#1

ID: 3a9d60b2

$$2(4 - x) + 3(4 - x) = 25$$

What is the positive solution to the given equation?

#2

ID: ba0edc30

$$x^2 - 2x - 9 = 0$$

One solution to the given equation can be written as $1 + \sqrt{k}$, where k is a constant. What is the value of k?

A) 8

B) 10

C) 20

D) 40

#3

ID: fc3d783a

In the xy-plane, a line with equation $2y = 4.5$ intersects a parabola at exactly one point. If the parabola has equation $y = -4x^2 + bx$, where b is a positive constant, what is the value of b?

#4

ID: 4661e2a9

$$x - y = 1$$
$$x + y = x^2 - 3$$

Which ordered pair is a solution to the system of equations above?

A) $(1 + \sqrt{3}, \sqrt{3})$

B) $(\sqrt{3}, -\sqrt{3})$

C) $(1 + \sqrt{5}, \sqrt{5})$

D) $(\sqrt{5}, -1 + \sqrt{5})$

#5

ID: f65288e8

$$\frac{1}{x^2 + 10x + 25} = 4$$

If x is a solution to the given equation, which of the following is a possible value of $x + 5$?

A) $\frac{1}{2}$

B) $\frac{5}{2}$

C) $\frac{9}{2}$

D) $\frac{11}{2}$

#6

ID: 2c288148

$$\sqrt{k - x} = 58 - x$$

In the given equation, k is a constant. The equation has exactly one real solution. What is the minimum possible value of $4k$?

#7

ID: f2f3fa00

During a 5-second time interval, the average acceleration a, in meters per second squared, of an object with an initial velocity of 12 meters per second is defined by the equation $a = \frac{v_f - 12}{5}$, where v_f is the final velocity of the object in meters per second. If the equation is rewritten in the form $v_f = xa + y$, where x and y are constants, what is the value of x ?

#8

ID: 6ce95fc8

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

Which of the following is a solution to the equation above?

A) 2

B) $1 - \sqrt{11}$

C) $\frac{1}{2} + \sqrt{11}$

D) $\frac{1 + \sqrt{11}}{2}$

#9

ID: f5aa5040

In the *xy*-plane, a line with equation $2y = c$ for some constant c intersects a parabola at exactly one point. If the parabola has equation $y = -2x^2 + 9x$, what is the value of c?

#10

ID: d0a53ef5

$$\sqrt{(x - 2)^2} = \sqrt{3x + 34}$$

What is the smallest solution to the given equation?

#11

ID: 2c05d312

$$57x^2 + (57b + a)x + ab = 0$$

In the given equation, a and b are positive constants. The product of the solutions to the given equation is kab, where k is a constant. What is the value of k?

A) $\frac{1}{57}$

B) $\frac{1}{19}$

C) 1

D) 57

#12

ID: 1fe32f7d

$$-x^2 + bx - 676 = 0$$

In the given equation, b is a positive integer. The equation has no real solution. What is the greatest possible value of b?

#13

ID: c303ad23

If $3x^2 - 18x - 15 = 0$, what is the value of $x^2 - 6x$?

#14

ID: 74473be4

Which quadratic equation has no real solutions?

A) $x^2 + 14x - 49 = 0$

B) $x^2 - 14x + 49 = 0$

C) $5x^2 - 14x - 49 = 0$

D) $5x^2 - 14x + 49 = 0$

#15

ID: 7bd10ef3

$$2x^2 - 4x = t$$

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

A) -3

B) -1

C) 1

D) 3

#16

ID: e11294f9

The solutions to $x^2 + 6x + 7 = 0$ are r and s, where $r < s$. The solutions to $x^2 + 8x + 8 = 0$ are t and u, where $t < u$. The solutions to $x^2 + 14x + c = 0$, where c is a constant, are $r + t$ and $s + u$. What is the value of c?

#17

ID: 03ff48d2

$$x(kx - 56) = -16$$

In the given equation, k is an integer constant. If the equation has no real solution, what is the least possible value of k?

