EXERCISE 4.1 PAGE NO: 34

Write the correct answer in each of the following:

1. **The linear equation 2x – 5y = 7 has**

A. A unique solution
B. Two solutions
C. Infinitely many solutions
D. No solution

Solution:

C. Infinitely many solutions

Explanation:

Expressing y in terms of x in the equation 2x – 5y = 7, we get,

2x – 5y = 7

– 5y = 7 – 2x

y = (7 – 2x)/– 5

Hence, we can conclude that the value of y will be different for different values of x.

Hence, option C is the correct answer.

2. The equation 2x + 5y = 7 has a unique solution, if x, y are:

A. Natural numbers
B. Positive real numbers
C. Real numbers
D. Rational numbers

Solution:

A. Natural numbers

Explanation:

Consider, 2x + 5y = 7

x	**1**
y	**1**

A. (1, 1) is a solution of 2x + 5y = 7

B. If positive real numbers are chosen, 2x + 5y = 7 will have many solutions.

C. If real numbers are chosen, 2x + 5y = 7 will have infinite solutions.

D. If rational numbers are chosen, 2x + 5y = 7 will have many solutions.

Hence, option A is the correct answer.

3. If (2, 0) is a solution of the linear equation 2x + 3y = k, then the value of k is

A. 4
B. 6
C. 5
D. 2

Solution:

A. 4

Explanation:

We know that,

(2, 0) = (x, y)

Substituting values of x and y in the above equation, we get

$2\times2 + 3\times0 = k$
$k = 4$
Hence, option A is the correct answer.

4. Any solution of the linear equation 2x + 0y + 9 = 0 in two variables is of the form

A. (-9/2 , m)
B. (n, -9/2)
C. (0, -9/2)
D. (– 9, 0)

Solution:

A. (-9/2 , m)
Explanation:
Solving the above equation we get,
$2x = -9$
$x = -9/2$
As the coefficient of y is 0, therefore, y can take any value and will not affect our answer.
A. $x = -9/2$
y = any value
B. $x = n$
C. $x = 0$
D. $x = -9$
Hence, option A is the correct answer.

5. The graph of the linear equation 2x + 3y = 6 cuts the y – axis at the point

A. (2, 0)
B. (0, 3)
C. (3, 0)
D. (0, 2)

Solution:

D. (0, 2)
Let $2x + 3y = 6$ cut the y-axis at P. therefore at P x-coordinate = 0.
Substituting $x = 0$, we get
$2(0) + 3y = 6$
$3y = 6$
$y = 2$
Hence the coordinates are (0, 2).
A. (2, 0) is wrong because it has $x = 2$
B. (0, 3) is wrong because it has $y = 3$
C. (3, 0) is wrong because it has $x = 3$
D. (0, 2) is right because it has $x = 0$ and $y = 2$ which is equal to the coordinates (0,2)
Hence, option D is the correct answer.

6. The equation x = 7, in two variables, can be written as

A. 1. x + 1. y = 7
B. 1. x + 0. y = 7

C. 0. x + 1. y = 7
D. 0. x + 0. y = 7

Solution:

B. 1. x + 0. y = 7
A. Simplifying the equation we get x + y = 7
B. Simplifying the equation we get x + 0y = 7 which is equal to x = 7
C. Simplifying the equation we get y = 7
D. simplifying the equation we get 0x + 0y = 7 which is not possible.
Hence, option (B) is the correct answer.

7. Any point on the x – axis is of the form

A. (x, y)
B. (0, y)
C. (x, 0)
D. (x, x)

Solution:

C. (x, 0)
Any point on the x-axis has its ordinate 0.
So, any point on the x-axis if of the form (x, 0).
Hence, option (C) is the correct answer.

8. Any point on the line y = x is of the form

A. (a, a)
B. (0, a)
C. (a, 0)
D. (a, – a)

Solution:

A. (a, a)
Any point on the line y = x will have x and y coordinate same.
So, any point on the line y = x is of the form (a, a).
Hence, option (A) is the correct answer.

9. The equation of x – axis is of the form

A. x = 0
B. y = 0
C. x + y = 0
D. x = y

Solution:

B. y = 0
The equation of x-axis is y = 0, since, x-axis is a parallel to itself at a distance 0 from it.
Hence, option (B) is the correct answer.

EXERCISE 4.2 PAGE NO: 37

Write whether the following statements are True or False? Justify your answers:

1. The point (0, 3) lies on the graph of the linear equation $3x + 4y = 12$.

Solution:

True.

