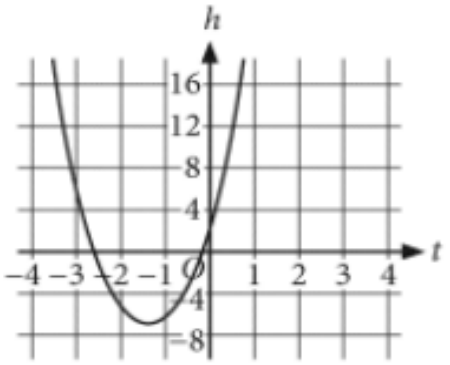
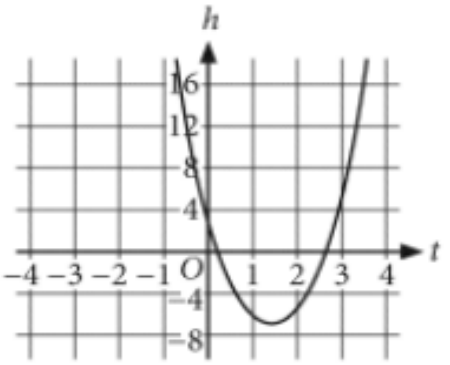
1.

A ball is thrown straight up into the air at an initial velocity of 14 meters per second from a height of 3 meters above ground. The height of the ball can be modeled by the equation $h = -5t^2 + 14t + 3$, where h represents the height of the ball, in meters, after t seconds. Which graph represents the equation?

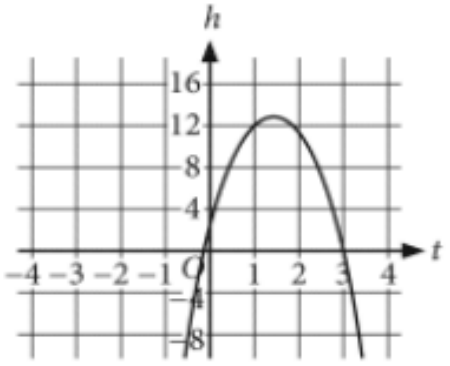
A)



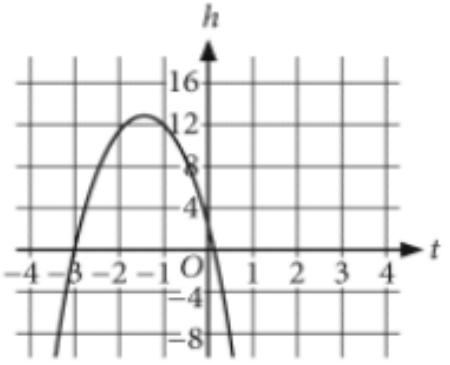
B)



C)



D)



2.

For the function g defined by $g(x) = x^2 + 2x + b$, what must b represent?

A) The minimum value of g

B) The maximum value of g

C) The x-intercept of the graph of g in the xy-plane

D) The y-intercept of the graph of g in the xy-plane

3.

$$2x^2 - 5x + c = 0$$

In the equation above, c is a constant. If the equation has no real solutions, which of the following could be the value of c ?

A) -4

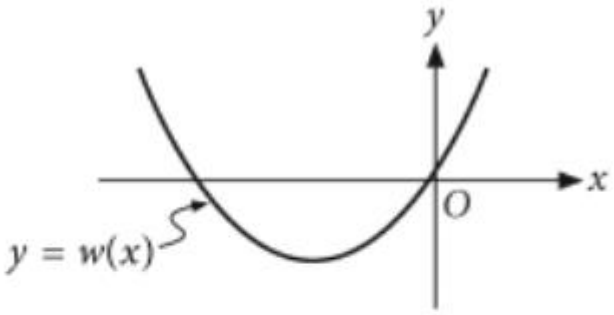
B) -3

C) 3

D) 4

4.

The graph of $y = w(x)$ is shown in the xy-plane.



If a, b, and c are positive constants, which of the following could define the function w ?

A) $w(x) = -a(x + b)^2 - c$

B) $w(x) = -a(x - b)^2 - c$

C) $w(x) = a(x + b)^2 - c$

D) $w(x) = a(x - b)^2 - c$

5.

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

In the equation above, c is a constant. If the equation has exactly one solution, what is the value of c ?

