8. Linear Equations in Two Variables

Exercise 8A

1. Question

Draw the graph of each of the following equations:

(i) x = 5

(ii) y = -2

(iii) x + 6 = 0

(iv) x + 7 = 0

(v) y = 0

(vi) x = 0

Answer

(i) The given equation is x = 5

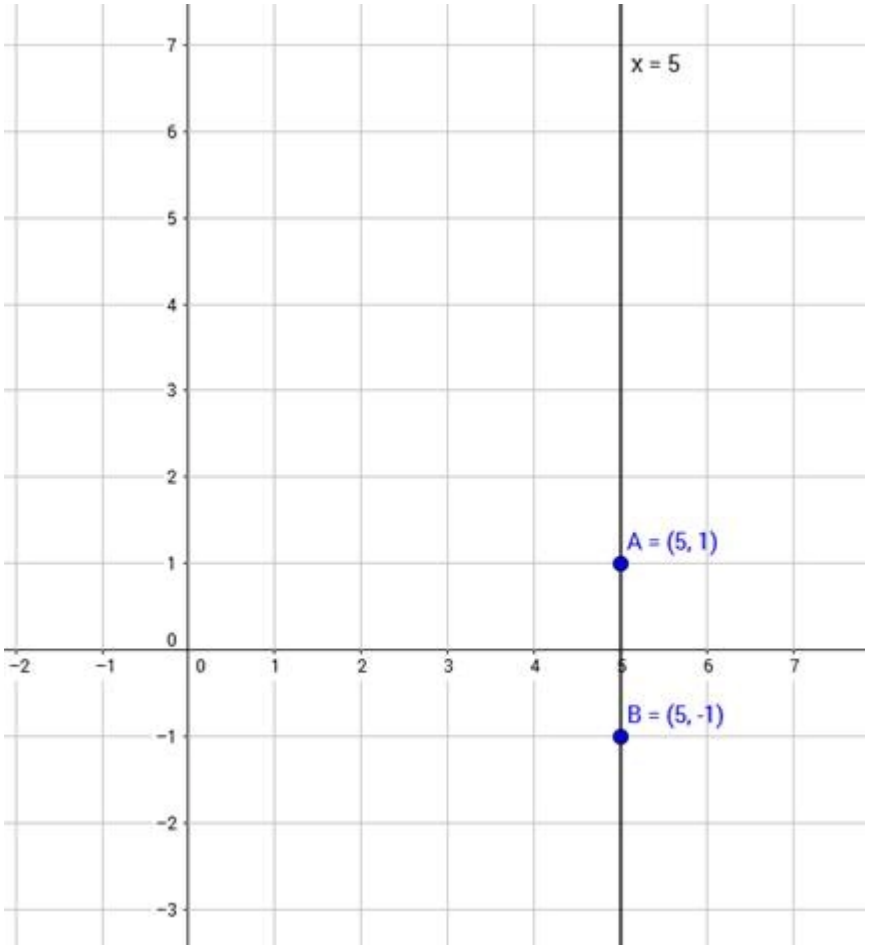
A line requires minimum of two points to be plot.

Thus we get the following table:

x	5	5
y	1	-1

Plot points A (5,1) and B (5,-1) on the graph paper.

Join AB.



The line AB is the required graph.

(ii) The given equation is y = -2

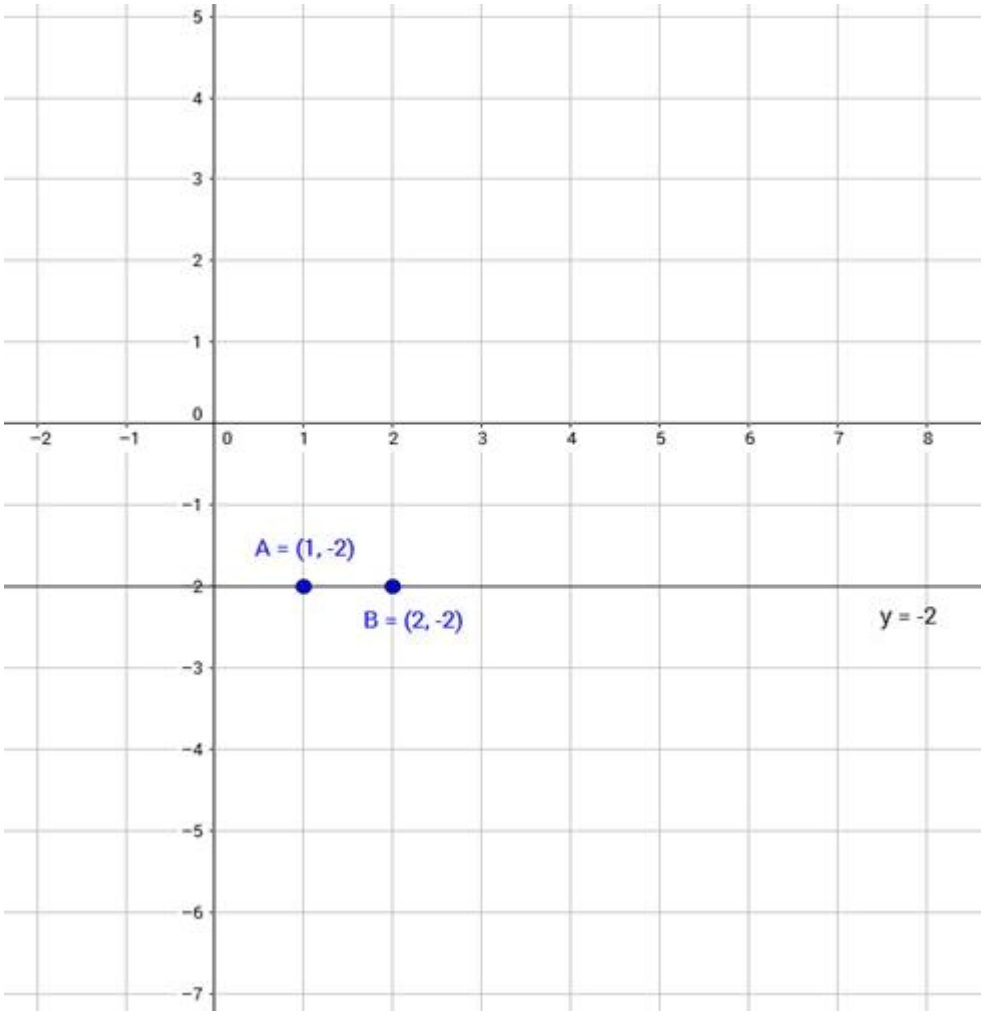
A line requires minimum of two points to be plot.

Thus we get the following table:

x	1	2
y	-2	-2

Plot points A(1,-2) and B(2,-2) on the graph paper.

Join AB.



The line AB is the required graph

(iii) The given equation is x + 6 = 0, which means x = -6

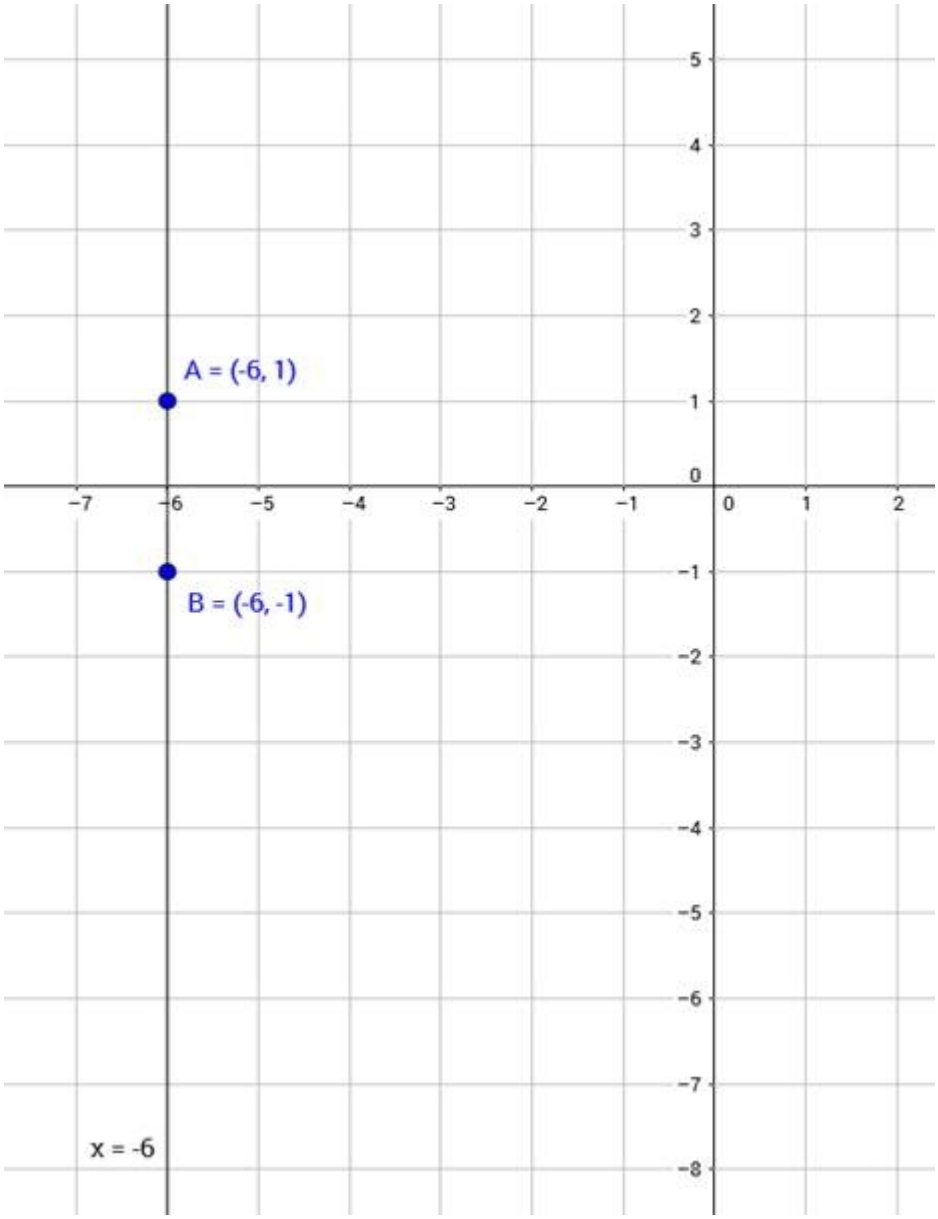
A line requires minimum of two points to be plot.

Thus we get the following table:

x	-6	-6
y	1	-1

Plot points A (-6,1) and B (-6,-1) on the graph paper.

Join AB.



The line AB is the required graph

(iv) The given equation is x + 7 = 0, which means x = -7

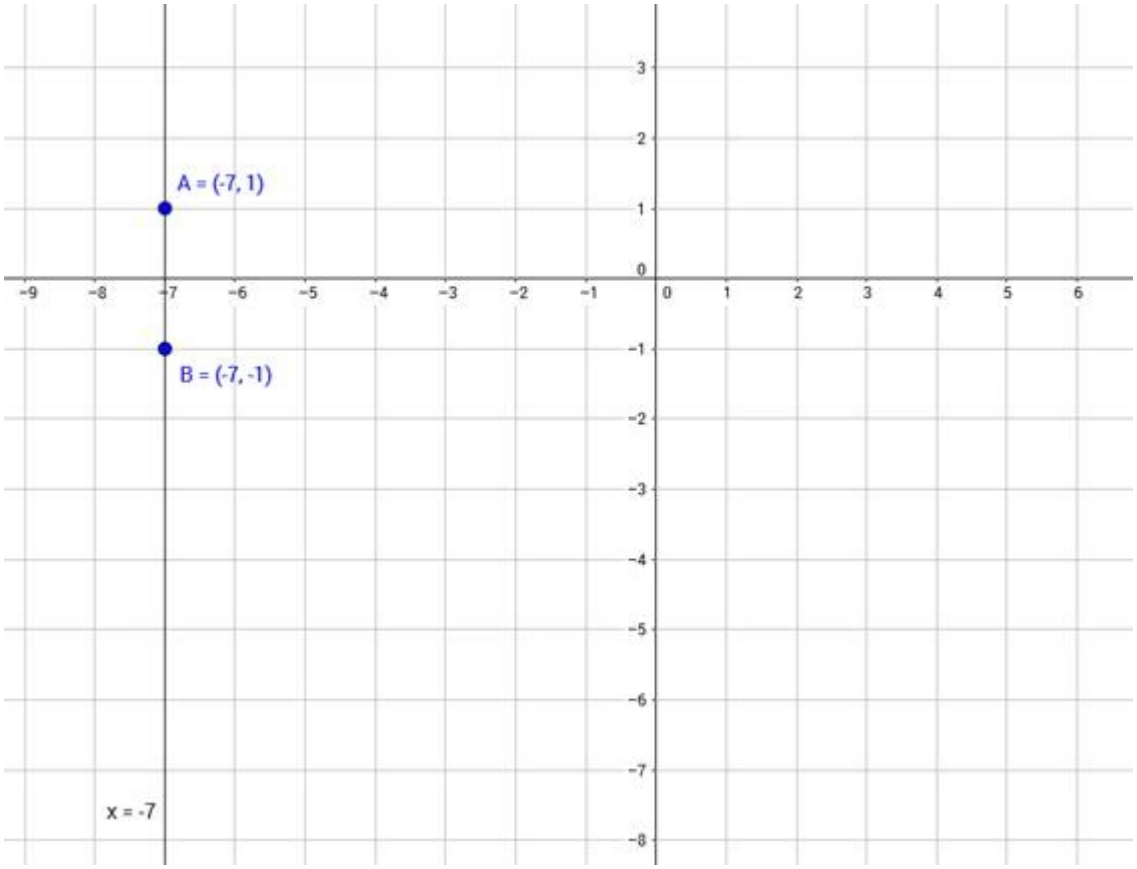
A line requires minimum of two points to be plot.

Thus we get the following table:

x	-7	-7
y	1	-1

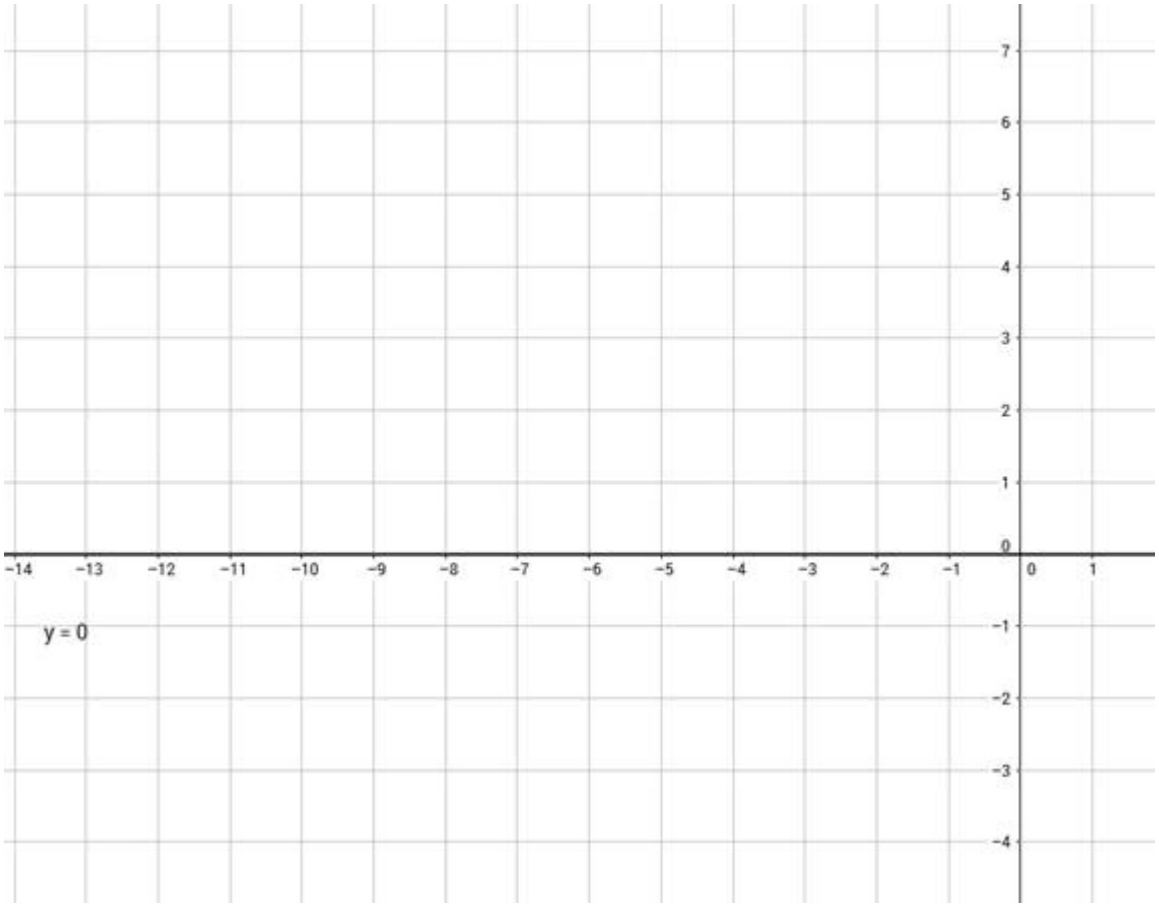
Plot points A (-7,1) and B (-7,-1) on the graph paper.

Join AB.