Justification:

We have the equation, 3x + 4y = 12.

Substituting the values of x = 0 and y = 3 from the point (0, 3) in the equation,

We get,

3(0) + 4(3) = 12 = RHS.

Hence, the point (0, 3) lies on the graph of the linear equation $3x + 4y = 12$.

2. The graph of the linear equation $x + 2y = 7$ passes through the point (0, 7).

Solution:

False.

Justification:

We have the equation, x + 2y = 7.

Substituting the values of x = 0 and y = 7 from the point (0, 7) in the equation,

We get,

0 + 2(7) = 14 ≠RHS

Hence, the graph of the linear equation x + 2y = 7 passes through the point (0, 7).

3. The graph given below represents the linear equation $x + y = 0$.

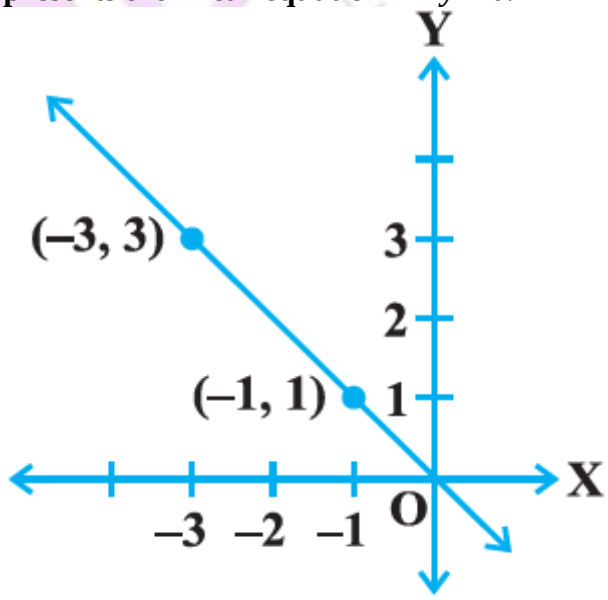


Fig. 4.1

Solution:

True.

Justification:

We have the equation, x + y = 0.
x + y = 0
x = – y
from the graph, we get the points (– 3, 3) and (– 1, 1),
Considering the point (– 3, 3)
x = – 3 and y = 3
Hence, substituting (– 3, 3) in equation,
We get,
– 3 = 3 which satisfies the equation x = – y
Considering the point (– 1, 1)
x = – 1 and y = 1
Hence, substituting (– 1, 1) in equation,
We get,
– 1 = 1 which satisfies the equation x = – y
Therefore, the given solution: (– 3, 3) and (– 1, 1) satisfies the given equation x = – y.
Hence, the given graph represents the linear equation x + y = 0.

EXERCISE 4.3 PAGE NO: 38

1. Draw the graphs of linear equations y = x and y = – x on the same Cartesian plane. What do you observe?

Solution:

According to the question,

y = x ------- eq (i)

