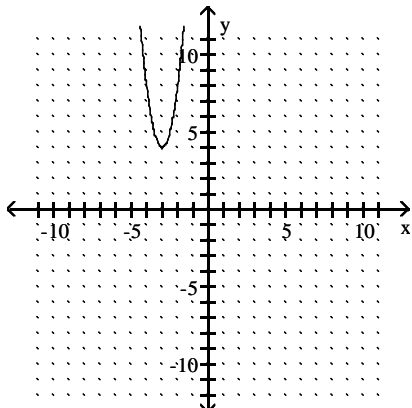
7) $(-\infty, -7) \cup (-5, \infty)$
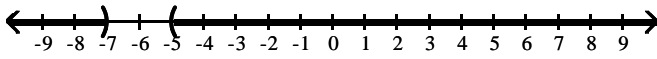
8) $(-1, 4)$
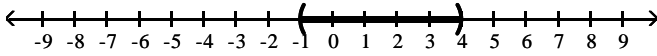
9) $[-2, 4]$
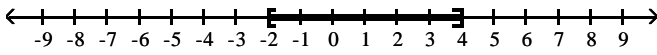
10) $(-\infty, 1] \cup [3, \infty)$
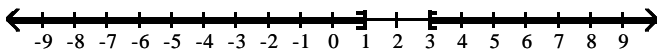
11) $(-\infty, -1) \cup (7, \infty)$
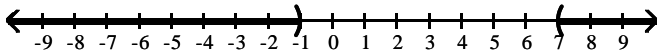
12) $(-\infty, -6) \cup (-6, \infty)$
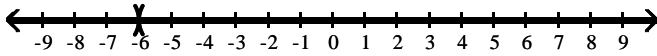
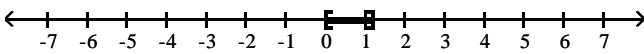13) $\left[-3, \dfrac{4}{3}\right]$
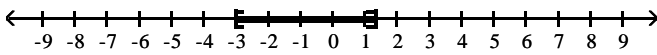
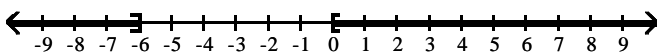14) $(-\infty, -1] \cup \left[\dfrac{5}{2}, \infty\right)$
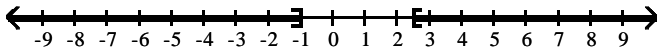
15) $\left(-1, \dfrac{1}{3}\right)$
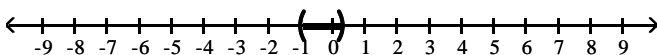
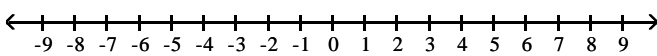16) $\left[0, \dfrac{6}{5}\right]$

17) $(-\infty, -6] \cup [0, \infty)$
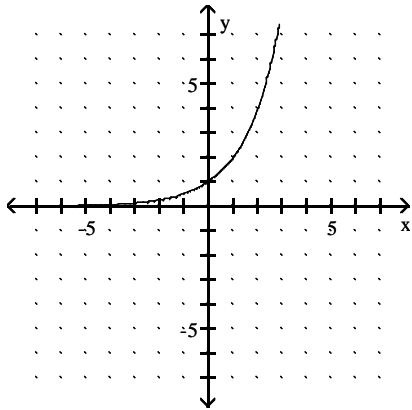
18) $\varnothing$

19) between day 1 and day 4

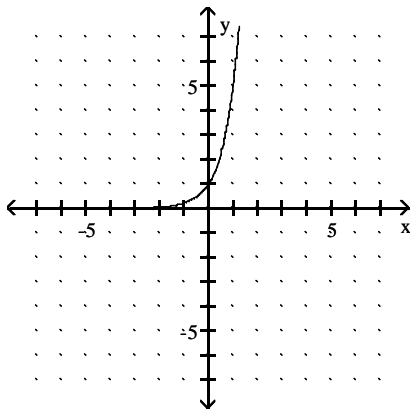20) between $\dfrac{3}{2}$ and $\dfrac{15}{2}$ sec