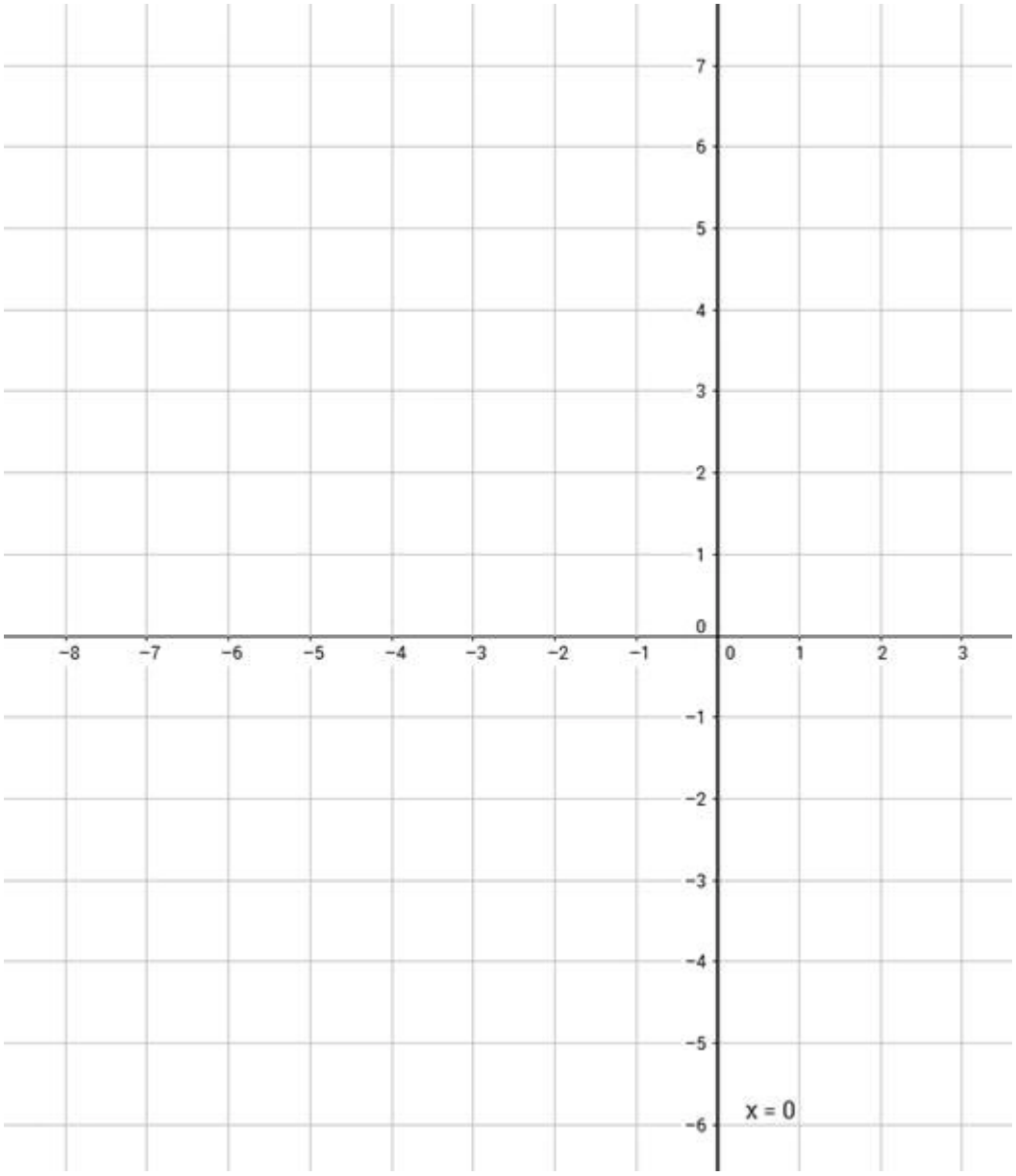


The line AB is the required graph

(v) Y =0 represents the x – axis



(vi) x = 0 represents y – axis



2. Question

Draw the graph of the equation y = 3x. From you graph, find the value of y when x = -2.

Answer

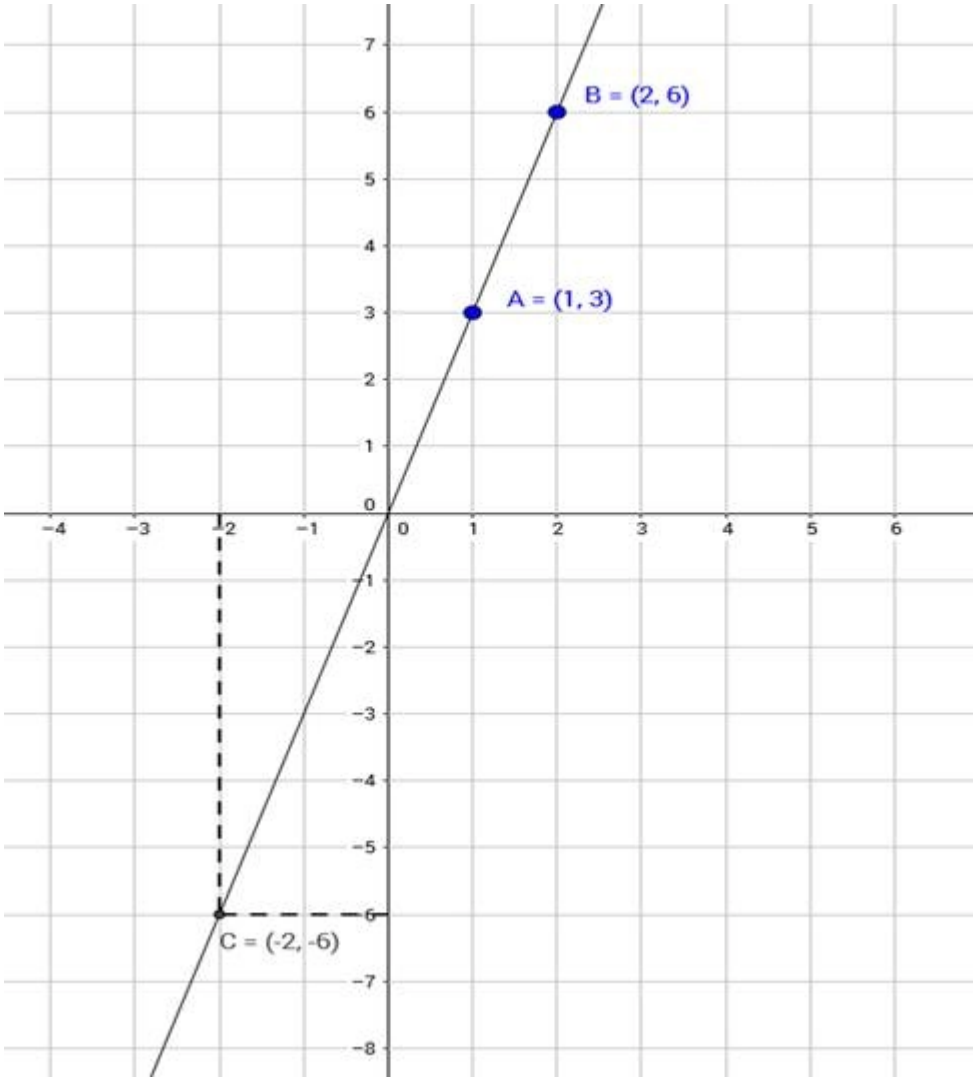
The given equation is y = 3x.

Now we find minimum two points to plot given line, y = 3x

Thus, we have the following table:

x	1	2
y	3	6

Plot points A (1,3) and B (2,6) on a graph paper and join them to get the required graph.



Locate X = -2 from origin. Then follow the graph grid in downward direction from the point (-2, 0) where it meets the line y=3x.

We get our required point as shown in the above graph, ie C(-2, -6)

Hence, our value of y = -6

3. Question

Draw the graph of the equation x + 2y – 3 = 0. From your graph, find the value of y when x = 5.

Answer

The given equation is,

$x + 2y - 3 = 0$

$\Rightarrow x = 3 - 2y$

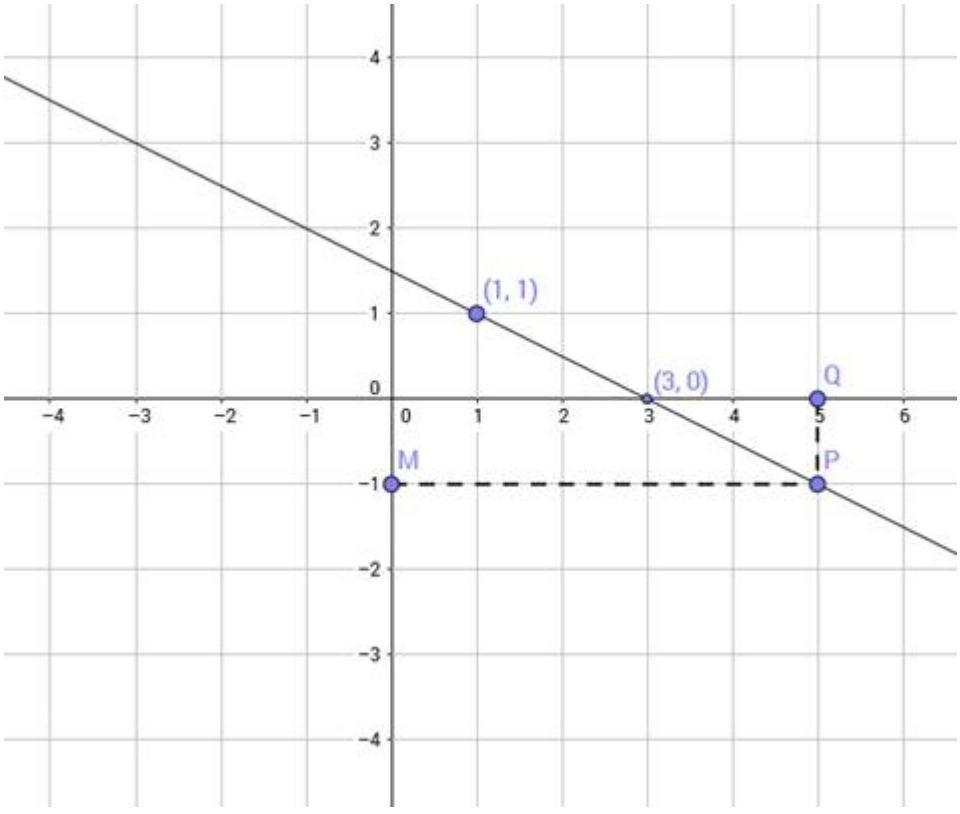
Putting $y = 1$, $x = 3 - (2 \times 1) = 1$

Putting $y = 0$, $x = 3 - (2 \times 0) = 3$

Thus, we have the following table:

x	1	3
y	1	0

Plot points (1,1) and (3,0) on a graph paper and join them to get the required graph.



Take a point Q on x-axis such that OQ = 5.

Draw QP parallel to y-axis meeting the line (x = 3 - 2y) at P.

Through P, draw PM parallel to x-axis cutting y-axis at M.

So, y = OM = -1.

4. Question

Draw the graph of each of the following equations:

(i) y = x

(ii) y = -x

(iii) y + 3x = 0

(iv) 2x + 3y = 0

(v) 3x – 2y = 0

(vi) 2x +y =0

Answer

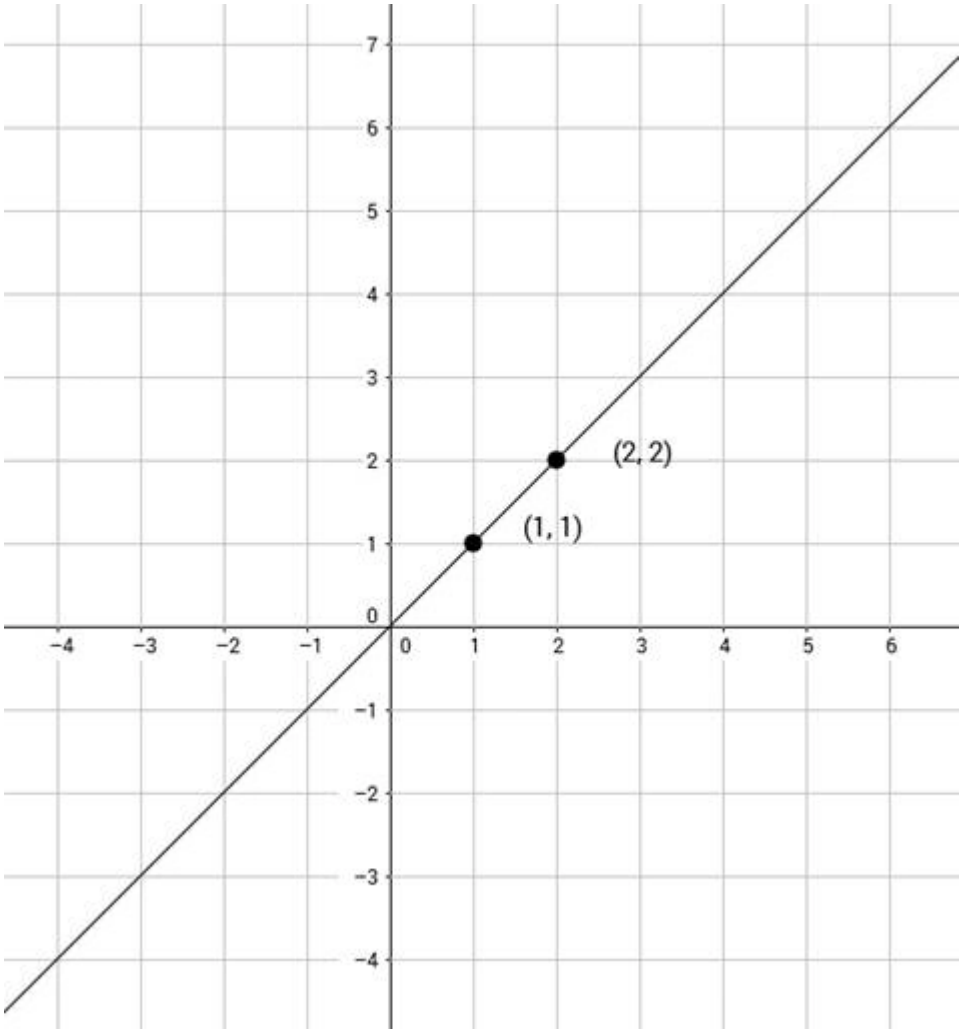
(i) The given equation is y = x

Let x = 1, then y = 1 and let x = 2, then y = 2

Thus, we have the following table:

x	1	2
y	1	2

Plot points (1,1) and (2,2) on a graph paper and join them to get the required graph.



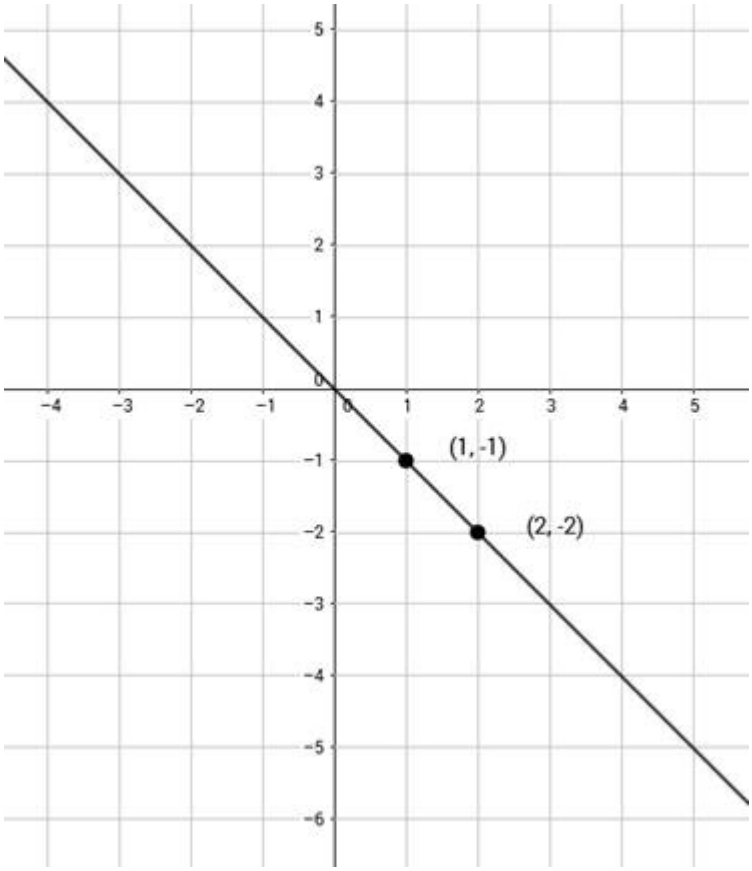
(ii) The given equation is y = -x

Now, if x = 1, y = -1 and if x = 2, y = -2

Thus, we have the following table:

x	1	2
y	-1	-2

Plot points (1,-1) and (2,-2) on a graph paper and join them to get the required graph.