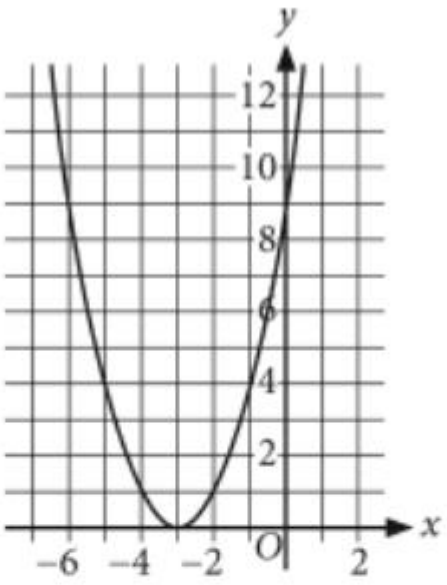
A) 25

B) 10

C) 5

D) 0

6.



The graph of $y = (x + k)^2$, where k is a constant, is shown. What is the value of k ?

A) −3

B) 0

C) 3

D) 9

7.

The height $h(t)$, in feet, reached by a projectile t seconds after launch is described by the function $h(t) = -16t^2 + 48t + 22$. What is the height, in feet, of the projectile 3 seconds after launch?

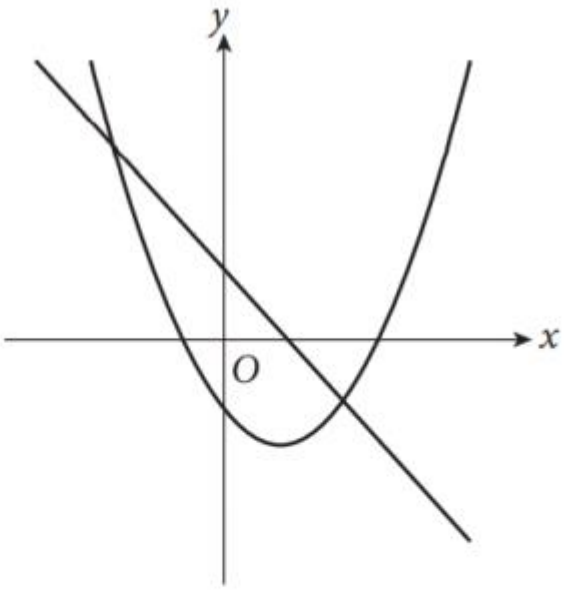
A) 22

B) 58

C) 118

D) 2,470

8.



A system of one linear and one quadratic equation is graphed in the xy-plane above. How many solutions does the system of equations have?

A) None

B) One

C) Two

D) More than two

9.

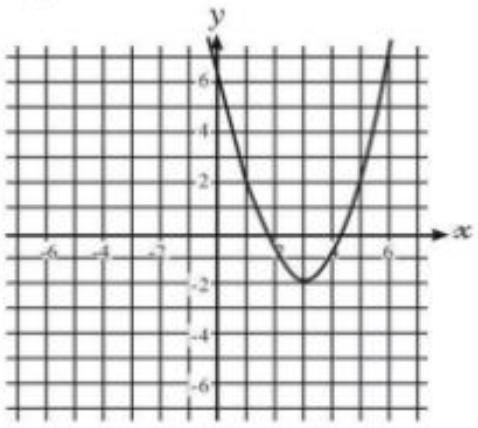
In the function f defined by $f(x) = x^2 + 5x + t$,
what must t represent?

A) The maximum value of f
B) The minimum value of f
C) The x-intercept of the graph of f in the xy-plane
D) The y-intercept of the graph of f in the xy-plane

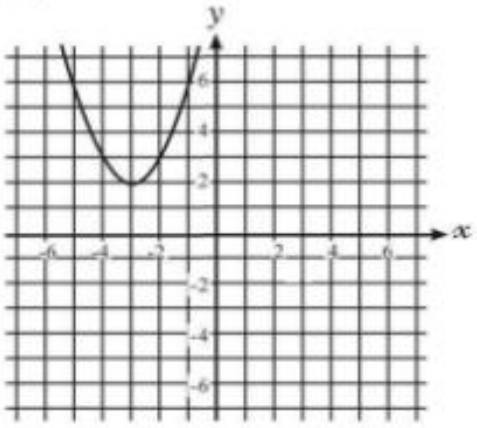
10.

Which of the following is the graph of $y = -(x+3)^2 - 2$?