Values of x and y satisfying the equation=

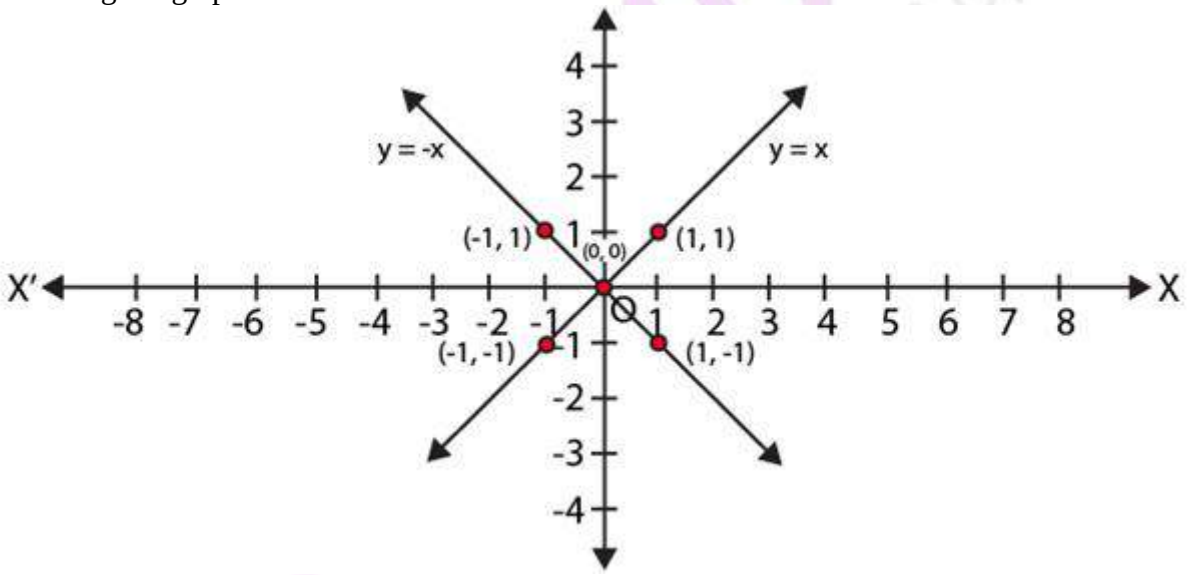
x	– 1	0	1
y	– 1	0	1

y = -x ------- (ii)

Values of x and y satisfying the equation=

x	– 1	0	1
y	1	0	– 1

Plotting the graph:



From the above graph,

We observe that the two lines y = x and y = – x intersect each other at O (0, 0).

2. Determine the point on the graph of the linear equation 2x + 5y = 19 whose ordinate is 1½ times its abscissa.

Solution:

From the question, we have,

2x + 5y = 19 …(i)

According to the question,

Ordinate is 1½ times its abscissa

⇒ y = 1½ x = (3/2) x

Substituting y = (3/2)x in eq. (i)

We get,

$2x + 5 (3/2) x = 19$
$(19/2)x = 19$
$x = 2$
Substituting $x = 2$ in eq. (i)
We get
$2x + 5y = 19$
$2(2) + 5y = 19$
$y = (19 – 4)/5 = 3$
Hence, we get $x = 2$ and $y = 3$
Thus, point (2, 3) is the required solution.

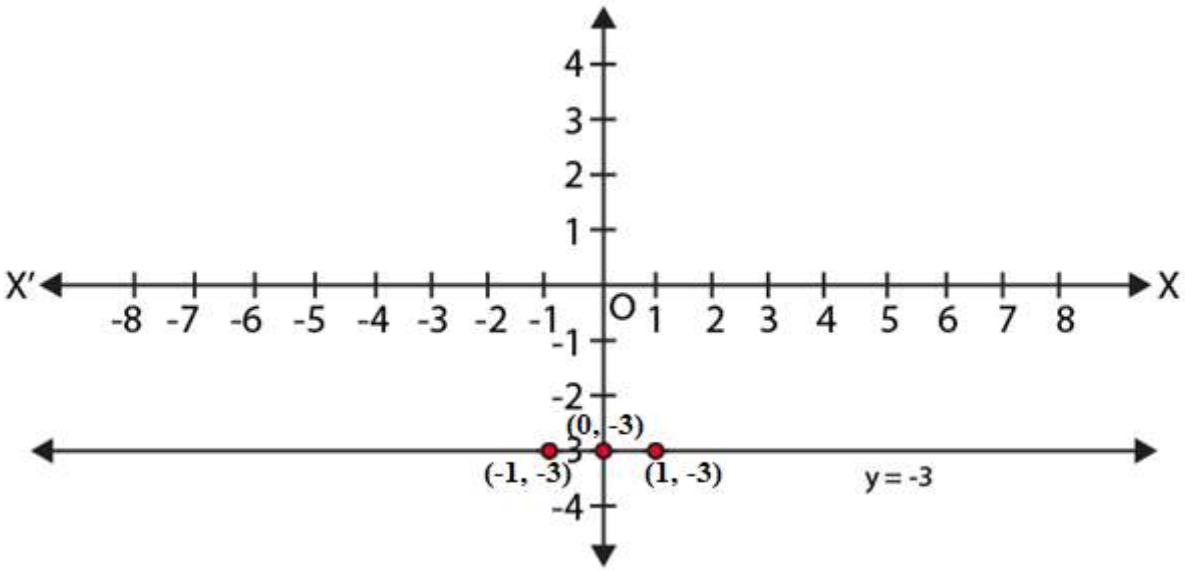
3. Draw the graph of the equation represented by a straight line which is parallel to the x-axis and at 3 units below.