(iii) The given equation is $y + 3x = 0$

$\Rightarrow y = -3x$

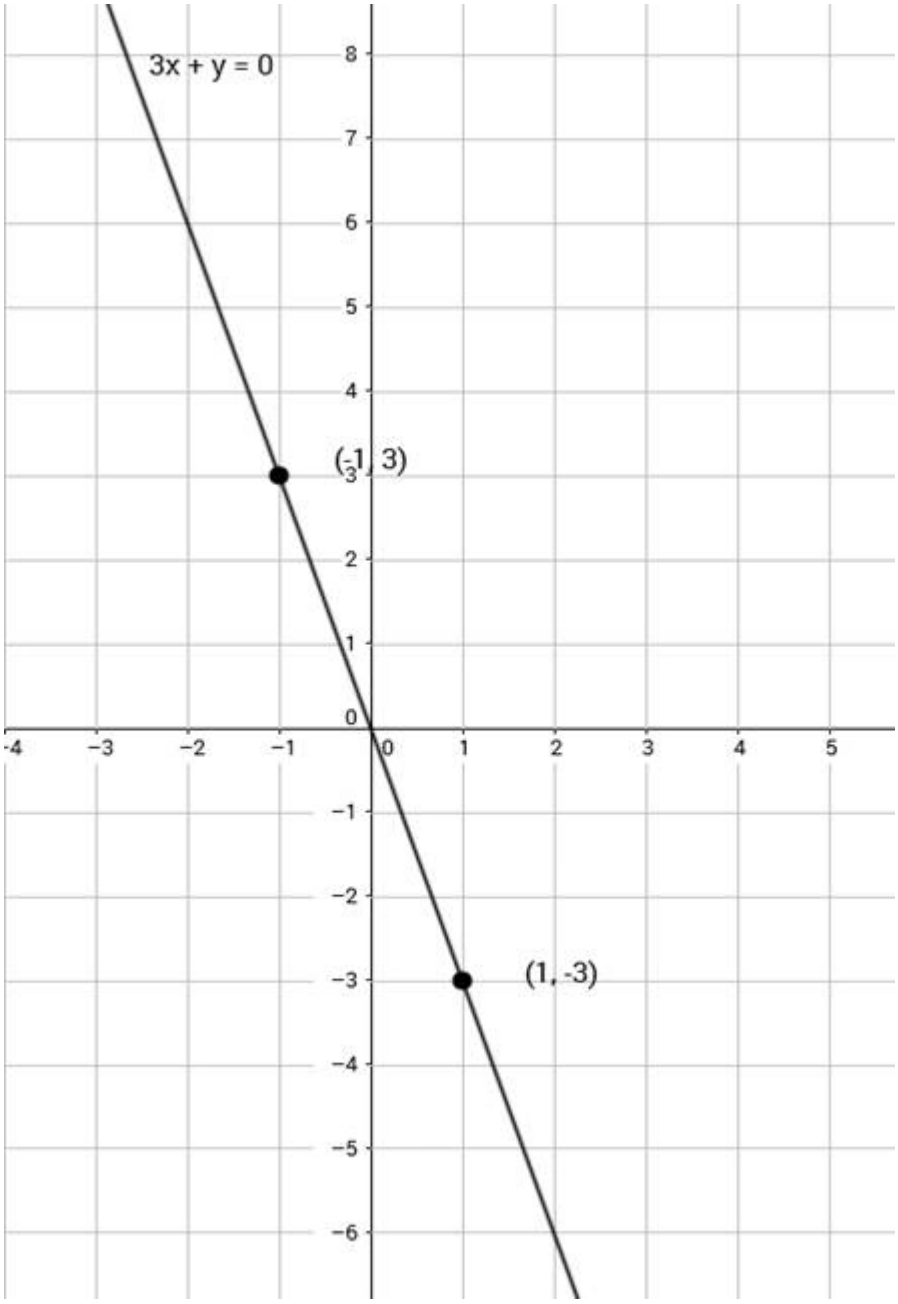
Now, if $x = -1$, then $y = -3 \times (-1) = 3$

And, if $x = 1$, then $y = -3 \times 1 = -3$

Thus we have the following table:

x	1	-1
y	-3	3

Plot points (1,-3) and (-1,3) on a graph paper and join them to get the required graph.



(iv) The given equation is 2x + 3y = 0

$y = \frac{-2}{3}x$

Now, if x = 3, then

$y = \frac{-2}{3} \times 3 = -2$

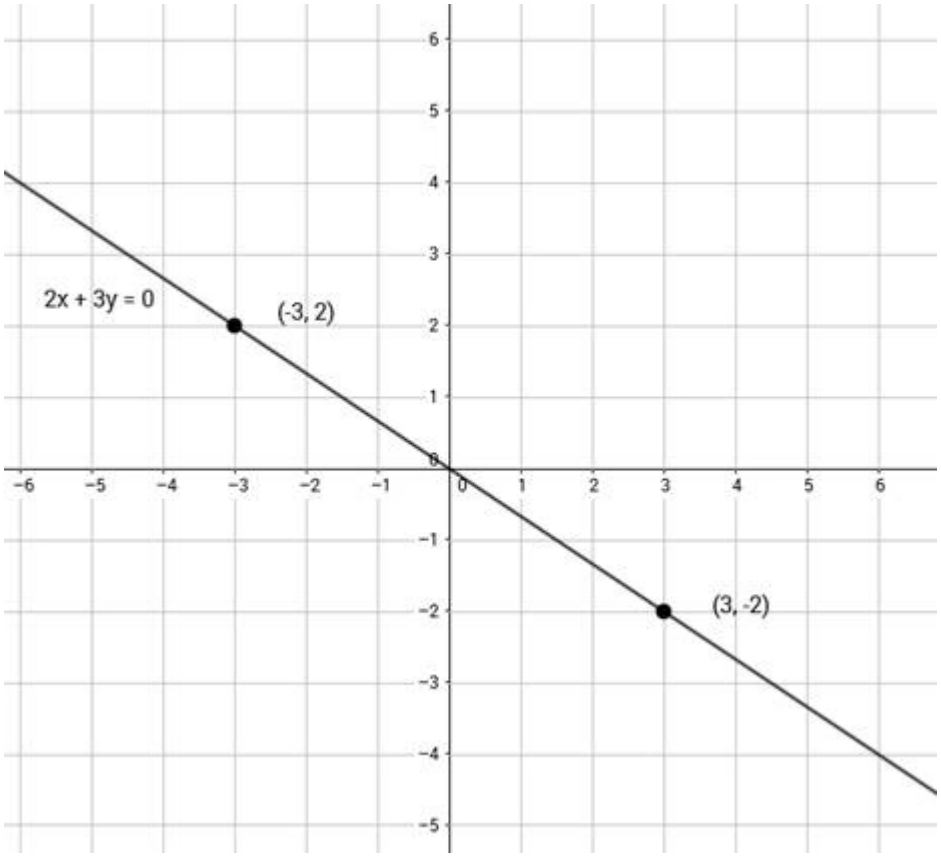
And, if x = -3, then

$y = \frac{-2}{3} \times (-3) = 2$

Thus, we have the following table

x	3	-3
y	-2	2

Plot points (3,-2) and (-3,2) on a graph paper and join them to get the required graph.



(v) The given equation is 3x - 2y = 0

$y = \frac{3}{2}x$

Now, if x = 2,

$y = \frac{3}{2} \times 2 = 3$

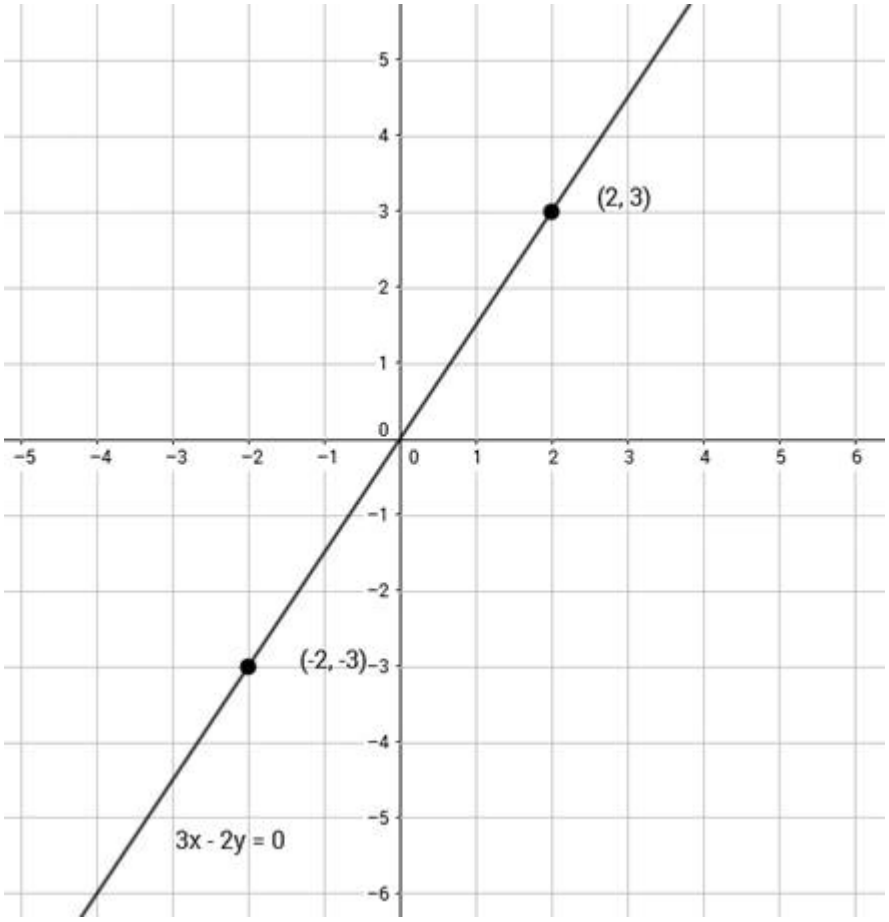
And, if x = -2,

$y = \frac{3}{2} \times (-2) = -3$

Thus, we have the following table:

x	2	-2
y	3	-3

Plot points (2,3) and (-2,-3) on a graph paper and join them to get the required graph.



(vi) The given equation is 2x + y = 0

⇒ y = -2x

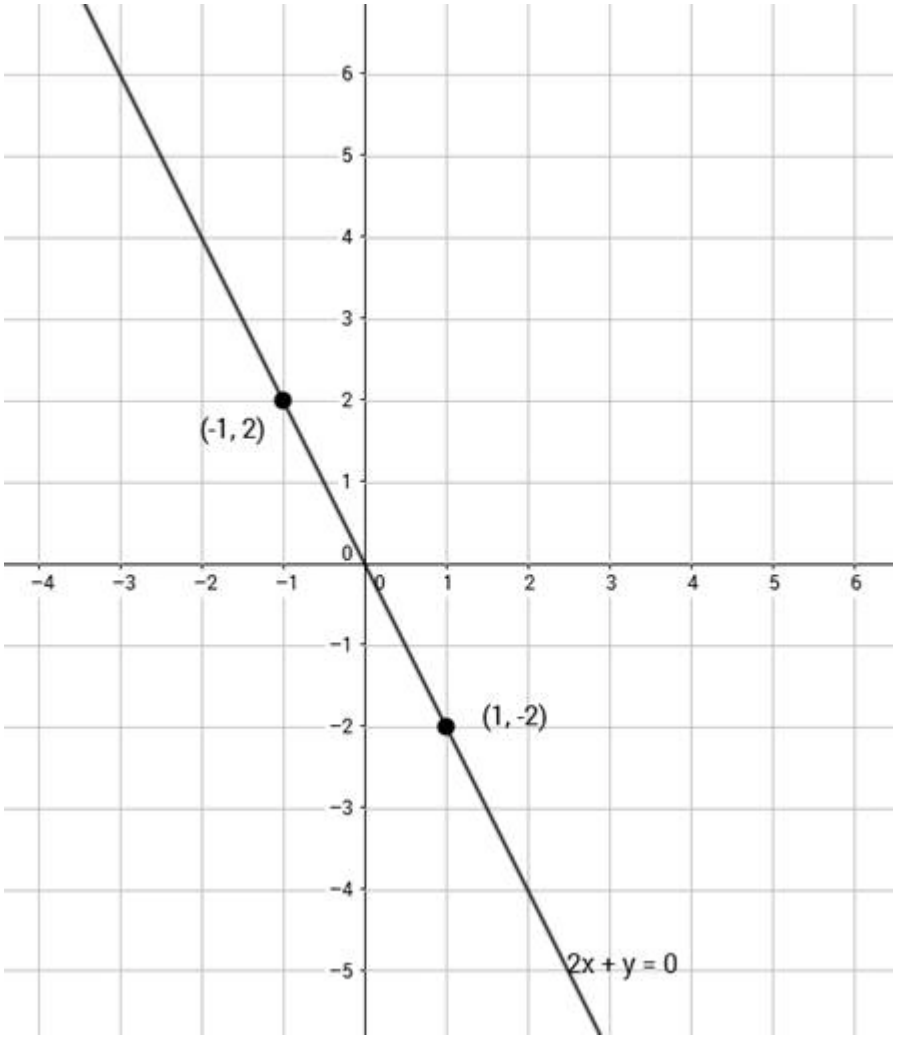
Now, if x = 1, then y = -2 × 1 = -2

And, if x = -1, then y = -2 × (-1) = 2

Thus, we have the following table:

x	1	-1
y	-2	2

Plot points (1,-2) and (-1,2) on a graph paper and join them to get the required graph.



5. Question

Draw the graph of the equation 2x - 3y = 5. From the graph, find (i) the value of y when x = 4, and (ii) the value of x when y = 3.

Answer

The given equation is, 2x - 3y = 5

$\therefore y = \frac{2x-5}{3}$

Now, if x = 4, then

$$y = \frac{2 \times 4 - 5}{3} = \frac{8-5}{3} = 1$$

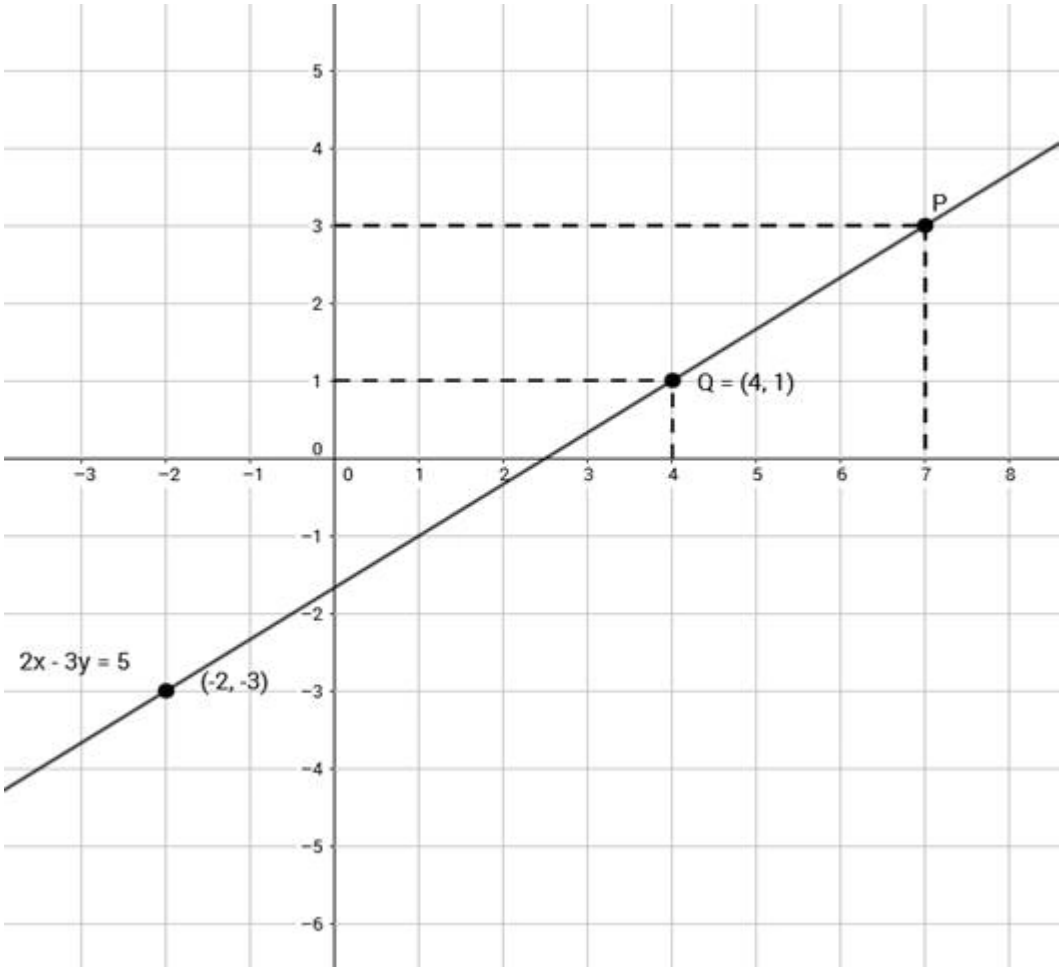
And, if x = -2, then

$$y = \frac{2 \times (-2) - 5}{3} = \frac{-4-5}{3} = -3$$

Thus, we have the following table:

x	4	-2
y	1	-3

Plot points (4,1) and (-2,-3) on a graph paper and join them to get the required graph.



(i) When x = 4, draw a line parallel to y-axis at a distance of 4 units from y-axis to its right cutting the line at Q and through Q draw a line parallel to x-axis cutting y-axis which is found to be at a

distance of 1 units above x-axis.

Thus, y = 1 when x = 4.

(ii) When y = 3, draw a line parallel to x-axis at a distance of 3 units from x-axis and above it, cutting the line at point P. Through P, draw a line parallel to y-axis meeting x-axis at a point which is found be 7 units to the right of y axis.

Thus, when y = 3, x = 7.

6. Question

Draw the graph of the equation 2x + y = 6. Find the coordinates of the point, where the graph cuts the x-axis.