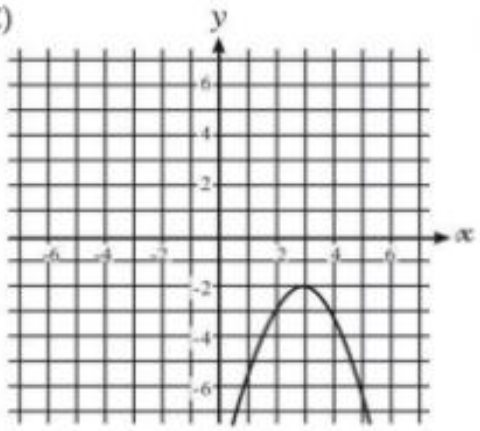
A)



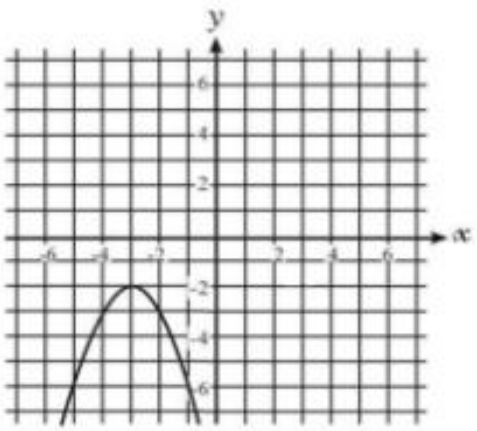
B)



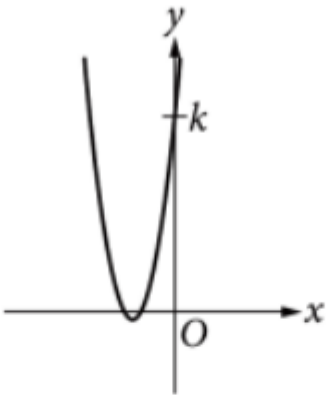
C)



D)



11.



The graph of $y = 2x^2 + 10x + 12$ is shown. If the graph crosses the y-axis at the point $(0, k)$, what is the value of k?

A) 2

B) 6

C) 10

D) 12

12.

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

In the given equation, c is a constant. If the equation has exactly one solution, what is the value of c ?

A) −2

B) 0

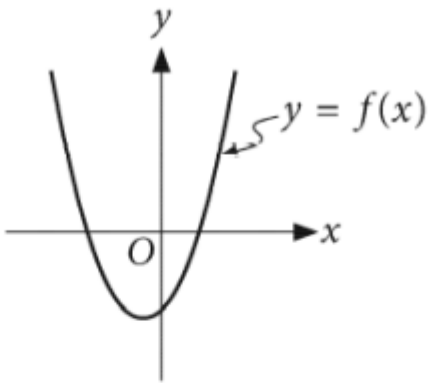
C) 1

D) 2

13.

In the equation $x^2 + kx + 1 = 0$, k is a positive constant. If the equation has exactly one solution, what is the value of k ?

14.



The graph of the quadratic function g is shown in the xy-plane above. Which of the following could define g ?

A) $g(x) = x^2$

B) $g(x) = (x - 2)(x - 1)$

C) $g(x) = (x + 2)(x - 1)$

D) $g(x) = (x + 2)(x + 1)$

15.

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

The solutions to the equation above can be expressed in the form $\frac{6 \pm \sqrt{n}}{4}$, where n is a positive integer.

What is the value of n ?

16.

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

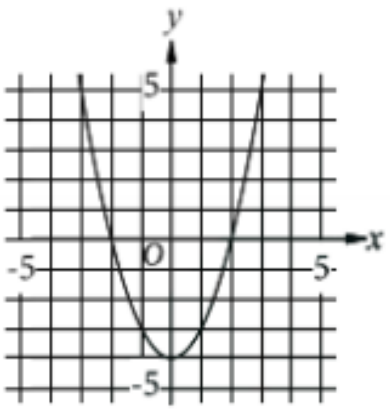
The equation above has solutions $x = n + \sqrt{k}$ and $x = n - \sqrt{k}$, where n and k are positive integers. What is the value of $n + k$?

17.

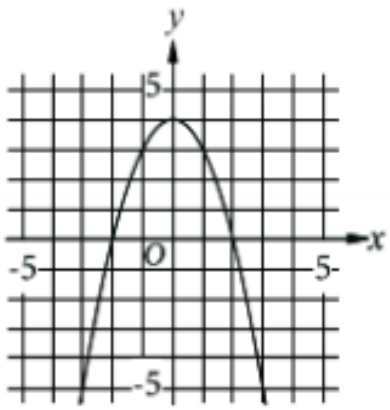
$$y = -x^2 + 4x$$

Which of the following is the graph in the xy-plane of the given equation?