#18

ID: 7028c74f

$$5(x + 7) = 15(x - 17)(x + 7)$$

What is the sum of the solutions to the given equation?

#19

ID: 17d0e87d

$$\frac{14x}{7y} = 2\sqrt{w + 19}$$

The given equation relates the distinct positive real numbers w, x, and y. Which equation correctly expresses w in terms of x and y?

A) $w = \sqrt{\frac{x}{y}} - 19$

B) $w = \sqrt{\frac{28x}{14y}} - 19$

C) $w = (\frac{x}{y})^2 - 19$

D) $w = (\frac{28x}{14y})^2 - 19$

#20

ID: 66bce0c1

$$\sqrt{2x+6} + 4 = x + 3$$

What is the solution set of the equation above?

A) $\{-1\}$

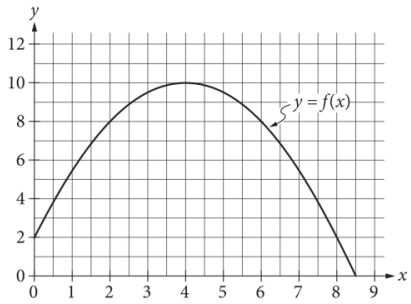
B) $\{5\}$

C) $\{-1, 5\}$

D) $\{0, -1, 5\}$

#21

ID: 97e50fa2



The graph of the function f, defined by $f(x) = -\frac{1}{2}(x - 4)^2 + 10$, is shown in the xy-plane above. If the function g (not shown) is defined by $g(x) = -x + 10$, what is one possible value of a such that $f(a) = g(a)$?

#22

ID: ebb717ab

$$x^2 - 34x + c = 0$$

In the given equation, c is a constant. The equation has no real solutions if $c > n$. What is the least possible value of n?

#23

ID: 3d12b1e0

$$-16x^2 - 8x + c = 0$$

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

#24

ID: 71014fb1

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

How many distinct real solutions does the given equation have?

A) Exactly one

B) Exactly two

C) Infinitely many

D) Zero

#25

ID: 4dc5c6f9

$$y = 18$$

$$y = -3(x - 18)^2 + 15$$

If the given equations are graphed in the *xy*-plane, at how many points do the graphs of the equations intersect?

A) Exactly one

B) Exactly two

C) Infinitely many

D) Zero

#26

ID: 2cd6b22d

$$5x^2 + 10x + 16 = 0$$

How many distinct real solutions does the given equation have?

A) Exactly one

B) Exactly two

C) Infinitely many

D) Zero

#27

ID: e9349667

$$y = x^2 + 2x + 1$$
$$x + y + 1 = 0$$

If (x_1, y_1) and (x_2, y_2) are the two solutions to the system of equations above, what is the value of $y_1 + y_2$?

A) -3

B) -2

C) -1

D) 1

#28

ID: b03adde3

If $u - 3 = \frac{6}{t - 2}$, what is t in terms of u ?

A) $t = \frac{1}{u}$

B) $t = \frac{2u + 9}{u}$

C) $t = \frac{1}{u - 3}$

D) $t = \frac{2u}{u - 3}$

#29

ID: 1ce9ffcd

$$-9x^2 + 30x + c = 0$$

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

A) 3

B) 0

C) -25

D) -53

#30

ID: 104bff62

$$\frac{x^2}{\sqrt{x^2 - c^2}} = \frac{c^2}{\sqrt{x^2 - c^2}} + 39$$

In the given equation, c is a positive constant. Which of the following is one of the solutions to the given equation?

A) $-c$

B) $-c^2 - 39^2$

C) $-\sqrt{39^2 - c^2}$

D) $-\sqrt{c^2 + 39^2}$

#31

ID: 7dbd46d9

$$8x + y = -11$$

$$2x^2 = y + 341$$

The graphs of the equations in the given system of equations intersect at the point (x, y) in the xy-plane. What is a possible value of x?