Answer

The given equation is 2x + y = 6

∴ y = 6 - 2x

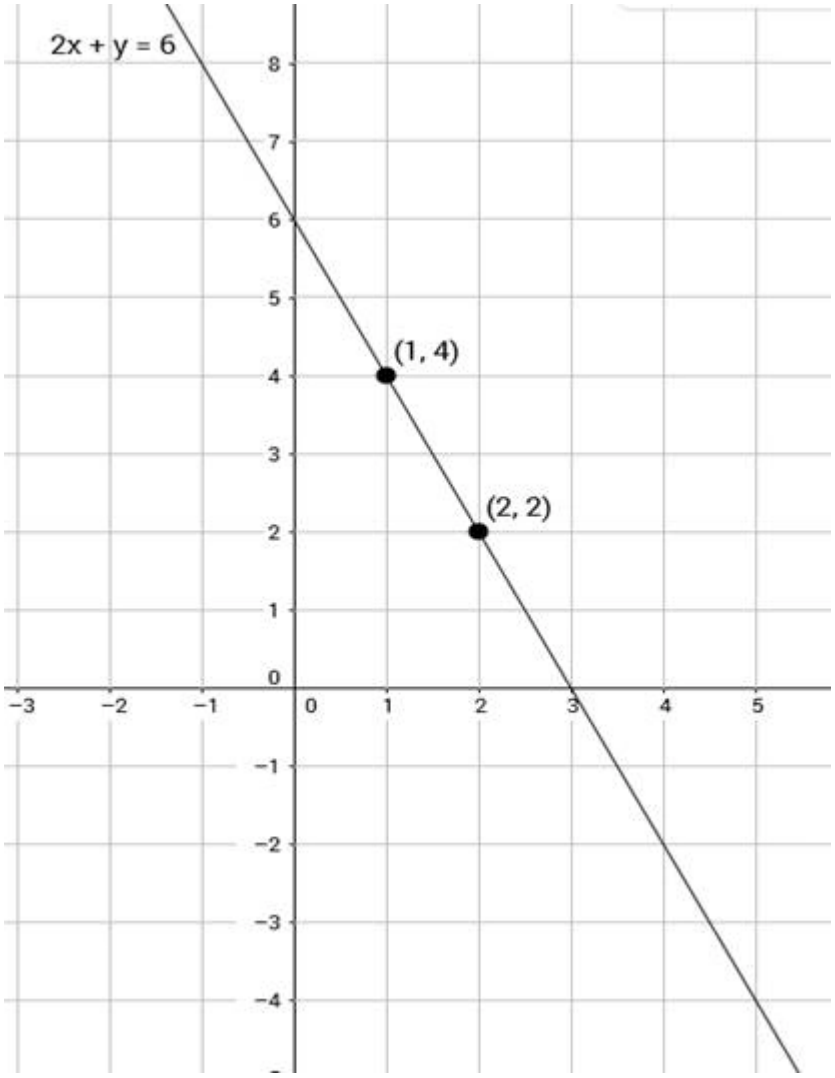
Now, if x = 1, then y = 6 - 2 × 1 = 4

And, if x = 2, then y = 6 - 2 × 2 = 2

Thus, we have the following table:

x	1	2
y	4	2

Plot points (1,4) and (2,2) on a graph paper and join them to get the required graph.



We find that the line cuts the x-axis at a point P which is at a distance of 3 units to the right of y-axis.

So, the co-ordinates of P are (3,0).

7. Question

Draw the graph of the equation 3x + 2y = 6. Find the coordinates of the point, where the graph cuts the y-axis.

Answer

The given equation is 3x + 2y = 6

2y = 6 - 3x

$\therefore y = \frac{6-3x}{2}$

Now, if x = 2, then

$y = \frac{6-3 \times 2}{2} = 0$

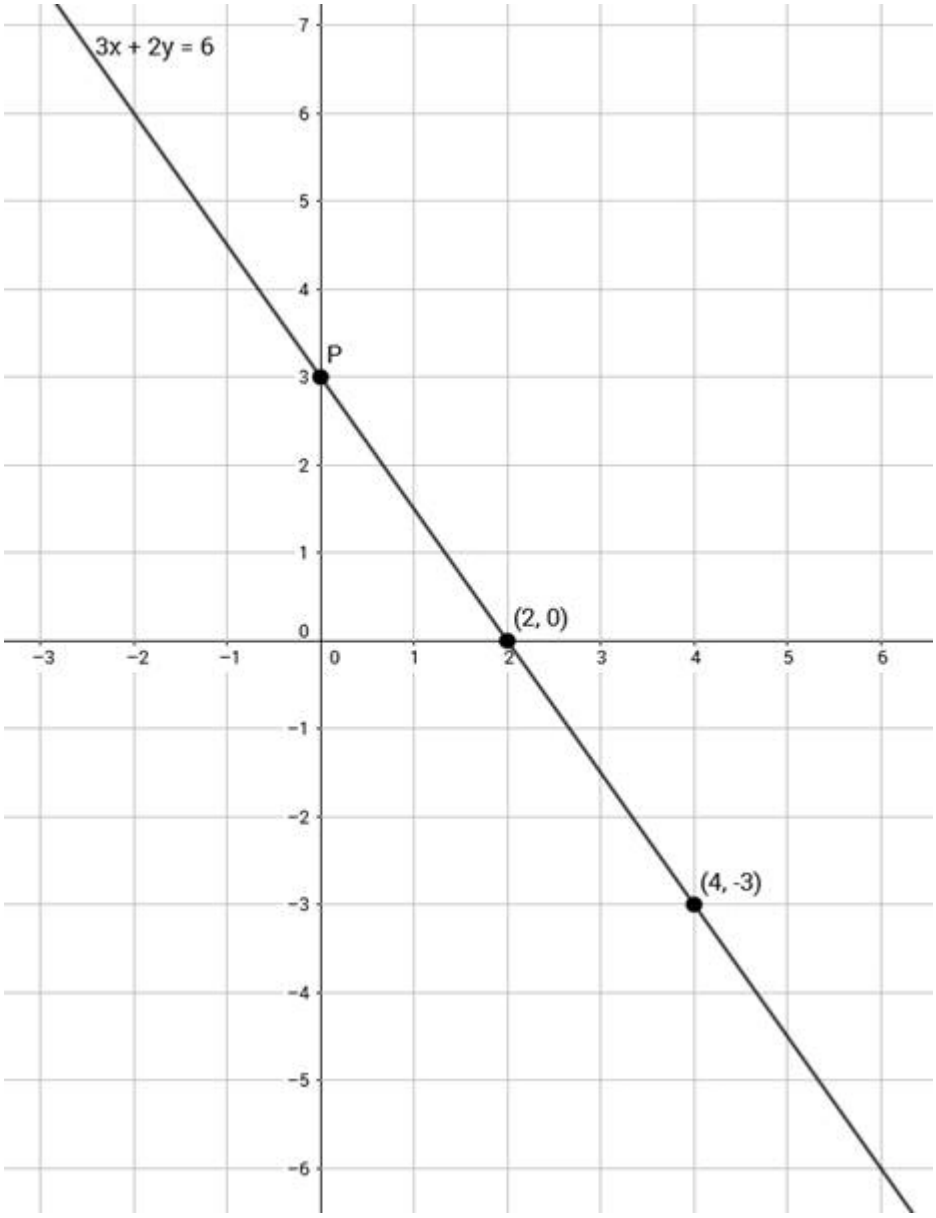
And, if x = 4, then

$y = \frac{6-3\times4}{2} = -3$

Thus, we have the following table:

x	2	4
y	0	-3

Plot points (2, 0) and (4,-3) on a graph paper and join them to get the required graph.



We find that the line 3x + 2y = 6 cuts the y-axis at a point P which is 3 units above the x-axis.

So, co-ordinates of P are (0,3).

CCE Questions

1. Question

x = 0 is the equation of

A. x-axis

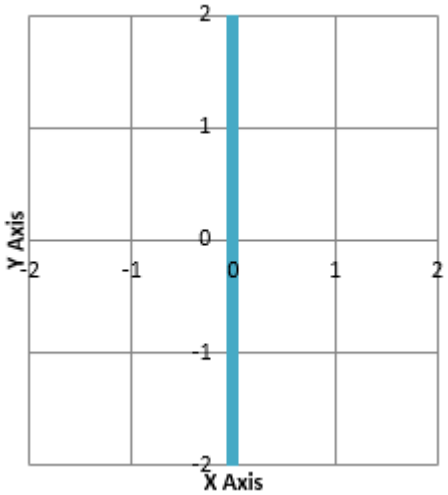
B. y-axis

C. a line parallel to x-axis

D. a line parallel to y-axis

Answer

Here, x = 0 is the equation of y-axis. Since, if we plot, x = 0 all the points will lie on y-axis irrespective of the value of y.



The blue line in the figure is the plotting of X = 0

which is also y-axis.

2. Question

y = 0 is the question of

A. x-axis

B. y-axis

C. a line parallel to x-axis

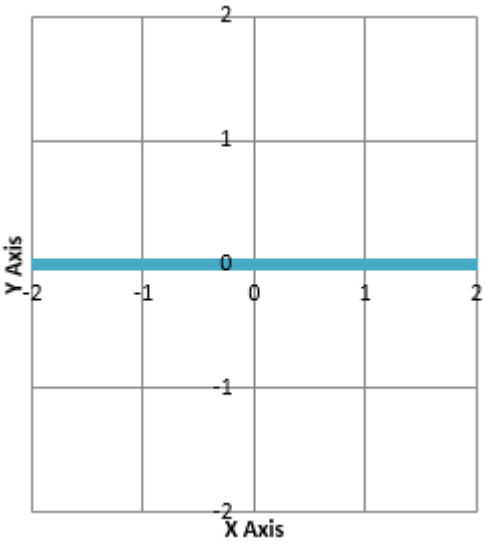
D. a line parallel to y-axis

Answer

y = 0 is the equation of x-axis. Since, if we plot,

y = 0 all the points will lie on x-axis irrespective

of the value of x.



The blue line in the figure is the plotting of

y = 0 which is also x-axis.

3. Question

x + 3 = 0 is the equation of a line

A. parallel to x-axis and passing through (– 3, 0)

B. parallel to y-axis and passing through (– 3, 0)

C. parallel to y-axis and passing through (0, – 3)

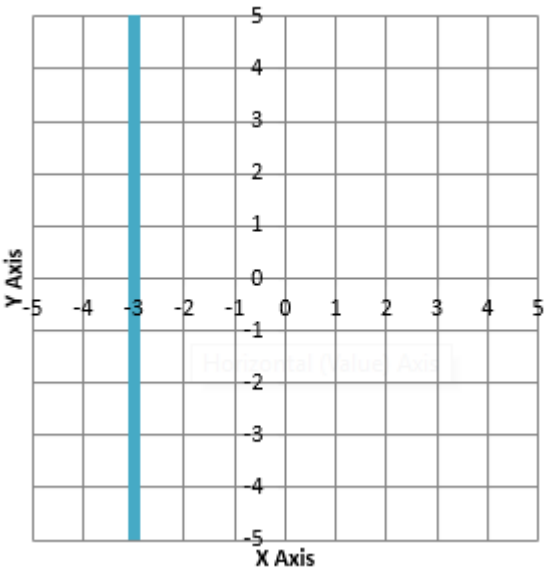
D. none of these

Answer

x + 3 = 0

⇒ x = 0 – 3

⇒ x = – 3



Therefore, the value of x co – ordinate will be – 3. Hence, the line will pass through (– 3,0).

Since, the value of x = – 3 therefore, it will pass through all values of y while x will remain constant. Hence, the line will be parallel to y-axis.

4. Question

y – 4 = 0 is the equation of a line

A. parallel to x-axis and passing through (4, 0)

B. parallel to y-axis and passing through (0, 4)

C. parallel to y-axis and passing through (0, 4)

D. none of these

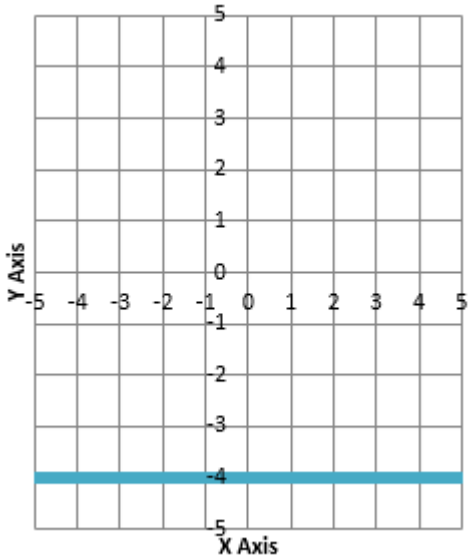
Answer

y – 4 = 0

⇒ y = 0 + 4

⇒ y = 0

Therefore, the value of y co – ordinate will be 4. Hence, the line will pass through (0,4) .



Since, the value of $y = 4$ therefore, it will pass through all values of x while y will remain constant. Hence, the line will be parallel to x-axis.

5. Question

The point of the form (a, a), where a ≠ 0 lies on

A. x-axis

B. y-axis

C. the line y = x

D. the line x + y = 0

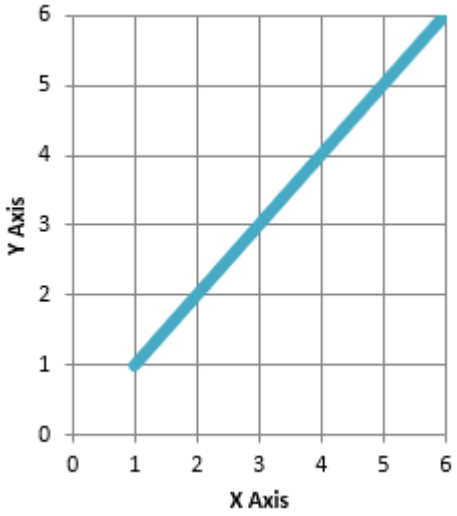
Answer

When a = 1 then we get the point (1,1)

When a = 2 then we get the point (2,2)

When a = 3 then we get the point (3,3)

And so on



On plotting these points on the graph we will get the equation of line y = x.

6. Question

The point of the form (a, a), where a ≠ 0 lies on

A. x-axis

B. y-axis

C. the line y – x = 0

D. the line x + y = 0

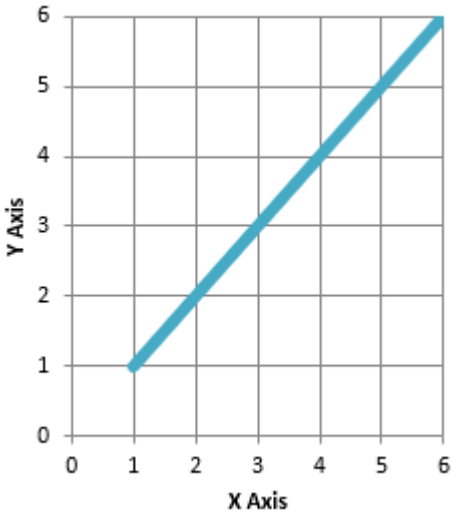
Answer

When a = 1 then we get the point (1,1)

When a = 2 then we get the point (2,2)

When a = 3 then we get the point (3,3)

And so on



On plotting these points on the graph we will get the equation of line y = x

⇒ y – x = 0

7. Question

The linear equation 3x – 5y = 15 has

A. a unique solutions

B. two solutions

C. infinitely many solutions

D. no solution

Answer

3x – 5y = 15

⇒ 3x = 15 + 5y

$\Rightarrow x = \frac{15+5y}{3}$

When y = – 6, then $x = \frac{15+5(-6)}{3}$

$\Rightarrow x = \frac{15-30}{3}$

$\Rightarrow x = -\frac{15}{3}$

$\Rightarrow x = -5$

When y = 0, then $x = \frac{15+5(0)}{3}$

$\Rightarrow x = \frac{15+0}{3}$

$\Rightarrow x = \frac{15}{3}$

⇒ x = 5

When y = 6, then,

$\Rightarrow x = \frac{15+5(6)}{3}$

$\Rightarrow x = \frac{15+30}{3}$

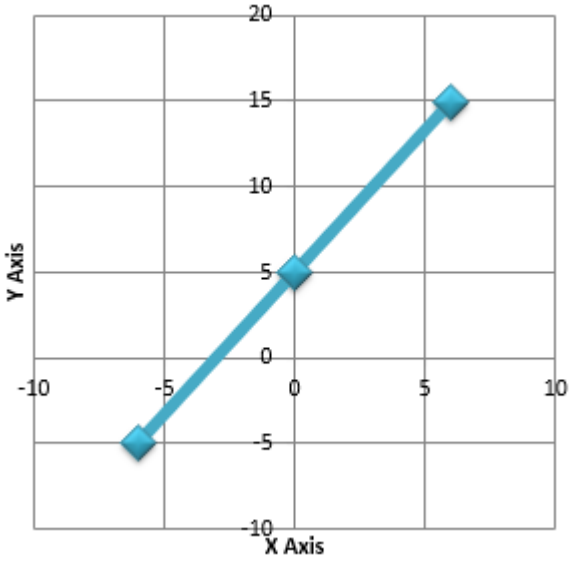
$\Rightarrow x = \frac{45}{3}$

⇒ x = 15

Thus, we have the following table,

X	– 6	0	6
Y	– 5	5	15

Plotting these points we have the following graph,



The blue line in the graph is the required line of the equation, 3x – 5y = 15

According to the graph, the equation satisfies many points therefore, it has infinitely many solutions.