Solution:

According to the question,
We get the linear equation,
$y = – 3$
Values of x and y satisfying the equation=

x	– 1	0	1
y	– 3	– 3	– 3

Plotting the graph:



4. Draw the graph of the linear equation whose solutions are represented by the points having the sum of the coordinates as 10 units.

Solution:

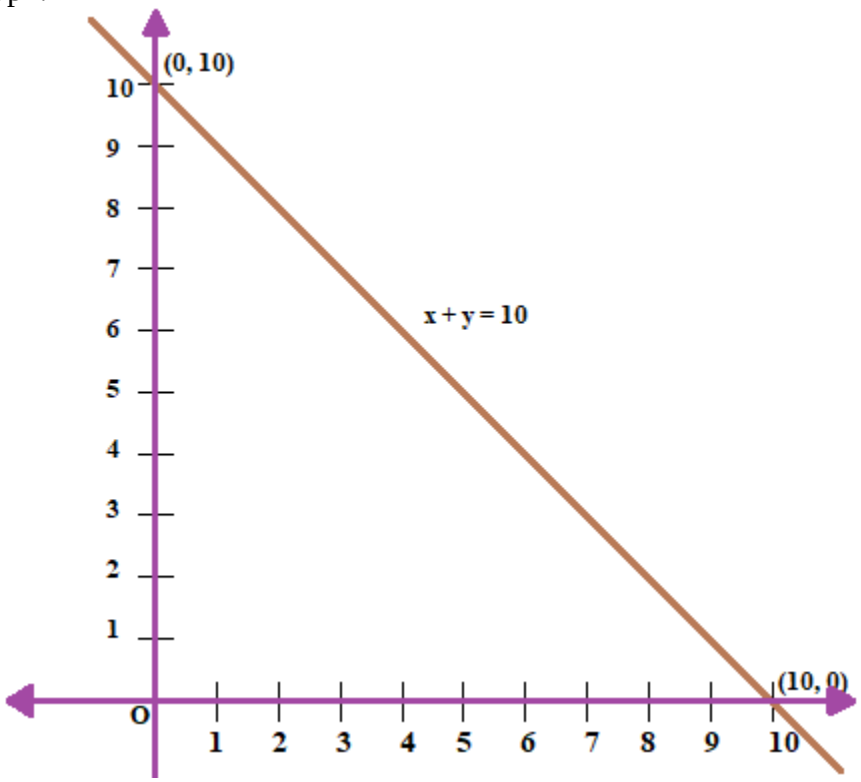
According to the question,
We get the linear equation,
$x + y = 10$
We get,

x = 10 – y

Values of x and y satisfying the equation=

x	10	5	0
y	0	5	10

Plotting the graph:



5. Write the linear equation such that each point on its graph has an ordinate 3 times its abscissa.

Solution:

According to the question,

A linear equation such that each point on its graph has an ordinate(y) which is 3 times its abscissa(x).

So we get,

⇒ y = 3x.

Hence, y = 3x is the required linear equation.

NCERT Exemplar Solutions For Class 9 Maths Chapter 4- Linear Equations In Two Variables

EXERCISE 4.4 PAGE NO: 41

1. Show that the points A (1, 2), B (– 1, – 16) and C (0, – 7) lie on the graph of the linear equation y = 9x – 7.

Solution:

