

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 ?

$$x - y = 1$$

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

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

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

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. $\frac{11}{2}$

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 ?

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

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

A. 2

B. $1 - \sqrt{11}$

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

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

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

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

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

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

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

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

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

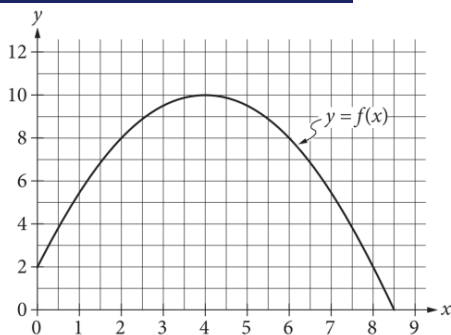
C. $w = \text{msup} - 19$

D. $w = \text{msup} - 19$

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

What is the solution set of the equation above?

- A. $\{-1\}$
- B. $\{5\}$
- C. $\{-1, 5\}$
- D. $\{0, -1, 5\}$



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 $f(a) = g(a)$?

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

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

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

How many distinct real solutions does the given equation have?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- D. Zero

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

$$x + y + 1 = 0$$

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

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. $t = \frac{2u}{u - 3}$

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

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

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

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

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

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 ?

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

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 ?

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

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

- A. 0
- B. 5
- C. 10
- D. 40

$$y = x^2 + 3x - 7$$

$$y - 5x + 8 = 0$$

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.

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

What value of x satisfies the equation above?

A. -3

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

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

D. 3

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. $-\frac{9}{2}$

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

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

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