8. Question

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

A. (2, 0)

B. (0, 2)

C. (0, 3)

D. (3, 0)

Answer

3x + 2y = 6

⇒ 2y = 6 – 3x

$\Rightarrow y = \frac{6-3x}{2}$

When x = 0, then,

$$\Rightarrow y = \frac{6-3(0)}{2}$$

$$\Rightarrow y = \frac{6-0}{2}$$

$$\Rightarrow y = \frac{6}{2}$$

$$\Rightarrow y = 3$$

When x = 2, then,

$$\Rightarrow y = \frac{6-3(2)}{2}$$

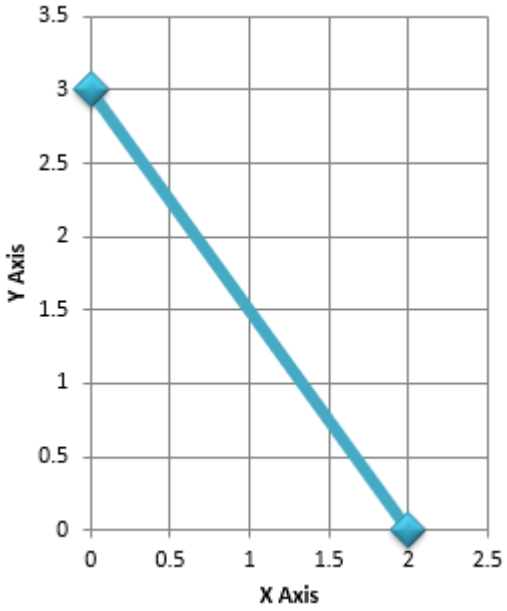
$$\Rightarrow y = \frac{6-6}{0}$$

$\Rightarrow y = 0$

Thus, we have the following table,

X	0	2
Y	3	0

Plotting these points we have the following graph,



The blue line in the graph is the required line of the equation, 3x + 2y = 6

According to the graph, the equation,

3x + 2y = 6 cuts the y-axis at the point (0, 3)

9. Question

The graph of the linear equation 4x + 3y = 12 cuts the x-axis at the point

A. (4, 0)

B. (0, 4)

C. (0, 3)

D. (3, 0)

Answer

4x + 3y = 12

⇒ 3y = 12 – 4x

$$\Rightarrow y = \frac{12-4x}{3}$$

When x = 0, then,

$$\Rightarrow y = \frac{12-4(0)}{3}$$

$$\Rightarrow y = \frac{12-0}{3}$$

$$\Rightarrow y = \frac{12}{3}$$

$$\Rightarrow y = 4$$

When x = 3, then,

$$\Rightarrow y = \frac{12-4(3)}{4}$$

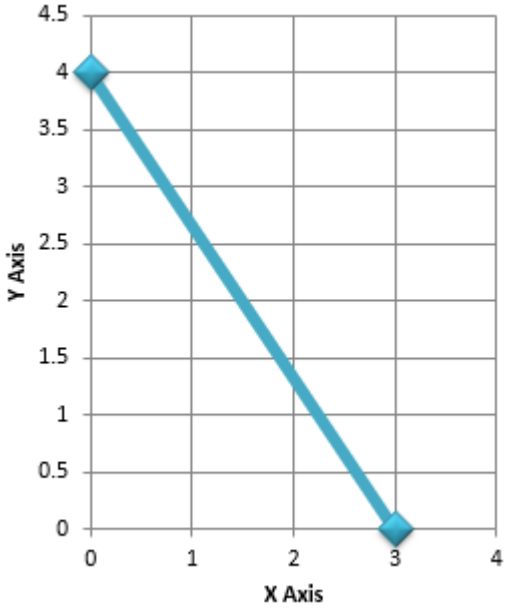
$$\Rightarrow y = \frac{12-12}{0}$$

⇒ y = 0

Thus, we have the following table,

X	0	3
Y	4	0

Plotting these points we have the following graph,



The blue line in the graph is the required line of the equation, 4x + 3y = 12

According to the graph, the equation,

4x + 3y = 12 cuts the x-axis at the point (3, 0)

10. Question

The graph of the line x = 3 passes through the point

A. (0, 3)

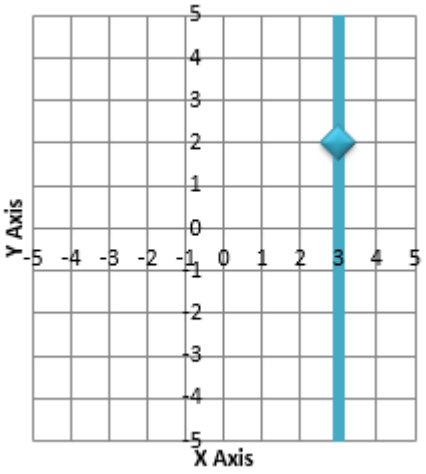
B. (2, 3)

C. (3, 2)

D. none of these

Answer

The graph of the line x = 3 is,



Clearly from the graph, it passes through (3,2)

11. Question

The graph of the line y = 2 passes through the point

A. (2, 0)

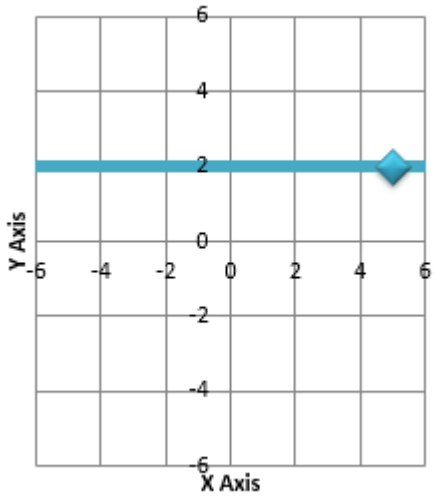
B. (2, 3)

C. (5, 2)

D. none of these

Answer

The graph of the line y = 2 is,



Clearly from the graph, it passes through (5,2)

12. Question

The graph of the line y = −3 does not pass through the point

A. (2, −3)

B. (3, −3)

C. (0, −3)

D. (−3, 2)

Answer

Out of all given four points, only (d) point has y coordinate= 2

Therefore, the line y = − 3 cannot pass through the point (− 3, 2)

13. Question

A linear equation in two variables x and y is of the form ax + by + c = 0, where

A. a ≠ 0, b ≠ 0

B. a ≠ 0, b = 0

C. a = 0, b ≠ 0

D. a = 0, c = 0

Answer

An equation of the form ax + by + c = 0, where a, b and c are real numbers such that a ≠ 0 and b ≠ 0, is called a linear equation in two variables

14. Question

Any point on x-axis is of the form:

A. (x, y), where x ≠ 0 and y ≠ 0

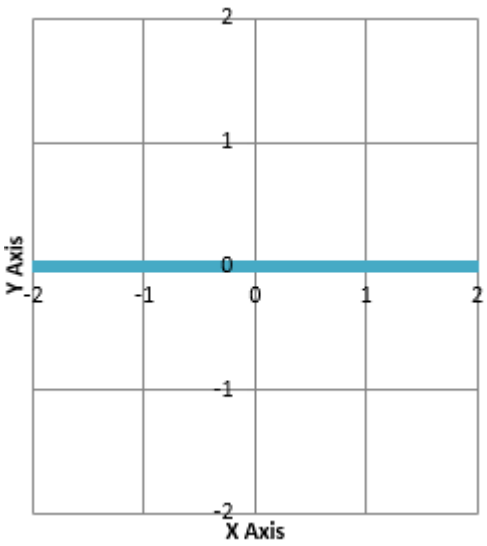
B. (0, y), where y ≠ 0

C. (x, 0), where x ≠ 0

D. (y, y), where y ≠ 0

Answer

Any point on x-axis will be of the form (x, 0) where $x \neq 0$ except origin which is (0, 0).



Since, the equation of x-axis is y = 0 therefore all the co – ordinates of y will be 0.

Eg: (– 2, 0), (3, 0), (5, 0)

15. Question

Any point on y-axis is of the form:

A. (x, 0), where x ≠ 0

B. (0, y), where y ≠ 0

C. (x, x), where x ≠ 0

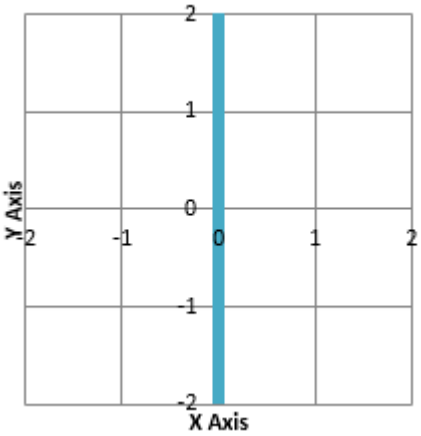
D. none of these

Answer

Any point on y-axis will be of the form (0, y) where $y \neq 0$ except origin which is (0, 0).

Since, the equation of y-axis is x = 0 therefore all the co – ordinates of x will be 0.

Eg: (0, – 2), (0, 3), (0, 5)



16. Question

How many linear equations in x and y can be satisfied by x = 2, y = 3?

A. Only one

B. Only two

C. Infinitely many

D. None of these

Answer

Let, a = – 1 and b = – 2 then,

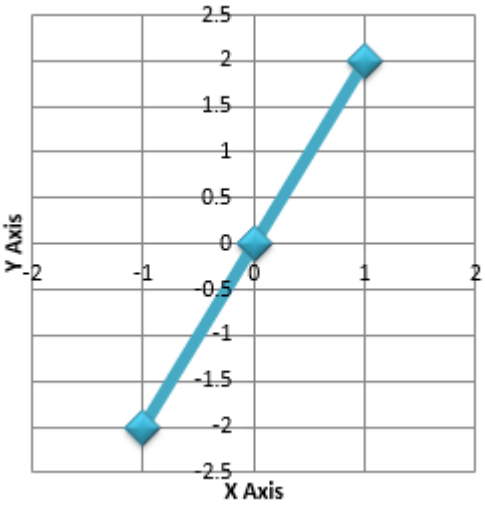
ax + by = c

⇒ (– 1) ×2 + (– 2) ×3 = – 8

Let, a = 0 and b = 0 then,

ax + by = c

⇒ 0×2 + 0×3 = 0



Let, a = 1 and b = 2 then,

ax + by = c

⇒ 1 × 2 + 2 3 = 8

a	b	c
- 1	- 2	- 8
0	0	0
1	2	8

Since, there can be many solutions for 2a + 3b = c, where a, b and c are constants.

Therefore, there can be infinitely many linear equations in x and y that can be satisfied by x = 2, y = 3

17. Question

The graph of the linear equation 3x + 2y = 6 is the line which meets the x-axis at the point

A. (0, 3)

B. (2, 0)

C. (2, 3)

D. (3, 2)

Answer

3x + 2y = 6

⇒ 2y = 6 – 3x

$\Rightarrow y = \frac{6-3x}{2}$

Let x = 0 then,

$y = \frac{6-3x}{2}$

$\Rightarrow y = \frac{6-3\times0}{2}$

$\Rightarrow y = \frac{6}{2}$

$\Rightarrow y = 3$

Let x = 2 then,

$y = \frac{6-3x}{2}$

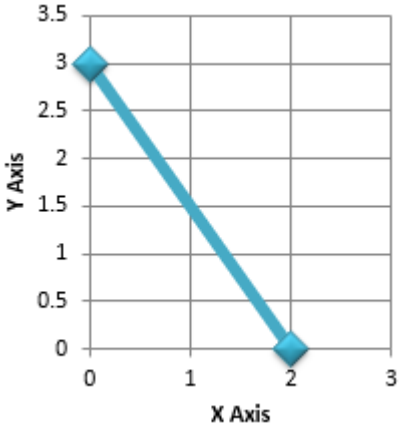
$y = \frac{6-3\times2}{2}$

$y = \frac{6-6}{2}$

$y = 0$

X	0	2
Y	3	0

The blue line is the graph of equation 3x + 2y = 6 which cuts the X – axis at (2, 0)



18. Question

The graph of the linear equation 2x + 5y = 10 is the line which meets the y-axis at the point

A. (0, 2)

B. (5, 0)

C. $\left(\frac{1}{2}, 2\right)$

D. (2, 1.2)

Answer

2x + 5y = 10

⇒ 5y = 10 − 2x

$\Rightarrow y = \frac{10-2x}{5}$

Let x = 0 then,

$\Rightarrow y = \frac{10-2\times0}{5}$

$\Rightarrow y = \frac{10-0}{5}$

$\Rightarrow y = \frac{10}{5}$

$\Rightarrow y = 2$

Let x = 5 then,

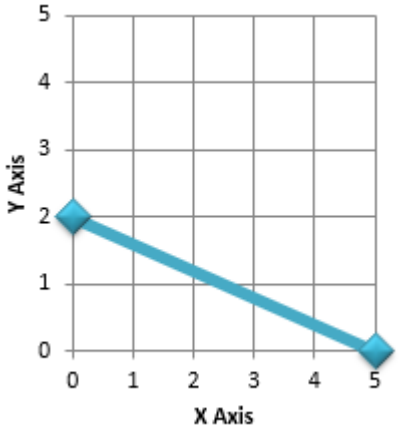
$\Rightarrow y = \frac{10-2\times5}{5}$

$\Rightarrow y = \frac{10-10}{5}$

$\Rightarrow y = 0$

X	0	5
Y	2	0

The blue line is the graph of equation 2x + 5y = 10 which cuts the Y – axis at (0, 2)



19. Question

If each of (– 2, 2), (0, 0) and (2, – 2) is a solution of a linear equation in x and y, then the equation is

A. x – y = 0

B. x + y = 0

C. – 2x + y = 0

D. –x + 2y = 0

Answer

We will find the solution by trying all the options.

Let the equation be x – y = 0

For the point (– 2, 2),

x = – 2 and y = 2

then, x – y = – 2 – 2 = – 4

For the point (0, 0),

x = 0 and y = 0

then, x – y = 0 – 0 = 0

For the point (2, – 2),

x = 2 and y = – 2

then, x – y = 2 – (– 2) = 2 + 2 = 4

Since, all the solutions are different therefore, the given points (– 2, 2), (0, 0) and (2, – 2) does not satisfy x – y

Let the equation be x + y = 0

For the point (– 2, 2),

x = – 2 and y = 2

then, x + y = – 2 + 2 = 0

For the point (0, 0),

x = 0 and y = 0

then, x + y = 0 + 0 = 0

For the point (2, – 2),

x = 2 and y = – 2

then, x + y = 2 + (– 2) = 2 – 2 = 0

Since, all the solutions are same therefore, the given points (– 2, 2), (0, 0) and

(2, – 2) satisfies x + y. Hence, the equation is x + y

20. Question

The graph of the linear equation x – y = 0 passes through the point

A. $\left(\frac{-1}{2},\frac{1}{2}\right)$

B. $\left(\frac{3}{2},\frac{-3}{2}\right)$

C. (0, – 1)

D. (1, 1)

Answer

We will find the solution by trying all the options.

Let point be $(\frac{-1}{2},\frac{1}{2})$ i.e., $x = \frac{-1}{2}$ and $y = \frac{1}{2}$

Then, $x - y = \frac{-1}{2} - \frac{1}{2}$

Or x – y = – 1 ≠ 0

Therefore, $(\frac{-1}{2}, \frac{1}{2})$ does not satisfy x – y = 0

Let point be $(\frac{3}{2}, \frac{-3}{2})$ i.e., $x = \frac{3}{2}$ and $y = \frac{-3}{2}$

Then, $x - y = \frac{3}{2} - \left(\frac{-3}{2}\right)$

Or x – y = $= \frac{3}{2} + \frac{3}{2}$

Or x – y = $\frac{6}{2}$ = 3 ≠ 0

Therefore, $\left(\frac{3}{2}, \frac{-3}{2}\right)$ does not satisfy x – y = 0

Let point be $(0, -1)$ i.e., x = 0 and y = – 1

then, x – y = 0 + 1 = 1≠0

Therefore, $(0, -1)$ does not satisfy x – y = 0

Let point be $(1,1)$ i.e., x = 1 and y = 1

then, x – y = 1 – 1 = 0

Therefore, $(1,1)$ satisfies x – y = 0

Hence, the graph of the linear equation x – y = 0 passes through the point (1, 1)

21. Question

The question consists of two statements, namely, Assertion (A) and Reason (R). Choose the correct option.

Assertion (A)	**Reason (R)**
X = 3 is a line parallel to y-axis.	The equation of a line parallel to y-axis is x = a.

A. Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).

B. Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).

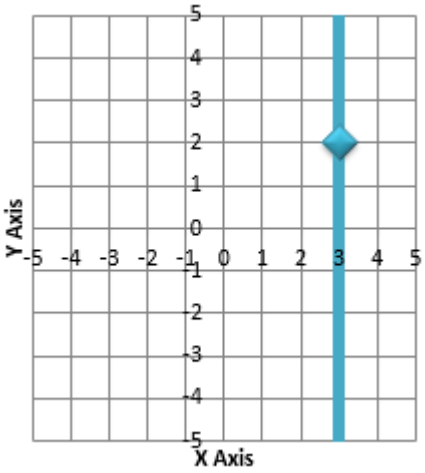
C. Assertion (A) is true and Reason (R) is false.

D. Assertion (A) is false and Reason (R) is true.

Answer

We know that the equation of y-axis is x = 0

and the equation of any line parallel to y axis is x = a, therefore, the reason is true.



Also, by the reason x = 3 is a line parallel to y-axis, therefore, the assertion is true.

Hence, both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).

22. Question

The question consists of two statements, namely, Assertion (A) and Reason (R). Choose the correct option.

Assertion (A)	**Reason (R)**
Y = mx represents a line passing through the origin.	Any line parallel to x-axis is y = b.

A. Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).

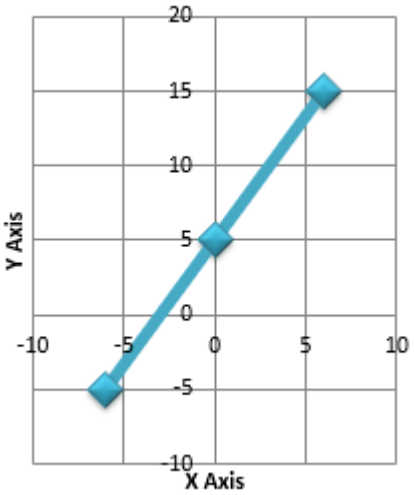
B. Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).

C. Assertion (A) is true and Reason (R) is false.

D. Assertion (A) is false and Reason (R) is true.

Answer

We know that the equation of x-axis is y = 0 and the equation of any line parallel to x-axis is y = b, therefore, the reason is true.



For, y = mx

If we put x = 0 then, y = m×0 = 0.

Therefore, we get (0, 0) which is origin.

So, y = mx represents a line passing through the origin, therefore, the assertion is true.

