



1

$$4x + 3y = 11$$

$$3x + 2y = 7$$

Which ordered pair, (x, y) , is the solution to the system of equations above?

- A) $(5, -1)$
- B) $(3, 1)$
- C) $(1, 2)$
- D) $(-1, 5)$

$x = -1$
 $y = 5$

2

$$x + y = 7$$

$$x - y = 1$$

If (x, y) is the solution to the system of equations above, what is the value of x ?

4

3

$$\begin{cases} -2x + 5y = 39 \\ 3x = -4y + 45 \end{cases}$$

$-2x + 5y = 39$
 $3x + 4y = 45$

From the system of equations above, what is the value of $2x + 7y$?

- A. -57
- B. 15
- C. 39
- D. 69

$x = 3$
 $y = 9$
 $2x + 7y$
 $2(3) + 7(9)$
 $= 69$

4

$$\begin{aligned} 2x + y &= 8 \\ + \quad x + 4y &= 11 \\ \hline \end{aligned}$$

If the x - and y -coordinates of a point in the xy -plane satisfy the system of equations above, what is the value of $6x + 10y$?

$x = 3, y = 2$
 $6(3) + 10(2) = 38$
 $2x(3x + 5y = 19)$
 $6x + 10y = 38$

5

$$2x + y = 5$$

$$+ \quad x + y = 3$$

If (x, y) is the solution to the system of equations above, what is the value of $3x + 2y$?

- A) 1
- B) 2
- C) 8
- D) 15

$x = 2$
 $y = 1$
 $3x + 2y$
 $3(2) + 2(1)$
 $= 8$
 $3x + 2y = 8$

6

$$\begin{cases} \frac{2}{3}x + y = -3 \\ \frac{1}{3}x + \frac{1}{2}y = -3 \end{cases}$$

What is the solution of the above system?

- A. $(-6, 1)$
- B. $(6, 9)$
- C. $(6, -7)$
- D. \emptyset



1

A library sells new and used books. If, out of the total of 474, there are twice as many new books as old ones. How many new books are there in the library?

- A. 316
- B. 158
- C. 352
- D. 238

$$\begin{aligned}
 n + u &= 474 \Rightarrow \\
 n &= 2u \Rightarrow \\
 \left. \begin{aligned} n + u &= 474 \\ n - 2u &= 0 \end{aligned} \right\} \begin{array}{l} \text{Mode} \\ 5 \\ 1 \end{array} \\
 \hline
 n &= 316, \quad u = 158
 \end{aligned}$$

2

The total revenue of a magic show is 16,360 EGP. If each adult ticket to attend the show cost 12 EGP and each children ticket cost 2 EGP, then what is the number of tickets of each type sold if 3,480 tickets in all were sold?

- A. 930 adult tickets and 2,550 children tickets
- B. 940 adult tickets and 2,540 children tickets
- C. 955 adult tickets and 2,525 children tickets
- D. 960 adult tickets and 2,520 children tickets

$$\begin{aligned}
 12a + 2c &= 16360 \quad \text{Mode} \\
 a + c &= 3480 \quad \begin{array}{l} 5 \\ 1 \end{array} \\
 \hline
 a &= 940 \quad c = 2540
 \end{aligned}$$

3

A truck contains 15 identical boxes that are either red or blue.

The red box weighs 3 kg and the blue box weighs 2 kg.

If the total weight of the boxes is 36 kgs, what is the difference between the red and blue boxes in the truck?

- A. 6
- B. 9
- C. 1
- D. 3

$$\begin{aligned}
 r + b &= 15 \\
 3r + 2b &= 36 \\
 \hline
 r &= 6 \quad b = 9 \\
 9 - 6 &= 3
 \end{aligned}$$

Mode
5
1

4

Amina went to the flower shop and bought 2 roses and 5 daisies for 6 EGP. Lara bought from the same shop, 4 roses and 2 daisies for 4 EGP. How much should Ahmad pay to buy 2 roses and 2 daisies?

- A. 1 EGP
- B. 1.5 EGP
- C. 2 EGP
- D. 3 EGP

$$\begin{aligned}
 2r + 5d &= 6 \\
 4r + 2d &= 4 \\
 \hline
 r &= \frac{1}{2} \quad d = 1 \\
 2r + 2d &= 2\left(\frac{1}{2}\right) + 2(1) \\
 &= 3
 \end{aligned}$$

Mode
5
1



1

$$\begin{cases} 3x + 2y = 5 \\ 6x + ny = 12 \end{cases}$$

In the system of equations above, n is a constant. If the system has **no solutions**, what is the value of n ?