A) -15

B) -11

C) 2

D) 8

#32

ID: 158591f0

$$x(x + 1) - 56 = 4x(x - 7)$$

What is the sum of the solutions to the given equation?

#33

ID: c9417793

$$(x - 9) + 45 = 63$$

What is the sum of the solutions to the given equation?

#34

ID: 30281058

In the xy-plane, the graph of $y = x^2 - 9$ intersects line p at $(1, a)$ and $(5, b)$, where a and b are constants. What is the slope of line p ?

A) 6

B) 2

C) -2

D) -6

#35

ID: 4fb8a648

$$y = x + 9$$

$$y = x^2 + 16x + 63$$

A solution to the given system of equations is (x, y). What is the greatest possible value of x?

A) -6

B) 7

C) 9

D) 63

#36

ID: 5910bfff

$$D = T - \frac{9}{25}(100 - H)$$

The formula above can be used to approximate the dew point D, in degrees Fahrenheit, given the temperature T, in degrees Fahrenheit, and the relative humidity of H percent, where $H > 50$. Which of the following expresses the relative humidity in terms of the temperature and the dew point?

A) $H = \frac{25}{9}(D - T) + 100$

B) $H = \frac{25}{9}(D - T) - 100$

C) $H = \frac{25}{9}(D + T) + 100$

D) $H = \frac{25}{9}(D + T) - 100$

#37

ID: fbb96bb1

$$x - 29 = (x - a)(x - 29)$$

Which of the following are solutions to the given equation, where a is a constant and $a > 30$?

I. a
II. $a + 1$
III. 29

A) I and II only

B) I and III only

C) II and III only

D) I, II, and III

#38

ID: 77c0cced

$$y = 2x^2 - 21x + 64$$

$$y = 3x + a$$

In the given system of equations, a is a constant. The graphs of the equations in the given system intersect at exactly one point, (x, y), in the *xy*-plane. What is the value of x?

A) -8

B) -6

C) 6

D) 8

#39

ID: 1697ffcf

In the xy-plane, the graph of $y = 3x^2 - 14x$ intersects the graph of $y = x$ at the points $(0,0)$ and (a,a). What is the value of a ?

#40

ID: 5edc8c98

$$64x^2 - (16a + 4b)x + ab = 0$$

In the given equation, a and b are positive constants. The sum of the solutions to the given equation is $k(4a + b)$, where k is a constant. What is the value of k?

#41

ID: ff2e5c76

$$x^2 - 40x - 10 = 0$$

What is the sum of the solutions to the given equation?

A) 0

B) 5

C) 10

D) 40

#42

ID: 2c5c22d0

$$y = x^2 + 3x - 7$$
$$y - 5x + 8 = 0$$

How many solutions are there to the system of equations above?

A) There are exactly 4 solutions.

B) There are exactly 2 solutions.

C) There is exactly 1 solution.

D) There are no solutions.

#43

ID: fc3dfa26

$$\frac{4x^2}{x^2-9} - \frac{2x}{x+3} = \frac{1}{x-3}$$

What value of x satisfies the equation above?

A) -3

B) $-\frac{1}{2}$

C) $\frac{1}{2}$

D) 3

#44

ID: 6011a3f8

$$64x^2 + bx + 25 = 0$$

In the given equation, b is a constant. For which of the following values of b will the equation have more than one real solution?

A) -91

B) -80

C) 5

D) 40

#45

ID: 9cb9beec

$$y = -1.50$$

$$y = x^2 + 8x + a$$

In the given system of equations, a is a positive constant. The system has exactly one distinct real solution. What is the value of a?

#46

ID: a54753ca

In the *xy*-plane, the graph of the equation $y = -x^2 + 9x - 100$ intersects the line $y = c$ at exactly one point. What is the value of c?

A) $-\frac{481}{4}$

B) -100

C) $-\frac{319}{4}$

D) $-\frac{9}{2}$

#47 ID: 58b109d4

$$x^2 + y + 7 = 7$$

$$20x + 100 - y = 0$$

The solution to the given system of equations is (x, y). What is the value of x?