The blue line is the graph of y = mx which clearly, passes through origin.

Hence, both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).

23. Question

The question consists of two statements, namely, Assertion (A) and Reason (R). Choose the correct option.

Assertion (A)	**Reason (R)**
X + y = 5 is the equation of a line passing through the origin.	Y = mx is the equation of a line passing through the origin.

A. Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).

B. Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).

C. Assertion (A) is true and Reason (R) is false.

D. Assertion (A) is false and Reason (R) is true.

Answer

We know that, y = mx is the equation of a line passing through the origin.

Since, For, y = mx

If we put x = 0 then, y = m×0 = 0.

Therefore, we get (0, 0) which is origin.

So, y = mx represents a line passing through the origin, therefore, the reason is true.

Now, if we put x = 0 in the equation x + y = 5 then,

0 + y = 5

⇒ y = 5

Therefore, the point is (0,5) which is not origin.

So, x + y = 5 is not the equation of a line passing through the origin, therefore, the assertion is not true.

Hence, Assertion (A) is false and Reason (R) is true.

24. Question

Match the following columns:

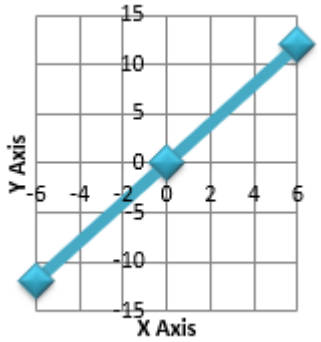
Column I	**Column II**
A. The equation of a line parallel to x-axis is	(p) y = mx
B. The equation of a line parallel to y-axis is	(q) $\frac{5}{2}$
C. The equation of a line through the origin is	(r) x = k
D. If the point (2, 3) lies on the graph of the equation 3y = ax + 4, then a =	(s) y = k

Answer

Column I	Column II
A. The equation of a line parallel to x-axis is	(s) $y = k$
B. The equation of a line parallel to y-axis is	(r) $x = k$
C. The equation of a line through the origin is	(p) $y = mx$
D. If the point (2, 3) lies on the graph of the equation $3y = ax + 4$, then a =	(q) $\frac{5}{2}$

A. We know that the equation of x-axis is y = 0 and the equation of any line parallel to x axis is y = k, where k is any constant.

B. We know that the equation of y-axis is x = 0 and the equation of any line parallel to y axis is x = k, where k is any constant.



C. For, y = mx

If we put x = 0 then, y = m×0 = 0 therefore, we get (0, 0) which is origin. So, y = mx represents a line passing through the origin.

The blue line is the graph of y = mx which clearly, passes through origin.

D. Given equation, 3y = ax + 4

⇒ ax = 3y – 4

$\Rightarrow a = \frac{3y-4}{x}$

Point (2,3) i.e. x = 2 and y = 3

$\Rightarrow a = \frac{3\times3-4}{2}$

$\Rightarrow a = \frac{9-4}{2}$

$\Rightarrow a = \frac{5}{2}$

25. Question

Write each of the following in the form ax + by + c = 0:

(i) x = – 2 (ii) y = 6

Answer

(i) x = – 2

⇒ x + 2 = 0

Comparing, x + 2 = 0 with ax + by + c = 0 we get,

the coefficient of x i.e., a = 1

and the coefficient of y i.e., b = 0 since, there is no term of y

and clearly, c = 2

putting the values of a, b and c in ax + by + c = 0 we get,

x + 0×y + 2 = 0

(ii) y = 6

⇒ y – 6 = 0

Comparing, y – 6 = 0 with ax + by + c = 0 we get,

the coefficient of x i.e., a = 0 since, there is no term of x

and the coefficient of y i.e., b = 1

and clearly, c = – 6

putting the values of a, b and c in ax + by + c = 0 we get,

0×x + y – 6 = 0

26. Question

Write each of the following in the form ax + by + c = 0:

(i) 3x = 5 (ii) 5y = 4

Answer

(i) 3x = 5

⇒ 3x – 5 = 0

Comparing, 3x – 5 = 0 with ax + by + c = 0 we get,

the coefficient of x i.e., a = 3

and the coefficient of y i.e., b = 0 since, there is no term of y

and clearly, c = – 5

putting the values of a, b and c in ax + by + c = 0 we get,

3x + 0×y – 5 = 0

(ii) 5y = 4

⇒ 5y – 4 = 0

Comparing, 5y – 4 = 0 with ax + by + c = 0 we get,

the coefficient of x i.e., a = 0 since, there is no term of x

and the coefficient of y i.e., b = 5

and clearly, c = – 4

putting the values of a, b and c in ax + by + c = 0 we get,

0×x + 5y – 4 = 0

27. Question

The total runs scored by two batsmen in a one – day cricket match is 215. Express this information in the form of a linear equation in two variables.

Answer

Let the runs scored by the first batsman be x

And,

Let the runs scored by the second batsman be y

The total runs scored are 215 which will be the sum of runs scored by both the batsmen, i.e.,

x + y = 215

28. Question

The weight of a book is three times the weight of a note book. Express this fact in the form of an equation in two variables.

Answer

Let the weight of the notebook be x

And,

Let the weight of the book be y

Then, the weight of a book is three times the weight of a note book, i.e.,

$y = 3 \times x$ or $y = 3x$

29. Question

Check which of the following are solutions of the equation $2x - 3y = 6$.

(i) (3, 0) (ii) (0, 2)

(iii) (2, 6) (iv) (6, 2)

Answer

(i) (3, 0)

$2x - 3y = 6$

LHS = $2x - 3y$

Where $x = 3$ and $y = 0$,

Putting these values in $2x - 3y$

$\Rightarrow 2 \times 3 - 3 \times 0$

$\Rightarrow 6 - 0$

$\Rightarrow 6 = RHS$

Since, LHS = RHS therefore, (3, 0) satisfies $2x - 3y = 6$

(ii) (0,2)

$2x - 3y = 6$

LHS = $2x - 3y$

Where $x = 0$ and $y = 2$,

Putting these values in $2x - 3y$

$\Rightarrow 2 \times 0 - 3 \times 2$

$\Rightarrow 0 - 6$

$\Rightarrow -6 \neq RHS$

Since, LHS $\neq$RHS therefore, (0, 2) does not satisfy $2x - 3y = 6$

(iii) (2, 6)

$2x - 3y = 6$

LHS = $2x - 3y$

Where x = 2 and y = 6,

Putting these values in 2x – 3y

⇒ 2×2 – 3×6

⇒ 4 – 18

⇒ – 14≠ RHS

Since, LHS ≠RHS therefore, (2, 6) does not satisfy 2x – 3y = 6

(iv) (6, 2)

2x – 3y = 6

LHS = 2x – 3y

Where x = 6 and y = 2,

Putting these values in 2x – 3y

⇒ 2×6 – 3×2

⇒ 12 – 6

⇒ 6 = RHS

Since, LHS = RHS therefore, (6, 2) satisfies 2x – 3y = 6

30. Question

Find the value of k, if x = 3, y = 1 is a solution of the equation 2x + 5y = k.

Answer

2x + 5y = k

Putting, x = 3 and y = 1 in 2x + 5y = k

⇒ 2×3 + 5×1 = k

⇒ 6 + 5 = k

⇒ 11 = k

Hence, k = 11

31. Question

Find four different solutions of 2x + y = 6.

Answer

2x + y = 6

⇒ y = 6 – 2x

To find four different solutions of the equation, we will put four different values of x.

Let them be, x = 1, x = 2, x = 3 and x = 4.

When, x = 1, then, y = 6 – 2×1

⇒ y = 6 – 2

⇒ y = 4

Therefore, (x, y) = (1, 4)

When, x = 2, then, y = 6 – 2×2

⇒ y = 6 – 4

⇒ y = 2

Therefore, (x, y) = (2, 2)

When, x = 3, then, y = 6 – 2×3

⇒ y = 6 – 6

⇒ y = 0

Therefore, (x, y) = (3, 0)

When, x = 4, then, y = 6 – 2×4

⇒ y = 6 – 8

⇒ y = – 2

Therefore, (x, y) = (4, – 2)

Hence, the solutions are (1, 4), (2, 2), (3, 0), (4, – 2)

32. Question

Express y in terms of x, given that $\frac{x}{5}+2y=3.$ Check whether (– 5, 2) is a solution of the given equation.

Answer

$\frac{x}{5} + 2y = 3$

$\Rightarrow 2y = 3 - \frac{x}{5}$

$\Rightarrow 2y = \frac{15 - x}{5}$

$\Rightarrow y = \frac{15 - x}{5 \times 2}$

$\Rightarrow y = \frac{15 - x}{10}$

$\Rightarrow y = \frac{1}{10}(15 - x)$

For point (– 5, 2), x = – 5 and y = 2. Putting these values in $y = \frac{1}{10}(15 - x)$ we get,

Now, for $R.H.S = \frac{1}{10}(15 - x)$

R.H.S $= \frac{1}{10}(15 - (-5))$

R.H.S $= \frac{1}{10}(15 + 5)$

$= \frac{20}{10}$

$= 2 = y = LHS$

Since, RHS = LHS, therefore, yes (– 5, 2) is a solution of $y = \frac{1}{10}(15 - x)$

33. Question

Show that (3, 1) as well as (2, – 2) are the solutions of the equation 3x – y = 8. Find two more solutions. How many solutions can we find?

Answer

The equation is 3x – y = 8

For (3, 1), x = 3 and y = 1

LHS = 3×3 – 1

= 9 – 1

= 8 = RHS

Since, RHS = LHS, therefore, (3, 1) is the solution of the equation 3x – y = 8.

For (2, – 2), x = 2 and y = – 2

LHS = 3×3 – 1

= 9 – 1

= 8 = RHS

Since, RHS = LHS, therefore, (2, – 2) is the solution of the equation 3x – y = 8.

Hence, (3, 1) and (2, – 2) are the solutions of the equation 3x – y = 8.

Now to find two more solutions,

3x – y = 8

⇒ y = 3x – 8

Let x = 1, then, y = 3x – 8

⇒ y = 3×1 – 8

⇒ y = 3 – 8

⇒ y = – 5

Therefore, (1, – 5) is a solution of 3x – y = 8.

Let x = 4, then, y = 3x – 8

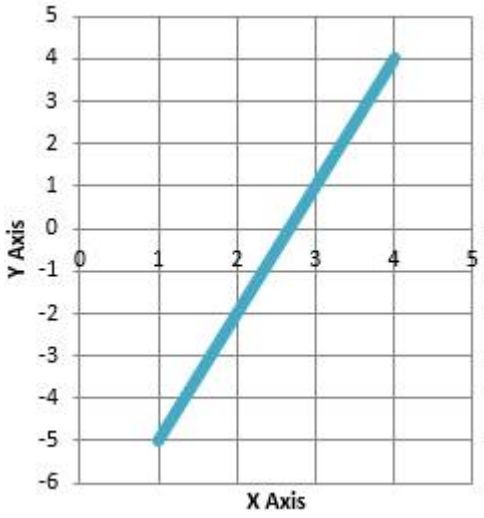
⇒ y = 3×4 – 8

⇒ y = 12 – 8

⇒ y = 4

Therefore, (4, 4) is a solution of 3x – y = 8.

Plotting the points we obtain the following graph,



The blue line in the graph is of the equation 3x – y = 8.

From the graph, it is clear that it has infinitely many solutions.

34. Question

For the equation 6x – 5y = 8, verify that

(i) (3, 2) is a solution (ii) (2, 3) is not a solution

Answer

(i) Given equation, 6x – 5y = 8

For the point, (3, 2),

x = 3 and y = 2

Putting these values in, 6x – 5y = 8

LHS = 6x – 5y

= 6×3 – 5×2

= 18 – 10

= 8 = RHS

Since, LHS = RHS, therefore, (3, 2) is a solution of 6x – 5y = 8.

(ii) Given equation, 6x – 5y = 8

For the point, (2, 3),

x = 2 and y = 3

Putting these values in, 6x – 5y = 8

LHS = 6x – 5y

= 6×2 – 5×3

= 12 – 15

= – 3 ≠ RHS

Since, LHS ≠ RHS, therefore, (2, 3) is not a solution of 6x – 5y = 8.

35. Question

If the point (3, 4) lies on the graph of the equation 3y = ax + 7, find the value of a.

Answer

Given equation: 3y = ax + 7

⇒ ax = 3y – 7

$\Rightarrow a = \frac{3y-7}{x}$

Since, the point (3, 4) lies on the graph of the equation 3y = ax + 7 therefore, it should satisfy the equation 3y = ax + 7

So, x = 3 and y = 4

Putting these values we get,

$$a = \frac{3y-7}{x}$$

$$\Rightarrow a = \frac{3\times 4-7}{3}$$

$$\Rightarrow a = \frac{12-7}{3}$$

$$\Rightarrow a = \frac{5}{3}$$

36. Question

Find two solutions for each of the following:

(i) 3x + 4y = 12 (ii) 3x + 5y = 0

(iii) 4y + 5 = 0

Answer

(i) 3x + 4y = 12

⇒ 4y = 12 – 3x

$\Rightarrow y = \frac{12-3x}{4}$

Let x = 4,

$y = \frac{12-3x}{4}$

$\Rightarrow y = \frac{12-3\times4}{4}$

$\Rightarrow y = \frac{12-12}{4}$

⇒ y = 0

Therefore, (4, 0) is a solution

Let x = – 4,

$y = \frac{12-3x}{4}$

$\Rightarrow y = \frac{12-3\times-4}{4}$

$\Rightarrow y = \frac{12+12}{4}$

⇒ y = 6

Therefore, (– 4, 6) is a solution

(ii) 3x + 5y = 0

⇒ 5y = 0 – 3x

$\Rightarrow y = \frac{-3x}{5}$

Let x = 5,

$y = \frac{-3x}{5}$

$\Rightarrow y = \frac{-3\times5}{5}$

$\Rightarrow y = \frac{-15}{5}$

$\Rightarrow y = -3$

Therefore, (5, – 3) is a solution

Let x = – 5,

$y = \frac{-3x}{5}$

$\Rightarrow y = \frac{-3\times-5}{5}$

$\Rightarrow y = \frac{15}{5}$

$\Rightarrow y = 3$

Therefore, (– 5, 3) is a solution

(iii) 4y + 5 = 0

$\Rightarrow 4y = 0 - 5$

$\Rightarrow y = \frac{-5}{4}$

Let x = 1,

$y = \frac{-5}{4}$

Therefore, $\left(1, \frac{-5}{4}\right)$ is a solution.

Let x = – 1,

$y = \frac{-5}{4}$

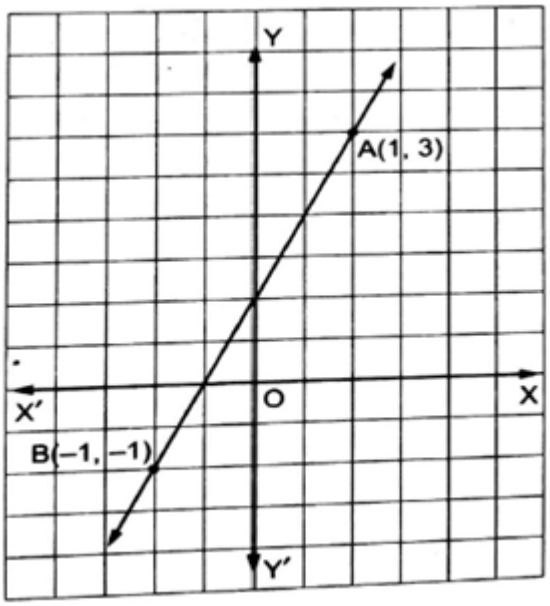
Therefore, $\left(-1, \frac{-5}{4}\right)$ is a solution.

37. Question

Study the graph given below. Choose the equation whose graph is given:

(i) y = x (ii) y = 2x

(iii) y = 2x + 1 (iv) x + y = 0



Answer

To find the correct answer, we will try all the options.

There are two points given,

A = (1, 3) and B = (– 1, – 1)

We will put them in all the equations and check whether they satisfy or not.

(i) y = x

When x = 1 then, y = x

⇒ y = 1 ≠ 3

So it does not satisfy y = x

Therefore, the graph does not satisfy y = x

(ii) y = 2x

When x = 1 then, y = 2x

⇒ y = 2 × 1

⇒ y = 2 ≠ 3

So it does not satisfy y = 2x

Therefore, the graph does not satisfy y = 2x

(iii) y = 2x + 1

When x = 1 then, y = 2x + 1

⇒ y = 2 × 1 + 1

⇒ y = 2 + 1

⇒ y = 3

So it satisfies y = 2x

Now When x = – 1 then, y = 2x + 1

⇒ y = 2 × – 1 + 1

⇒ y = – 2 + 1

⇒ y = – 1

So it also satisfies y = 2x

Therefore, the graph satisfies y = 2x + 1

(iv) x + y = 0

When x = 1 then, y = – x

⇒ y = – 1 ≠ 3

So it does not satisfy x + y = 0

Therefore, the graph does not satisfy x + y = 0

38. Question

Draw the graph of the equation 3x + 5y – 15 = 0 and show that x = 1, y = 2 is not a solution of the given equation.