- A) 2
 - B) 4**
 - C) 6
 - D) 12
- Handwritten work: $\frac{3}{6} = \frac{2}{n}$
 $n = \frac{2 \times 6}{3} = 4$

2

$$\begin{cases} 2x + 15y = 18 \\ kx - 5y = -7 \end{cases}$$

What is the value of k if the above system of simultaneous equations admits **no solutions**?

- A. $-\frac{1}{3}$
 - B. -6**
 - C. $-\frac{2}{3}$
 - D. $\frac{2}{3}$
- Handwritten work: $\frac{2}{k} = \frac{15}{-5}$
 $k = \frac{2 \times -5}{15}$

3

$$\begin{cases} 3x + 7y = 14 \\ ax + 28y = 56 \end{cases}$$

In the system of the equation above, a is a constant. If the system has **infinitely many solutions**, what is the value of a ?

- A) 2
 - B) 3
 - C) 4
 - D) 12**
- Handwritten work: $\frac{3}{a} = \frac{7}{28} = \frac{14}{56}$
 $a = \frac{3 \times 28}{7} = 12$

4

$$\begin{cases} 2x + 3y = 5 \\ 4x + cy = 8 \end{cases}$$

In the system of equations above, c is a constant. For what value of c will there be **no solution** (x, y) to the system of equations?

- A) 3
 - B) 4
 - C) 5
 - D) 6**
- Handwritten work: $\frac{2}{4} = \frac{3}{c}$
 $c = \frac{3 \times 4}{2}$
 $c = 6$

5

$$\begin{cases} 6x - 8y = 24 \\ -\frac{2}{3}x + \frac{8}{9}y = m \end{cases}$$

In the system of equations above, m is a constant. If the system has **more than one solution**, what is the value of m ?

- A) $-\frac{8}{3}$**
 - B) $-\frac{1}{3}$
 - C) $\frac{2}{3}$
 - D) $\frac{8}{3}$
- Handwritten work: $\frac{6}{-\frac{2}{3}} = \frac{-8}{\frac{8}{9}} = \frac{24}{m}$
 $m = \frac{24 \times \frac{8}{9}}{-8} = -\frac{8}{3}$



1

$$2 + 3i + 4i^2 + 5i^3 + 6i^4$$

If the expression above is equivalent to $a + bi$, where a and b are constants, what is the value of $a + b$? (Note $i = \sqrt{-1}$)

- (A) 2
- (B) 6
- (C) 10
- (D) 12

$i^2 = -1$
 $i^3 = -i$
 $i^4 = 1$

$$2 + 3i + 4(-1) + 5(-i) + 6(1)$$

$$2 + 3i - 4 - 5i + 6$$

$$4 - 2i = a + bi$$

$a = 4$ $b = -2$ $4 + (-2) = 2$

2

$$(3i^2 + 2)(3i^2 - 2)$$

The expression shown above can be written as the complex number $ai + b$, where a and b are real numbers. What is the value of $a + b$? (Note $i = \sqrt{-1}$)

$i^2 = -1$
 $i^3 = -i$
 $i^4 = 1$

$$(-3 + 2)(-3 - 2)$$

$$(-1)(-5) = 5$$

$ai + b = 5$

$a = 0$ $b = 5$

3

If the expression $\frac{-2i - i^3}{1 + 3i}$ is written in the form $a + bi$ where a and b are real numbers and $i = \sqrt{-1}$, what is the value of $b - a$?

$i^2 = -1$
 $i^3 = -i$
 $i^4 = 1$

$$\frac{-2i + i}{1 + 3i} = \frac{-i}{1 + 3i} \times \frac{1 - 3i}{1 - 3i}$$

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

$$= \frac{-i - 3}{10}$$

$$\frac{-1}{10}i - \frac{3}{10} = a + bi$$

$a = -\frac{3}{10}$, $b = -\frac{1}{10}$

$b - a = -\frac{1}{10} + \frac{3}{10} = \frac{2}{10} = 0.2$

4

In the complex number system, what is the value of the expression $16i^4 - 8i^2 + 4$? (Note: $i = \sqrt{-1}$)

5

Which of the following is equal to $(5 + 2i)(5 - 2i)$? (Note: $i = \sqrt{-1}$)

- (A) 21
- (B) 29
- (C) $21 - 20i$
- (D) $29 + 20i$

6

For $i = \sqrt{-1}$, which of the following is equivalent to $\frac{2i - 3}{i - 5}$?