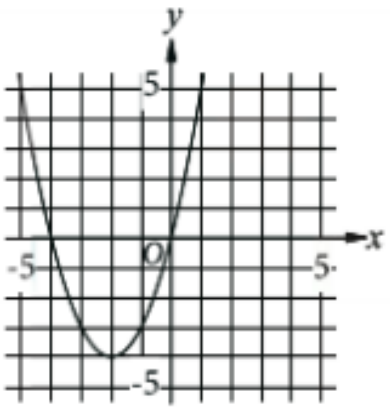
A)



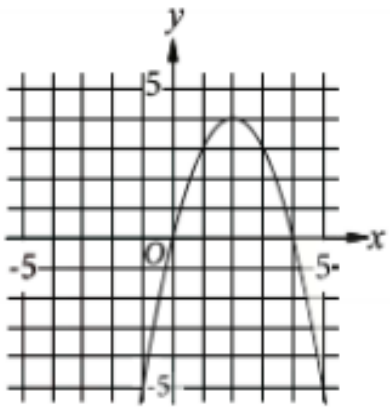
B)



C)



D)

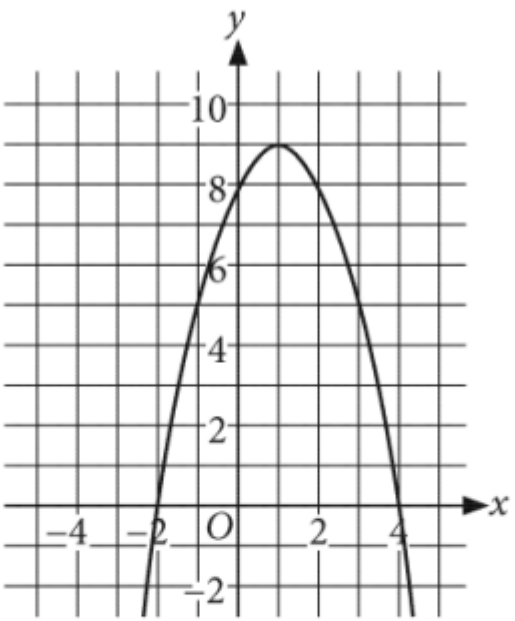


18.

$$h(t) = -16t^2 + 48t + 72$$

If air resistance is ignored, the function h defined above models the height above ground, in feet, of a toy rocket t seconds after it is launched from the roof of building. Based on the model, what is the **height above ground, in feet, of the toy rocket 1 second after launch?**

19.



Which of the following is an equation of the parabola shown in the xy-plane?

A) $y = -(x + 2)(x - 4)$

B) $y = -(x - 2)(x + 4)$

C) $y = (x + 2)(x - 4)$

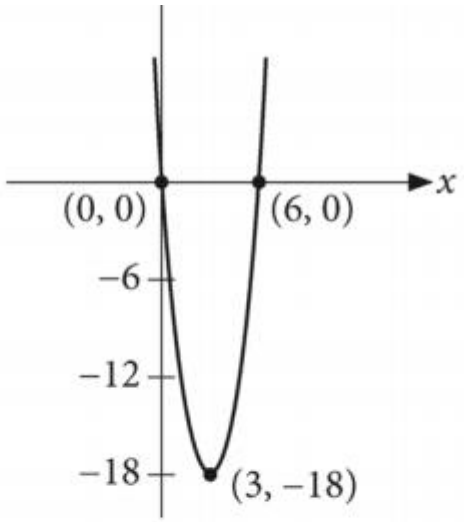
D) $y = (x - 2)(x + 4)$

20.

$$x^2 - 8x - 15 = 0$$

The solutions to the given equation can be written as $\frac{8 \pm \sqrt{k}}{2}$, where k is a constant. What is the value of k ?

21.



Which of the following is an equation of the parabola shown in the xy-plane above?

A) $y = \frac{1}{2}x(x + 6)$

B) $y = \frac{1}{2}x(x - 6)$

C) $y = -2x(x + 6)$

D) $y = 2x(x - 6)$

22.

$$y=-(x-3)^2+a$$

In the equation above, a is a constant. The graph of the equation in the xy-plane is a parabola. Which of the following is true about the parabola?