Answer

3x + 5y – 15 = 0

⇒ 5y = 15 – 3x

$$\Rightarrow y = \frac{15-3x}{5}$$

When, x = 0 then,

$$y = \frac{15-3x}{5}$$

$$\Rightarrow y = \frac{15-3\times0}{5}$$

$$\Rightarrow y = \frac{15-0}{5}$$

$$\Rightarrow y = \frac{15}{5}$$

⇒ y = 3

When, x = 5 then,

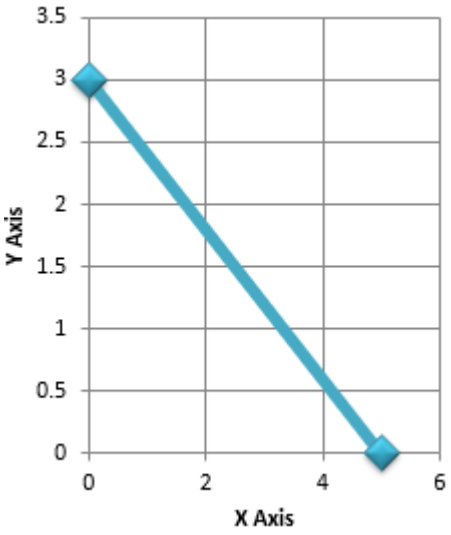
$$y = \frac{15-3x}{5}$$

$$\Rightarrow y = \frac{15-3\times5}{5}$$

$\Rightarrow y = \frac{15-15}{5}$

$\Rightarrow y = 0$

Plotting (0, 3) and (5, 0) we get the following graph,



The blue line indicates the required graph of 3x + 5y – 15 = 0

Now, to show that (1, 2) is not the solution of

3x + 5y – 15 = 0

We put x = 1 and y = 2 in $y = \frac{15-3x}{5}$

$\text{RHS} = \frac{15-3x}{5}$

$= \frac{15-3\times1}{5}$

$= \frac{15-3}{5}$

$= \frac{12}{5} \neq 2 = \text{RHS}$

Since, LHS ≠ RHS therefore, x = 1, y = 2 is not a solution 3x + 5y – 15 = 0.

39. Question

Draw the graph of the equation 3x + 2y = 12. At what points does the graph cut the x-axis and the y-axis?

Answer

3x + 2y = 12

⇒ 3x + 2y = 12

⇒ 2y = 12 – 3x

$\Rightarrow y = \frac{12-3x}{2}$

When, x = 0 then,

$y = \frac{12-3x}{2}$

$\Rightarrow y = \frac{12-3\times0}{2}$

$\Rightarrow y = \frac{12-0}{2}$

$\Rightarrow y = \frac{12}{2}$

$\Rightarrow y = 6$

When, x = 4 then,

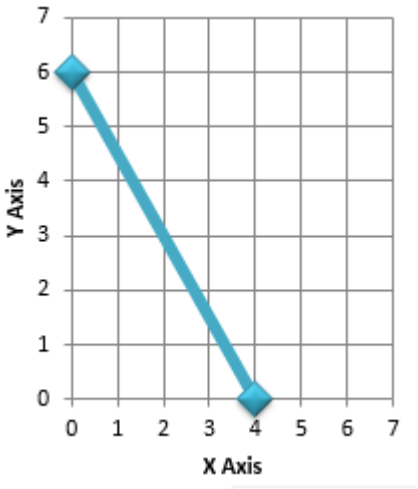
$y = \frac{12-3x}{2}$

$\Rightarrow y = \frac{12-3\times4}{2}$

$\Rightarrow y = \frac{12-12}{2}$

$\Rightarrow y = 0$

On plotting, (0, 6) and (4, 0) we get the following graph,



The blue line indicates the required graph of 3x + 2y = 12

It can be clearly seen from the graph, that it cuts the x axis at (4, 0) and y axis at (0, 6)

40. Question

Draw the graph of the equation x – 2y = 6. Verify that each of the points P(2, – 2), Q(4, – 1), and R(– 2, – 4) lies on the straight line.

Answer

Given equation,

x – 2y = 6

⇒ – 2y = 6 – x

$$\Rightarrow y = -\frac{6-x}{2}$$

$$\Rightarrow y = \frac{x-6}{2}$$

For point, P (2, – 2), x = 2 and y = – 2

$$RHS = \frac{x-6}{2}$$

$$= \frac{2-6}{2}$$

$$= \frac{-4}{2}$$

= – 2 = LHS

Since, RHS = LHS, therefore, (2, – 2) satisfies x – 2y = 6

For point, Q (4, – 1), x = 4 and y = – 1

$$RHS = \frac{x-6}{2}$$

$$= \frac{4-6}{2}$$

$$= \frac{-2}{2}$$

= – 1 = LHS

Since, RHS = LHS, therefore, (4, – 1) satisfies x – 2y = 6

For point, Q (– 2, – 4), x = – 2 and y = – 4

$$RHS = \frac{x-6}{2}$$

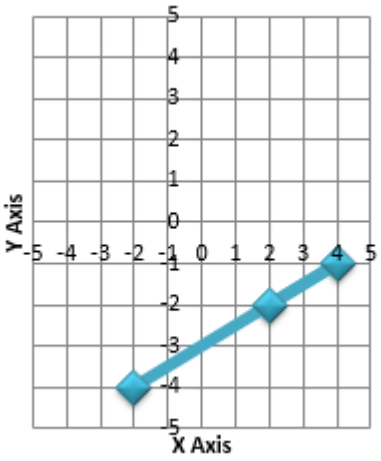
$$= \frac{-2-6}{2}$$

$$= \frac{-8}{2}$$

= – 4 = LHS

Since, RHS = LHS, therefore, (– 2, – 4) satisfies x – 2y = 6

On plotting, P (2, – 2), Q (4, – 1), and R (– 2, – 4) we get the following graph,



The blue line indicates the required graph of x – 2y = 6

It can be clearly seen from the graph, that the points P (2, – 2), Q (4, – 1), and R (– 2, – 4) lies on the straight line

41. Question

There are two scales of measuring temperature, namely, Fahrenheit (F) and Celsius (C).

The relation between the two scales is given by

$$F = \frac{9}{5}C + 32 \qquad \text{(i)}$$

(i) Draw the graph of the given linear equation taking C along x-axis and F along y-axis.

Fill in the blanks given below:

(ii) 0°C = (…)°F (iii) 95°F = (…)°C

(iv) 0°F = (…)°C

(v) Find the temperature which is numerically the same in both (F) and (C).

Answer

(i) Given equation,

$$F = \frac{9}{5}C + 32$$

Let $C = 0°$, then,

$$F = \frac{9}{5}C + 32$$

$$\Rightarrow F = \frac{9}{5} \times 0 + 32$$

⇒ F = 0 + 32

⇒ F = 32°

Let $C = 10°$, then,

$$F = \frac{9}{5} C + 32$$

$$\Rightarrow F = \frac{9}{5} \times 10 + 32$$

⇒ F = 18 + 32

⇒ F = 50°

Let $C = 20°$, then,

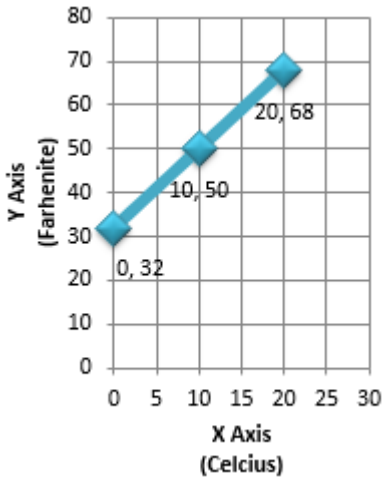
$$F = \frac{9}{5} C + 32$$

$$\Rightarrow F = \frac{9}{5} \times 20 + 32$$

⇒ F = 36 + 32

⇒ F = 68°

On plotting, (0, 32), (10, 50) and (20, 68) we get the following graph,



The blue line indicates the required graph of $F = \frac{9}{5} C + 32$

(ii) When, $C = 0°$, then,

$$F = \frac{9}{5} C + 32$$

$$\Rightarrow F = \frac{9}{5} \times 0 + 32$$

⇒ F = 0 + 32

⇒ F = 32°

(iii) When $F = 95°$, then

$$F = \frac{9}{5}C + 32$$

$$\Rightarrow 95 = \frac{9}{5} \times C + 32$$

$$\Rightarrow 95 - 32 = \frac{9}{5} \times C$$

$$\Rightarrow 63 = \frac{9}{5} \times C$$

$$\Rightarrow C = \frac{63 \times 5}{9}$$

⇒ C = 35°

(iv) When F = 0°, then

$$F = \frac{9}{5}C + 32$$

$$\Rightarrow 0 = \frac{9}{5} \times C + 32$$

$$\Rightarrow 0 - 32 = \frac{9}{5} \times C$$

$$\Rightarrow -32 = \frac{9}{5} \times C$$

$$\Rightarrow C = \frac{-32 \times 5}{9}$$

⇒ C = 17.7°

(v) Put C = F, then

$$F = \frac{9}{5}C + 32$$

$$\Rightarrow F = \frac{9}{5} \times F + 32$$

$$\Rightarrow F - \frac{9}{5} \times F = 32$$

$$\Rightarrow \frac{5F - 9F}{5} = 32$$

$$\Rightarrow F = -\frac{32 \times 5}{4}$$

$$\Rightarrow F = -\frac{160}{4}$$

⇒ F = – 40° = C

Therefore, – 40°F = – 40°C

42. Question

A taxi charges Rs 20 for the first km and @ Rs 12 per km for subsequent distance covered. Taking the distance covered as x km and total fare Rs y, write a linear equation depicting the relation in x and y.

Draw the graph between x and y.

From your graph find the taxi charges for covering 16 km.

Ans. y = 12x + 8, Rs 200

Answer

Total distance covered = x km

Total fare = Rs y

Charges for 1 km = Rs 20

Charges for 2 kms = Rs 20 + Rs 12

Charges for 3 kms = Rs 20 + Rs 12 × 2

Continuing, we get,

Charges for (x – 1) kms = Rs 20 + Rs 12 × (x – 2)

Charges for x kms = Rs 20 + Rs 12 × (x – 1)

Total fare = Rs y

Therefore,

Total fare = Charges for x kms

⇒ y = 20 + 12 × (x – 1)

⇒ y = 20 + 12x – 12

⇒ y = 12x + 8

Let x = 1 then, y = 12x + 8

⇒ y = 12× 1 + 8

⇒ y = 12 + 8

⇒ y = 20

Let x = 5 then, y = 12x + 8

⇒ y = 12× 5 + 8

⇒ y = 60 + 8

⇒ y = 68

Let x = 10 then, y = 12x + 8

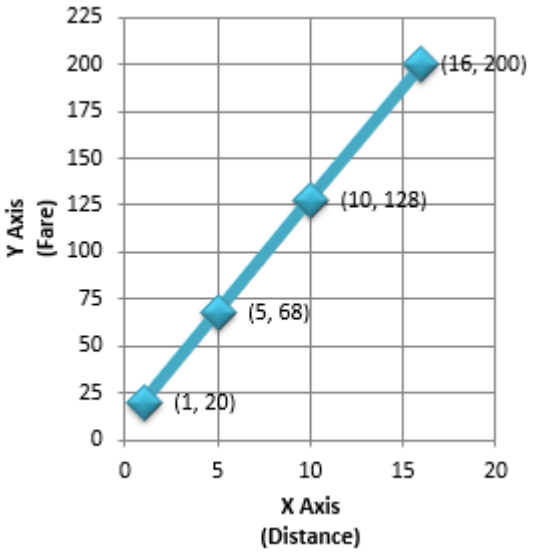
⇒ y = 12× 10 + 8

⇒ y = 120 + 8

⇒ y = 128

Plotting, (1, 20), (5, 68) and (10, 128) on the graph we get,

The blue line indicates the required graph of y = 12x + 8



When x = 16, we take 16 on x axis.

Draw a line from 16 on x axis which is parallel to y axis and meets the blue line.

Clearly from the graph the value at y axis is 200

Therefore, taxi charges at covering 16 km = Rs 200

43. Question

If the work done by a body on applying a constant force is directly proportional to the distance travelled by the body, then express this in the form of an equation in two variables by taking the constant force as 4 units. From the graph, find the work done when the distance travelled is (i) 2 units (ii) 0 units (iii) 5 units.

Answer

Work done = W

Force = F = 4

Distance = d

Since, Work done ∝ Distance

Therefore, W ∝ d

⇒ W = F× d

⇒ W = 4d

Let d = 0

⇒ W = 4 × 0 = 0

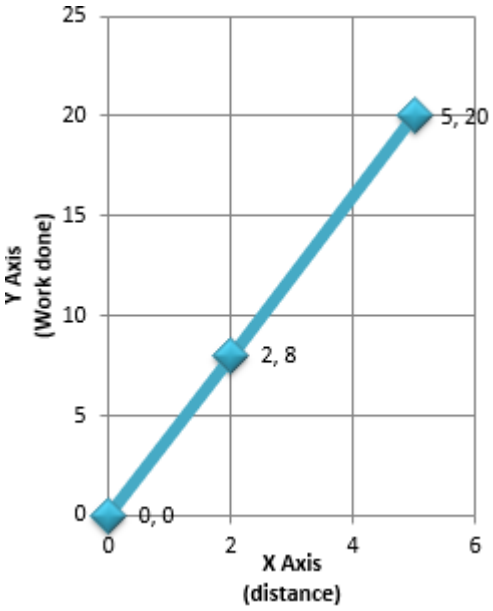
Let d = 2

⇒ W = 4 × 2 = 8

Let d = 5

⇒ W = 4 × 5 = 20

Plotting them we get the following graph,



The blue line indicates the required graph of W = 4d

Clearly from the graph,

(i) When d = 2 units

then, W = 8 units

(ii) When d = 0 unit

then, W = 0 unit

(iii) When d = 5 units

then, W = 20 units

Formative Assessment (Unit Test)

1. Question

For the equation 5x + 8y = 50, if y = 10, then the value of x is

A. 6

B. – 6

C. 12

D. – 12

Answer

Given equation, 5x + 8y = 50

Put y = 10 in 5x + 8y = 50

⇒ 5x + 8× 10 = 50

⇒ 5x + 80 = 50

⇒ 5x = 50 – 80

⇒ 5x = – 30

$$\Rightarrow x = -\frac{30}{5}$$

$$\Rightarrow x = -6$$

2. Question

The linear equation 2x + 5y = 16 has

A. a unique solution

B. two solutions

C. no solutions

D. infinitely many solutions

Answer

Given equation,

2x + 5y = 16

⇒ 5y = 16 – 2x

$$\Rightarrow y = \frac{16-2x}{5}$$

When x = – 2

$$\Rightarrow y = \frac{16-2\times(-2)}{5}$$

$$\Rightarrow y = \frac{16-(-4)}{5}$$

$$\Rightarrow y = \frac{20}{5}$$

$$\Rightarrow y = 4$$

When x = 8

$\Rightarrow y = \frac{16-2\times8}{5}$

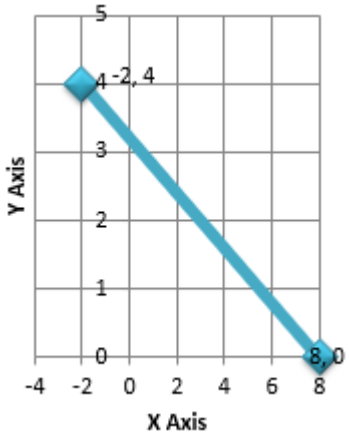
$\Rightarrow y = \frac{16-16}{5}$

⇒ y = 0

Thus we have the following table,

X	– 2	0
Y	4	8

Plotting (– 2, 4) and (8, 0) we get the following graph,



The blue line is the equation of 2x + 5y = 16

Clearly, from the graph we get infinitely many solutions.

3. Question

Express $\frac{2x}{3}+\frac{y}{6}-5=0$ in the form ax + by + c = 0.

Answer

Given equation,

$\frac{2x}{3}+\frac{y}{6}-5=0$

Taking LCM,

$\frac{4x+y-30}{6} = 0$

⇒ 4x + y – 30 = 0×6

⇒ 4x + y – 30 = 0

4. Question

If 5y – 3x + 15 = 0, then express y in terms of x.

Answer

Given equation,

5y – 3x + 15 = 0

⇒ 5y – 3x + 15 = 0

⇒ 5y = 3x – 15

$\Rightarrow y = \frac{3x-15}{5}$

5. Question

For what value of k does the point (k, – 3) lies on the line 3x – y = 6?

Answer

Given equation, 3x – y = 6

For the point, (k, – 3), x = k and y = – 3

Put the values of x and y in $3x - y = 6$

⇒ 3k – (– 3) = 6

⇒ 3k + 3 = 6

⇒ 3k = 6 – 3

⇒ 3k = 3

$\Rightarrow k = \frac{3}{3}$

⇒ k = 1

6. Question

If x = 3, y = – 2 satisfies 2x – 3y = k, then find the value of k.

Answer

Given equation, 2x – 3y = k

For the point, (3, – 2), x = 3 and y = – 2

Put the values of x and y in 2x – 3y = k

⇒ 2×3 – 3×(– 2) = k

⇒ 6 –(– 6) = k

⇒ 6 + 6 = k

⇒ k = 12

7. Question

Find the points where the graph of the equation 3x + 4y = 12 cuts the x-axis and the y-axis.