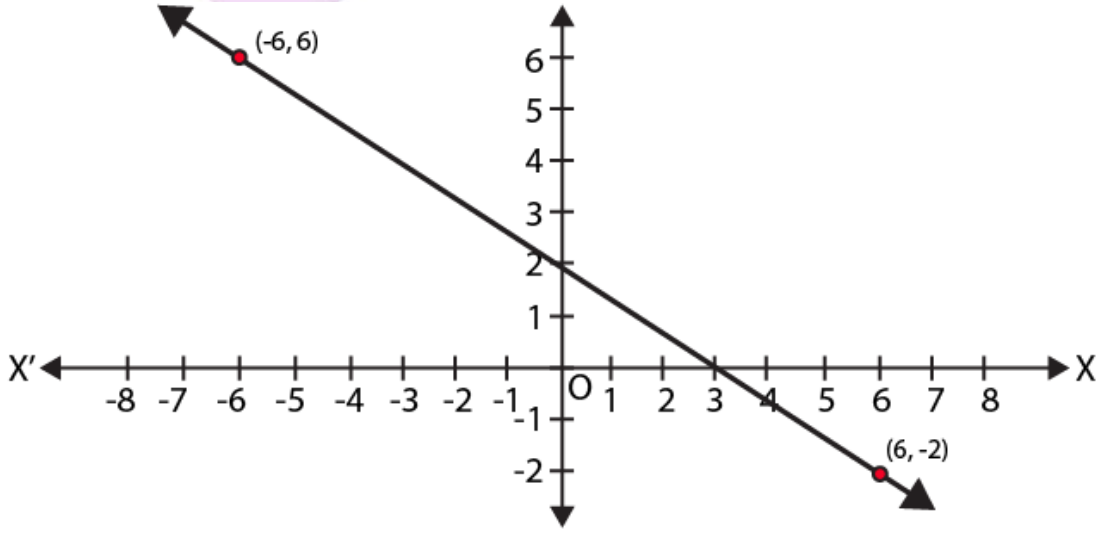
We have the equation,
y = 9x – 7
For A (1, 2),
Substituting the values of (x,y) = (1, 2),
We get,
2 = 9(1) – 7 = 9 – 7 = 2
For B (–1, –16),
Substituting the values of (x,y) = (–1, –16),
We get,
–16 = 9(–1) – 7 = – 9 – 7 = – 16
For C (0, –7),
Substituting the values of (x,y) = (0, –7),
We get,
– 7 = 9(0) – 7 = 0 – 7 = – 7
Hence, we find that the points A (1, 2), B (–1, –16) and C (0, –7) satisfies the line y = 9x – 7.
Hence, A (1, 2), B (–1, –16) and C (0, –7) are solutions of the linear equation y = 9x – 7
Therefore, points A (1, 2), B (–1, –16), C (0, –7) lie on the graph of linear equation y = 9x – 7.

2. The following observed value of x and y are thought to satisfy a linear equation. Write the linear equation-

x	**6**	**– 6**
y	**– 2**	**6**

Draw the graph using the value of x, y as given in the above table. At what points the graph of the linear equation (i) cuts the X-axis ? (ii) cuts the Y-axis?

Solution:



We know that,
The linear equation of a line is,
y = mx + c, where, c is the y-intercept
From the graph,
We get y-intercept is 2.
⇒ c = 2.
Also, from the graph,
We get,
$x_1 = 6$, $y_1 = -2$ and $x_2 = -6$, $y_2 = 6$
We know that,
m = slope of the line

$$\Rightarrow m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\Rightarrow m = \frac{6 - (-2)}{-6 - 6}$$

$$\Rightarrow m = \frac{8}{-12}$$

$$\Rightarrow m = -\frac{2}{3}$$

∴ we get the linear equation,
y = – (2/3)x + 2
Multiplying whole equation by 3, we get,
⇒ 3y = – 2x + 6
⇒ 2x + 3y – 6 = 0

Thus, the points the graph of the linear equation cuts
(i)x-axis
Since, the point is on x axis, we have, y = 0.
Substituting y = 0 in the equation, 2x + 3y – 6 = 0,
We get,
2x + 3×0 – 6 = 0
⇒ 2x = 6
⇒ x = 3
Hence, the point at which the graph cuts x-axis = (3, 0).

(ii) y-axis
Since, the point is on y axis, we have, x = 0.
Substituting x = 0 in the equation, 2x + 3y – 6 = 0,
We get,
2×0 + 3y – 6 = 0
⇒ 3y = 6
⇒ y = 2
Hence, the point at which the graph cuts x-axis = (0, 2).

3. Draw the graph of the linear equation 3x + 4y = 6. At what points, the graph cuts X and Y-axis?
Solution:

According to the question,
We get the equation,
3x + 4y = 6.
We need at least 2 points on the graph to draw the graph of this equation,
Thus, the points the graph cuts
(i) x-axis
Since, the point is on x axis, we have, y = 0.
Substituting y = 0 in the equation, 3x + 4y = 6,
We get,
3x + 4×0 = 6
⇒ 3x = 6
⇒ x = 2
Hence, the point at which the graph cuts x-axis = (2, 0).

(ii) y-axis
Since, the point is on y axis, we have, x = 0.
Substituting x = 0 in the equation, 3x + 4y = 6,
We get,
3×0 + 4y = 6
⇒ 4y = 6
⇒ $y = 6/4$
⇒ $y = 3/2$
⇒ y = 1.5
Hence, the point at which the graph cuts x-axis = (0, 1.5).
Plotting the points (0, 1.5) and (2, 0) on the graph.