A) Its minimum occurs at $(-3, a)$.

B) Its minimum occurs at $(3, a)$.

C) Its maximum occurs at $(-3, a)$

D) Its maximum occurs at $(3, a)$.

23.

$$2x^2+3x-4=0$$

If one of the solutions of the given equation is $\frac{-3+\sqrt{c}}{4}$, where c is a constant, what is the value of c ?

24.

$$x^2+bx+16=0$$

In the given equation, b is a constant. If the equation has exactly one solution, which of the following could be the value of b ?

A) 16

B) 0

C) −2

D) −8

25.

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

In the quadratic equation above, c is a constant. For which of the following values of c does the equation have two different integer solutions?

A) 3

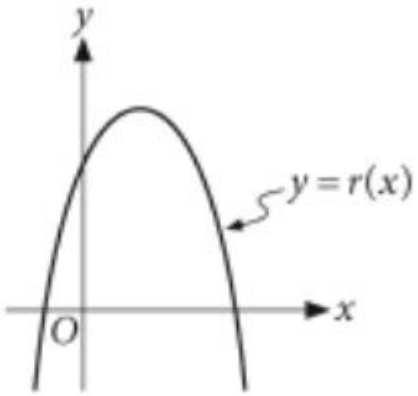
B) 4

C) 5

D) 6

26.

The graph of $y = r(x)$ is shown in the xy-plane.



If a, b, and c are positive constants, which of the following could define the function r?

A) $r(x) = -a(x-b)^2 + c$

B) $r(x) = -a(x+b)^2 + c$

C) $r(x) = a(x-b)^2 + c$

D) $r(x) = a(x+b)^2 + c$

27.

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

The equation above has solutions $x = \frac{2 + \sqrt{n}}{2}$ and $x = \frac{2 - \sqrt{n}}{2}$, where n is a positive integer. What is the value of n ?

28.

$$x^2 - 2x - 10 = 0$$

A positive value x that satisfies the equation above can be written in the form $x = a + a\sqrt{c}$, where a and c are integers. What is the value of c ?

29.

The graph of the equation $y = 2(x + r)^2 - s$ in the xy-plane is a parabola, where r and s are constants. What is the vertex of this parabola?

A) $(-2r, -s)$

B) $(-r, -s)$

C) $(r, -s)$

D) $(2r, -s)$

30.

$$x^2 + bx + 25 = 0$$

In the equation above, b is a constant. If the equation has exactly one solution, which of the following could be the value of b ?

A) -5

B) 1

C) 5

D) 10

31.

$$x^2 + 4x + k = 0$$

In the equation shown, k is a constant. If the equation has no real solutions, which of the following could be the value of k ?

A) 6

B) 4

C) 3

D) 2

32.

$$3x^2 + bx + 5 = 0$$

For the quadratic equation shown, b is a constant. If the equation has no real solutions, which of the following must be true?

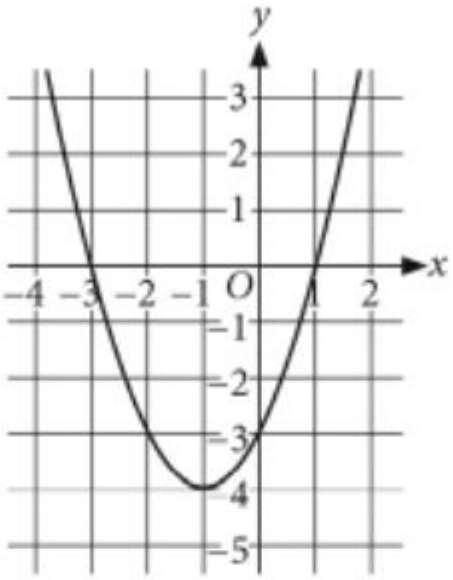
A) $b^2 < 60$

B) $b^2 > 60$

C) $b < 0$

D) $b > 0$

33.



An equation for the graph shown is $y = (x - 1)(x + b)$, where b is a constant. What is the value of b ?

A) 3

B) 1

C) −3

D) −4

34 .

$$x^2 + bx - 12 = 0$$

In the given equation, b is a positive integer constant. Which value could be a solution to the equation?

A) 3

B) 4

C) 6

D) 12

35.

$$x^2 - 5x + 5k = 0$$

In the given equation, k is a constant. The equation has no real solutions. What is a possible value of k ?

A) $\frac{3}{4}$

B) 1

C) $\frac{5}{4}$

D) 2