Answer

Given equation, 3x + 4y = 12

⇒ 4y = 12 – 3x

$\Rightarrow y = \frac{12-3x}{4}$

When x = – 4, then,

$$y = \frac{12 - 3x}{4}$$

$$\Rightarrow y = \frac{12 - 3 \times (-4)}{4}$$

$$\Rightarrow y = \frac{12 - (-12)}{4}$$

$$\Rightarrow y = \frac{12 + 12}{4}$$

$$\Rightarrow y = \frac{24}{4}$$

⇒ y = 6

When x = 0, then,

$$y = \frac{12 - 3x}{4}$$

$$\Rightarrow y = \frac{12 - 3 \times 0}{4}$$

$$\Rightarrow y = \frac{12 - 0}{4}$$

$$\Rightarrow y = \frac{12}{4}$$

⇒ y = 3

When x = 4, then,

$$y = \frac{12 - 3x}{4}$$

$$\Rightarrow y = \frac{12 - 3 \times 4}{4}$$

$$\Rightarrow y = \frac{12 - 12}{4}$$

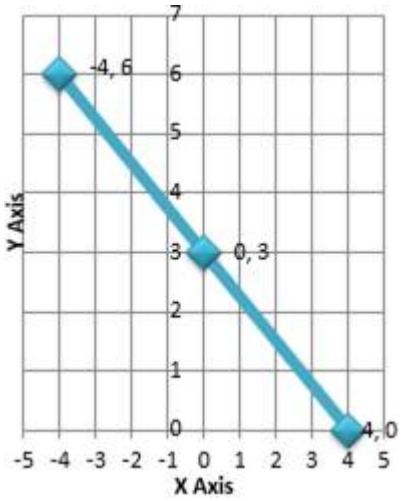
$$\Rightarrow y = \frac{12 - 12}{4}$$

$\Rightarrow y = 0$

Thus we have the following table,

X	– 4	0	4
Y	6	3	0

On plotting the points, (– 4, 6), (0, 3) and (4, 0) we get the following graph,



Clearly from the graph, it cuts x axis at (4, 0) and y axis at (0, 3)

8. Question

The area of the triangle formed by the line x + 3y = 12 and the coordinate axes is

A. 12 sq units

B. 18 sq units

C. 24 sq units

D. 30 sq units

Answer

Given equation,

x + 3y = 12

⇒ 3y = 12 – x

$\Rightarrow y = \frac{12-x}{3}$

When x = 0, then,

$y = \frac{12-x}{3}$

$\Rightarrow y = \frac{12-0}{3}$

$\Rightarrow y = \frac{12}{3}$

⇒ y = 4

When x = 6, then,

$y = \frac{12-6}{3}$

$\Rightarrow y = \frac{12-6}{3}$

$\Rightarrow y = \frac{6}{3}$

⇒ y = 2

When x = 12, then,

$y = \frac{12-12}{3}$

$\Rightarrow y = \frac{12-12}{3}$

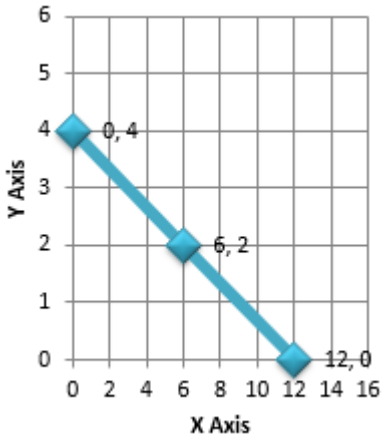
⇒ y = 0

Thus we have the following table,

X	0	6	12
Y	4	2	0

Now on plotting (0, 4), (6, 2) and (12, 0) we have the following graph,

Clearly from the graph,



Base of triangle = 12 – 0 = 12 units

Height of triangle = 4 – 0 = 4 units

We know that, Area of triangle =

$$\frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times 12 \text{ units} \times 4 \text{ units}$$

$$= \frac{48}{2} \text{ sq. units}$$

= 24 sq. units

Therefore, the area of the triangle is 24 sq. units

9. Question

The question consists of two statements, namely, Assertion (A) and Reason (R). Choose the correct option.

Assertion (A)	Reason (R)
Y = mx represents a line passing through the origin.	Any line parallel to x-axis is y = k.

A. Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).

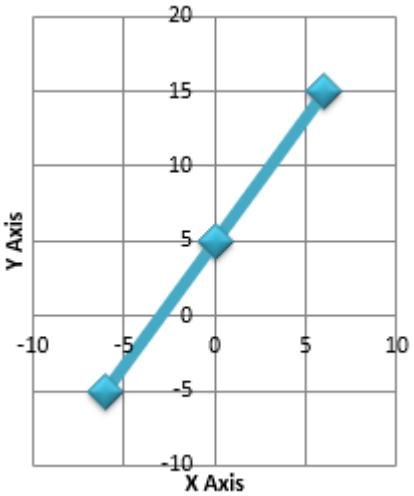
B. Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).

C. Assertion (A) is true and Reason (R) is false.

D. Assertion (A) is false and Reason (R) is true.

Answer

We know that the equation of x-axis is y = 0 and the equation of any line parallel to x-axis is y = k, therefore, the reason is true.



For, y = mx

If we put x = 0 then, y = m×0 = 0 therefore, we get (0, 0) which is origin. So, y = mx represents a line passing through the origin, therefore, the assertion is true.

The blue line is the graph of y = mx which clearly, passes through origin.

Hence, both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).

10. Question

The question consists of two statements, namely, Assertion (A) and Reason (R). Choose the correct option.

Assertion (A)	**Reason (R)**
X = 3 is a line parallel to y-axis.	Any line parallel to y-axis is y = k, where k ∈ R.

A. Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).

B. Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).

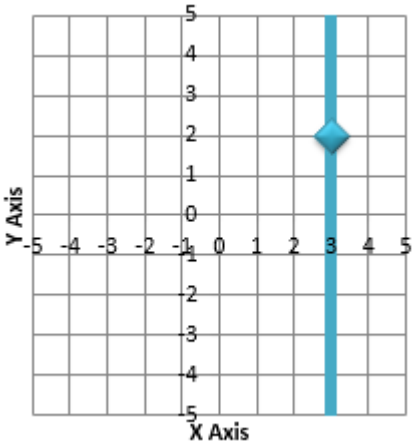
C. Assertion (A) is true and Reason (R) is false.

D. Assertion (A) is false and Reason (R) is true.

Answer

We know that the equation of y-axis is x = 0 and the equation of any line parallel to y axis is x = a, therefore, the reason is true.

Also, by the reason x = 3 is a line parallel to y-axis, therefore, the assertion is true.



Hence, both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).

11. Question

Match the following columns:

Column I	**Column II**
A. Any line parallel to x-axis is	(p) 3
B. Any line parallel to y-axis is	(q) y = mx
C. Any line passing through the origin is	(r) x = k
D. If the point (– 2, 2) lies on the line ax + 4y = 2, then a =	(s) y = k

The correct answer is:

(a) – ……., (b) – ……., (c) – ……., (d) – …….,

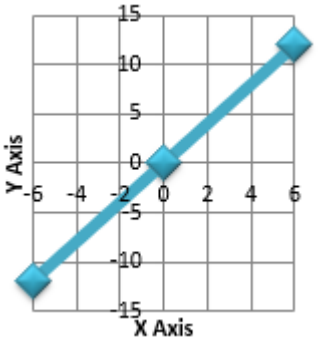
Answer

(a) – (s), (b) – (r), (c) – (q), (d) – (p)

Column I	Column II
A. Any line parallel to x-axis is	(s) y = k
B. Any line parallel to y-axis is	(r) x = k
C. Any line passing through the origin is	(q) y = mx
D. If the point (– 2, 2) lies on the line ax + 4y = 2, then a =	(p) 3

A. We know that the equation of x-axis is y = 0 and the equation of any line parallel to x axis is y = k, where k is any constant.

B. We know that the equation of y-axis is x = 0 and the equation of any line parallel to y axis is x = k, where k is any constant.



C. For, y = mx

If we put x = 0 then, y = m×0 = 0 therefore, we get (0, 0) which is origin. So, y = mx represents a line passing through the origin.

The blue line is the graph of y = mx which clearly, passes through origin.

D. Given equation, ax + 4y = 2

⇒ ax = 2 – 4y

$\Rightarrow a = \frac{2-4y}{x}$

Point (– 2,2) i.e, x = – 2 and y = 2

$\Rightarrow a = \frac{2-4\times2}{-2}$

$\Rightarrow a = \frac{2-8}{-2}$

$\Rightarrow a = \frac{-6}{-2}$

⇒ a = 3

12. Question

Give the geometrical representation of x = 3 as an equation in

(i) one variable (ii) in two variables

Answer

(i) In one variable it will only be in the terms of x,

Therefore, the geometrical representation in one variable is x = 3

(ii) In two variables it will be in the terms of x and y,

Since, there is no term of y so the coefficient of y will be 0

Therefore, the geometrical representation in two variables is x + 0 × y = 3

13. Question

For the line 2x + 3y = 6, we have

(i) x – intercept = ……. (ii) y – intercept = …….

Answer

Given equation, 2x + 3y = 6

(i) x – intercept lies on the x-axis, therefore, y = 0,

Put y = 0 in 2x + 3y = 6

⇒ 2x + 3× 0 = 6

⇒ 2x + 0 = 6

⇒ 2x = 6

$\Rightarrow x = \frac{6}{2}$

⇒ x = 3

Therefore, x – intercept = 3

(ii) y – intercept lies on the y-axis, therefore, x = 0,

Put x = 0 in 2x + 3y = 6

⇒ 2×0 + 3y = 6

⇒ 0 + 3y = 6

⇒ 3y = 6

$\Rightarrow x = \frac{6}{3}$

⇒ x = 2

Therefore, y – intercept = 2

14. Question

Draw the graph of the line y = x and show that the point (2, 3) does not lie on it.

Answer

When x = – 4 then, y = x

⇒ y = – 4

When x = – 2 then, y = x

⇒ y = – 2

When x = 0 then, y = x

⇒ y = 0

When x = 2 then, y = x

⇒ y = 2

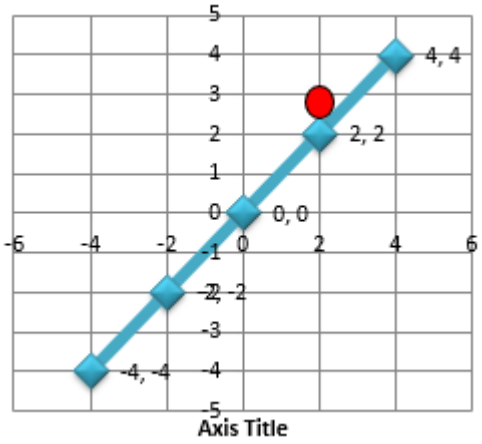
When x = 4 then, y = x

⇒ y = 4

Thus we have the following table,

X	– 4	– 2	0	2	4
Y	– 4	– 2	0	2	4

On plotting we get the following graph,



Clearly from the graph, (2,3) does not lie on the line y = x

15. Question

Draw the graph of 2x – 3y = 4. From the graph, find whether x = – 1, y = – 2 is a solution or not.

Answer

Given equation, 2x – 3y = 4

⇒ 3y = 2x – 4

$$\Rightarrow y = \frac{2x-4}{3}$$

When x = – 4, then,

$$y = \frac{2x-4}{3}$$

$$\Rightarrow y = \frac{2\times(-4)-4}{3}$$

$$\Rightarrow y = \frac{-8-4}{3}$$

$$\Rightarrow y = \frac{-12}{3}$$

⇒ y = – 4

When x = – 1, then,

$$y = \frac{2x-4}{3}$$

$$\Rightarrow y = \frac{2\times(-1)-4}{3}$$

$$\Rightarrow y = \frac{-2-4}{3}$$

$$\Rightarrow y = \frac{-6}{3}$$

$\Rightarrow y = -2$

When x = 2, then,

$$y = \frac{2x - 4}{3}$$

$$\Rightarrow y = \frac{2 \times 2 - 4}{3}$$

$$\Rightarrow y = \frac{4 - 4}{3}$$

$\Rightarrow y = 0$

When x = 5, then,

$$y = \frac{2x - 4}{3}$$

$$\Rightarrow y = \frac{2 \times 5 - 4}{3}$$

$$\Rightarrow y = \frac{10 - 4}{3}$$

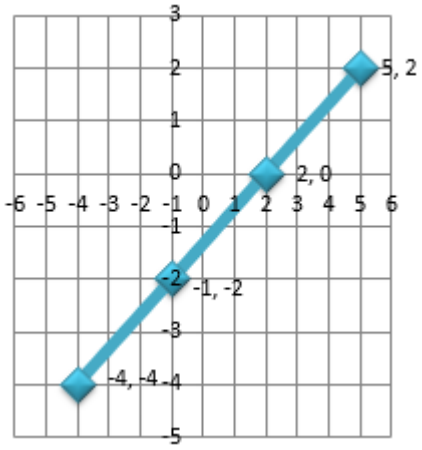
$$\Rightarrow y = \frac{6}{3}$$

$\Rightarrow y = 2$

Thus we have the following table,

X	- 4	- 1	2	5
Y	- 4	- 2	0	2

On plotting these points we have the following graph,



Clearly, from the graph (– 1, – 2) is the solution of the line 2x – 3y = 4

16. Question

The runs scored by two batsmen in a cricket match are 164. Write a linear equation in two variables x and y. Also write a solution of this equation.

Answer

Let the runs scored by the first batsman be x

And,

Let the runs scored by the second batsman be y

The total runs scored are 164 which will be the sum of runs scored by both the batsmen, i.e.,

x + y = 164

Let x = 100 then, x + y = 164

⇒ 100 + y = 164

⇒ y = 164 – 100

⇒ y = 64

Therefore, (100, 64) is a solution of x + y = 164

17. Question

Find whether the given statement is true or false:

(i) x = 2, y = 3 is a solution of the equation 5x – 3y = 1.

(ii) y = 2x + 5 is a straight line passing through the point (1, 5).

(iii) The area bounded by the line x + y = 6, the x-axis and the y-axis is 18 sq units.

Answer

(i) Given equation, 5x – 3y = 1

Putting x = 2 and y = 3 in 5x – 3y = 1

LHS = 5x – 3y

= 5× 2 – 3× 3

= 10 – 9

= 1 = RHS

Therefore, the statement is true

(ii) Given equation, y = 2x + 5

Putting x = 1 and y = 5 in y = 2x + 5

⇒ y = 2× 1 + 5

⇒ y = 2 + 5

⇒ y = 7 ≠ 5

Therefore, the statement is false

(iii) Given equation,

x + y = 6

⇒ y = 6 – x

When x = 0, then,

y = 6 – x

⇒ y = 6 – 0

⇒ y = 6

When x = 3, then,

y = 6 – x

⇒ y = 6 – 3

⇒ y = 3

When x = 6, then,

y = 6 – x

⇒ y = 6 – 6

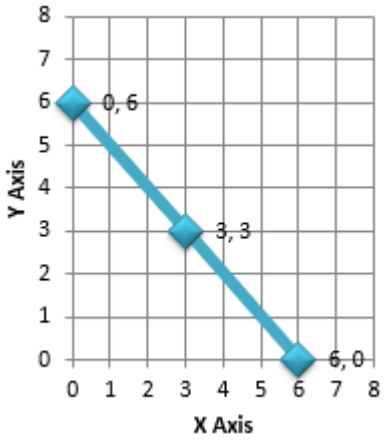
⇒ y = 0

Thus we have the following table,

X	0	3	6
Y	6	3	0

Now on plotting (0, 6), (3, 2) and (6, 0) we have the following graph,

Clearly from the graph,



Base of triangle = 6 – 0 = 6 units

Height of triangle = 6 – 0 = 6 units

We know that, Area of triangle =

$$\frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times 6 \text{ units} \times 6 \text{ units}$$

$$= \frac{36}{2} \text{ sq. units}$$

= 18 sq. units

Therefore, the area of the triangle is 18 sq. units

Therefore, the statement is true

18. Question

Two men start from points A and B respectively, 42 km apart. One walks from A to B at 4 km/hr and another walks from B to A at a certain uniform speed. They meet each other after 6 hours. Find the speed of the second man.

Answer

Distance between the two men = 42 km

Speed of man at point A = 4 km/hr

Speed of man at point B = 4 km/hr (say)

Time = 6 hrs

$$\text{Relative speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\Rightarrow \text{Relative speed} = \frac{42\ \text{km}}{6\ \text{hrs}}$$

⇒ Relative speed = 7 km/hrs

Speed of man at point B = Relative speed – Speed of man at point A

= 7 km/hrs – 4 km/hr

= 3 km/hrs

Therefore, speed of second man is 3 km/hrs

19. Question

The taxi fare in a city is such that Rs 50 is the fixed amount and Rs 16 per km is charged. Taking the distance covered as x km and total fare as Rs y, write a linear equation in x and y. What is the total fare for 20 km?

Answer

Fixed amount = Rs 50

Charges for 1 km = Rs 16

Charges for 2 km = Rs 16 × 2 = Rs 32

Charges for x km = Rs 16 × x = Rs 16x

Total fare = y = Fixed amount + Charges for x km

= Rs 50 + Rs 16x

Therefore, the linear equation is, y = 50 + 16x

Now, to find the total fare for 20 kms, put x = 20 in y = 50 + 16x

⇒ y = 50 + 16 × 20

⇒ y = 50 + 320

⇒ y = 370

Therefore, the total fare for 20 km is Rs 370

20. Question

Draw the graph for each of the equations x + y = 6 and x – y = 2 on the same graph paper and find the coordinates of the point where the two straight lines intersect.

Answer

Given equation, x + y = 6

⇒ y = 6 – x

When x = 0, then y = 6 – x

⇒ y = 6 – 0

⇒ y = 6

When x = 2, then y = 6 – x

⇒ y = 6 – 2

⇒ y = 4

When x = 4, then y = 6 – x

⇒ y = 6 – 4

⇒ y = 2

When x = 6, then y = 6 – x

⇒ y = 6 – 6

⇒ y = 0

Thus we have the following table,

X	0	2	4	6
Y	6	4	2	0

Given equation, x – y = 2

⇒ y = x – 2

When x = 0, then y = x – 2

⇒ y = 0 – 2

⇒ y = – 2

When x = 2, then y = x – 2

⇒ y = 2 – 2

⇒ y = 0

When x = 4, then y = x – 2

⇒ y = 4 – 2

⇒ y = 2

When x = 6, then y = 6 – 2

⇒ y = 6 – 2

⇒ y = 4

Thus we have the following table,

X	0	2	4	6
Y	– 2	0	2	4

From the graph, it is clear that x + y = 6 and x – y = 2 intersects at (4, 2)