21) x is between 5 thousand units and 14 thousand units
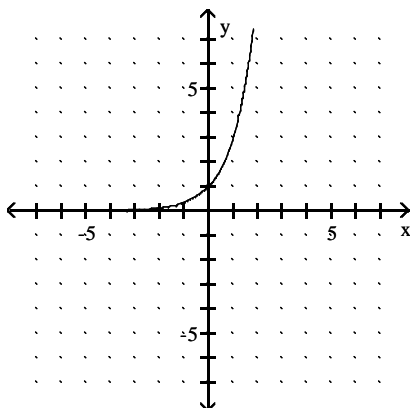
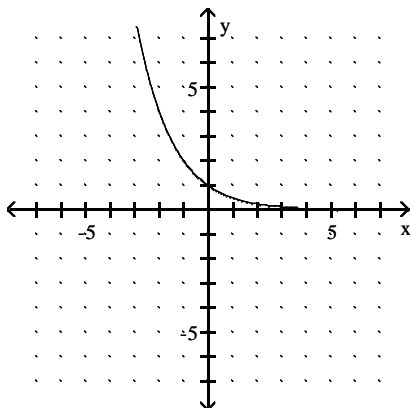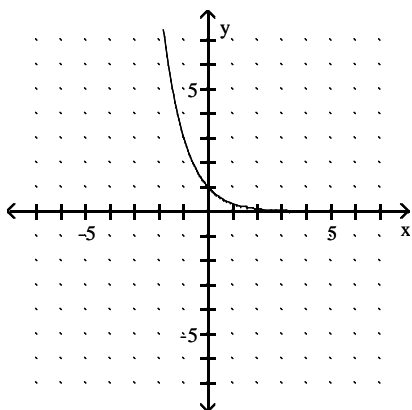22) The length of the shortest side cannot exceed 9 feet.

23)

24)

25)
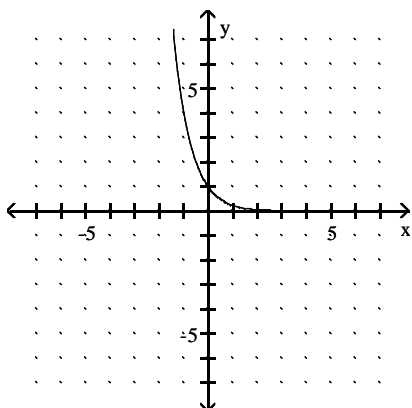
26)

27)

28)

29)

30)
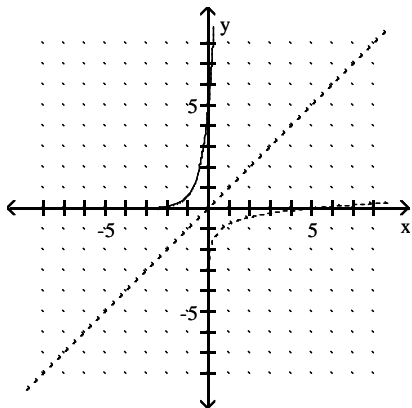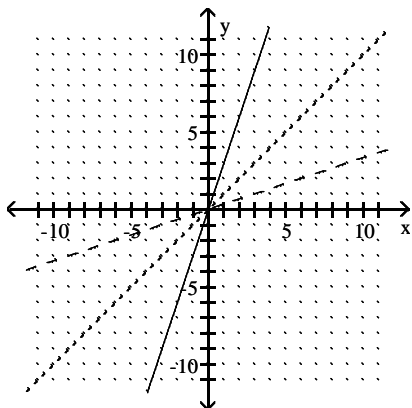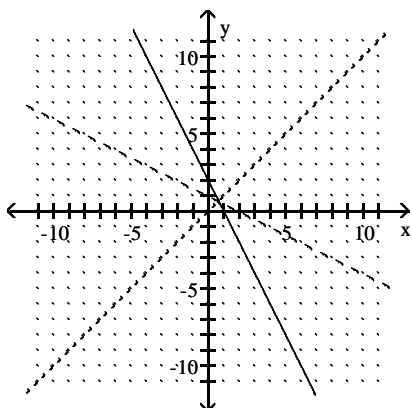
31)

32)
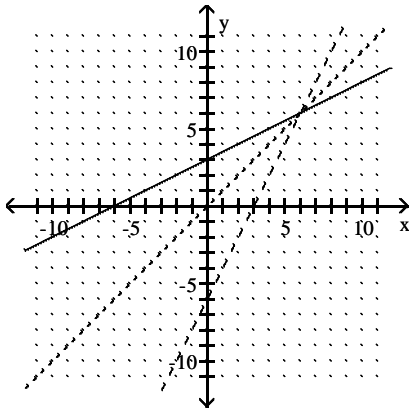
33)
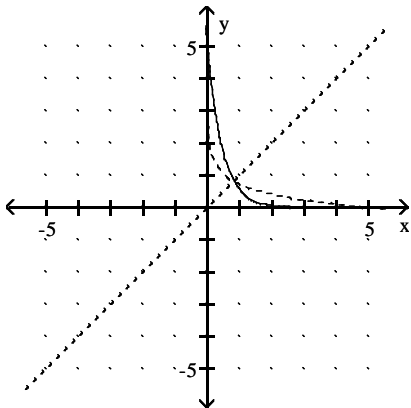
34) $f^{-1}(x) = x - 9$

35) $f^{-1}(x) = x + 2$

36) $f^{-1}(x) = -\frac{1}{7}x$

37) $f^{-1}(x) = \frac{1}{4}x + 9$

38) $f^{-1}(x) = \sqrt[3]{x - 6}$

39) $f^{-1}(x) = \sqrt[3]{x - 2}$