- A. $\frac{13 - 7i}{24}$
- B. $\frac{13 - 13i}{24}$
- C. $\frac{17 - 7i}{26}$
- D. $\frac{17 - 13i}{24}$

Mr. Kably



$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

$$a^2 - b^2 = (a-b)(a+b)$$

~~$$a^2 + b^2$$~~

$$a^2 - b^2 = 20, \quad a - b = 5$$

$$a + b = \dots$$

$$(a-b)(a+b) = 20$$

$$5(a+b) = 20$$

$$a+b = \frac{20}{5}$$

$$a+b = 4$$



1

$$4x^2 - 9 = (px + t)(px - t)$$

In the equation above, p and t are constants.
Which of the following could be the value of p ?

- A) 2
- B) 3
- C) 4
- D) 9

2

If $a^2 + b^2 = 20$ and $ab = 8$, then what is $(b - a)^2$?

(Grid in)

$$\begin{aligned} (b - a)^2 &= b^2 - 2ab + a^2 \\ &= 20 - 2(8) \\ &= 20 - 16 \\ &= 4 \end{aligned}$$

$$\begin{aligned} (a+b)^2 &= a^2 + 2ab + b^2 \\ (a-b)^2 &= a^2 - 2ab + b^2 \\ a^2 - b^2 &= (a-b)(a+b) \end{aligned}$$

3

If $a^2 - b^2 = 21$ and $a - b = 3$, what is the value of $a + b$?

4

$$4x^5 - 16x^3y^2 + 16xy^4$$

Which of the following is equivalent to the expression shown above?

- A. $x(2x^2 - 2y)^2$
- B. $x^2(2x^2 - 2y^2)^2$
- C. $x(2x^2 - 4y^2)^2$
- D. $x(4x^2 - 4y^2)^2$



$$2x + 5 = 9$$
$$2x = 9 - 5$$
$$x = \frac{9 - 5}{2}$$

$$ax + b = c$$
$$ax = c - b$$
$$x = \frac{c - b}{a}$$



1

A bricklayer uses the formula $n = 7\ell h$ to estimate the number of bricks, n , needed to build a wall that is ℓ feet long and h feet high. Which of the following correctly expresses ℓ in terms of n and h ?

- A) $\ell = \frac{7}{nh}$
- B) $\ell = \frac{h}{7n}$
- C) $\ell = \frac{n}{7h}$
- D) $\ell = \frac{n}{7+h}$

$n = 7\ell h$
 $\frac{n}{7h} = \ell$

2

The distance d , in feet, traveled by a falling object t seconds after the object is dropped can be modeled by the equation $d = 16t^2$. Which of the following expresses the number of seconds after the object is dropped in terms of the distance traveled?

- A) $t = \frac{4}{\sqrt{d}}$
- B) $t = \frac{\sqrt{d}}{4}$
- C) $t = \frac{4}{d^2}$
- D) $t = \frac{d^2}{4}$

$d = 16t^2$
 $\sqrt{\frac{d}{16}} = t$
 $\frac{\sqrt{d}}{4} = t$

3

$$0.8p = t$$

At a store, a coat originally priced at p dollars is on sale for t dollars, and the relationship between p and t is given in the equation above. What is p in terms of t ?

- A) $p = t - 0.8$
- B) $p = 0.8t$
- C) $p = \frac{0.8}{t}$
- D) $p = \frac{t}{0.8}$

4

$$Q = \sqrt{\frac{2dK}{h}}$$

The formula above is used to estimate the ideal quantity, Q , of items a store manager needs to order given the demand quantity, d ; the setup cost per order, K ; and the storage cost per item, h . Which of the following correctly expresses the storage cost per item in terms of the other variables?

- A. $h = \sqrt{\frac{2dK}{Q}}$
- B. $h = \frac{\sqrt{2dK}}{Q}$
- C. $h = \frac{2dK}{Q^2}$
- D. $h = \frac{Q^2}{2dK}$