

CBSE NCERT Solutions for Class 9 Mathematics Chapter 4

Back of Chapter Questions

Exercise: 4.1

1. The cost of a notebook is twice the cost of pen write a linear equation in two variables to represent this statement.

Solution:

Let the cost of a notebook be ₹ x and cost of pen be ₹ y

Given that cost of a notebook = $2 \times$ cost of a pen

$$\Rightarrow x = 2y$$

$$\Rightarrow x - 2y = 0$$

Hence, $x - 2y = 0$ is the representation of the given statement.

2. Express the following linear equations in the form $ax + by + c = 0$ and indicate the values of a , b and c in each case:

(i) $2x + 3y = 9.3\bar{5}$

(ii) $x - \frac{y}{5} - 10 = 0$

(iii) $-2x + 3y = 6$

(iv) $x = 3y$

(v) $2x = -5y$

(vi) $3x + 2 = 0$

(vii) $y - 2 = 0$

(viii) $5 = 2x$

Solution:

(i) $2x + 3y = 9.3\bar{5}$

$$\Rightarrow 2x + 3y - 9.3\bar{5} = 0$$

Comparing above equation with $ax + by + c = 0$.

We get, $a = 2, b = 3, c = -9.3\bar{5}$

(ii) $x - \frac{y}{5} - 10 = 0$

Comparing above equation with $ax + by + c = 0$.

We get, $a = 1, b = -\frac{1}{5}, c = -10$

(iii) $-2x + 3y = 6$

$$\Rightarrow -2x + 3y - 6 = 0$$

Comparing above equation with $ax + by + c = 0$.

We get, $a = -2, b = 3, c = -6$

(iv) $x = 3y$

$$\Rightarrow x - 3y + 0 = 0$$

Comparing above equation with $ax + by + c = 0$.

We get, $a = 1, b = -3, c = 0$

(v) $2x = -5y$

$$\Rightarrow 2x + 5y + 0 = 0$$

Comparing above equation with $ax + by + c = 0$.

We get, $a = 2, b = 5, c = 0$

(vi) $3x + 2 = 0$

$$\Rightarrow 3x + 0.y + 2 = 0$$

Comparing above equation with $ax + by + c = 0$.

We get, $a = 3, b = 0, c = 2$

(vii) $y - 2 = 0$

$$\Rightarrow 0.x + 1.y - 2 = 0$$

Comparing above equation with $ax + by + c = 0$.

We get, $a = 0, b = 1, c = -2$

(viii) $5 = 2x$

$$\Rightarrow -2x + 0.y + 5 = 0$$

Comparing above equation with $ax + by + c = 0$.

We get, $a = -2, b = 0, c = 5$

Exercise: 4.2

1. Which one of the following options is true, and why?

$y = 3x + 5$ has

(i) a unique solution

- (ii) only two solutions
- (iii) infinitely many solutions

Solution:

- (iii) is correct

$y = 3x + 5$ has infinitely many solutions

For every $x \in \mathbb{R}$, there exists a y .

Hence infinitely many solutions.

2. Write four solutions for each of the following equations

(i) $2x + y = 7$

(ii) $\pi x + y = 9$

(iii) $x = 4y$

Solution:

(i) $2x + y = 7$

$$y = 7 - 2x$$

For $x = 0$

$$\Rightarrow y = 7 - 2(0) = 7$$

$\therefore (0, 7)$ is a solution.

For $x = 1$

$$\Rightarrow y = 7 - 2(1) = 5$$

$\therefore (1, 5)$ is a solution.

For $x = 2$

$$\Rightarrow y = 7 - 2(2) = 3$$

$\therefore (2, 3)$ is a solution.

For $x = 3$

$$\Rightarrow y = 7 - 2(3) = 1$$

$\therefore (3, 1)$ is a solution.

(ii) $\pi x + y = 9$

$$\Rightarrow y = 9 - \pi x$$

For $x = \frac{1}{\pi}$

$$\Rightarrow y = 9 - \pi \cdot \frac{1}{\pi} = 8$$

$\therefore \left(\frac{1}{\pi}, 8\right)$ is a solution

For $x = \frac{2}{\pi}$

$$\Rightarrow y = 9 - \pi \cdot \frac{2}{\pi} = 7$$

$\therefore \left(\frac{2}{\pi}, 7\right)$ is a solution

For $x = \frac{3}{\pi}$

$$\Rightarrow y = 9 - \pi \cdot \frac{3}{\pi} = 6$$

$\therefore \left(\frac{3}{\pi}, 6\right)$ is a solution

For $x = 0$

$$\Rightarrow y = 9 - \pi(0) = 9$$

$\therefore (0, 9)$ is a solution

(iii) $x = 4y$

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

For $x = 0$

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

$\therefore (0, 0)$ is a solution

For $x = 4$

$$\Rightarrow y = \frac{4}{4} = 1$$

$\therefore (4, 1)$ is a solution

For $x = 8$

$$\Rightarrow y = \frac{8}{4} = 2$$

$\therefore (8, 2)$ is a solution

For $x = 12$

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

∴ (12, 3) is a solution

3. Check which of the following are solutions of the equation $x - 2y = 4$ and which are not

- (i) (0, 2)
- (ii) (2, 0)
- (iii) (4, 0)
- (iv) $(\sqrt{2}, 4\sqrt{2})$
- (v) (1, 1)

Solution:

- (i) L.H.S

Given point (0, 2)

$$x - 2y$$

$$\Rightarrow x - 2y = 0 - 2(2) = -4$$

$$\Rightarrow -4 \neq 4$$

∴ L.H.S \neq R.H.S

Hence, (0, 2) is not a solution of $x - 2y = 4$.

- (ii) L.H.S

Given point (2, 0)

$$x - 2y$$

$$\Rightarrow x - 2y = 2 - 2(0) = 2$$

$$\Rightarrow 2 \neq 4$$

∴ L.H.S \neq R.H.S

Hence, (2, 0) is not a solution of $x - 2y = 4$.

- (iii) L.H.S

$$x - 2y$$

Given point (4, 0)

$$\Rightarrow x - 2y = 4 - 2(0) = 4$$

$$\Rightarrow 4 = 4$$

$$\therefore \text{L.H.S} = \text{R.H.S}$$

Hence, $(4, 0)$ is a solution of $x - 2y = 4$.

(iv) L.H.S

$$x - 2y$$

Given point $(\sqrt{2}, 4\sqrt{2})$

$$\Rightarrow x - 2y = \sqrt{2} - 2 \cdot 4\sqrt{2} = -7\sqrt{2}$$

$$\Rightarrow -4 \neq 4$$

$$\therefore \text{L.H.S} \neq \text{R.H.S}$$

Hence, $(\sqrt{2}, 4\sqrt{2})$ is a solution of $x - 2y = 4$.

(v) L.H.S

$$x - 2y$$

Given point $(1, 1)$

$$\Rightarrow x - 2y = 1 - 2(1) = -1$$

$$\Rightarrow -1 \neq 4$$

$$\therefore \text{L.H.S} \neq \text{R.H.S}$$

Hence, $(1, 1)$ is not a solution of $x - 2y = 4$.

4. Find the value of k , if $x = 2, y = 10$ is a solution of the equation $2x + 3y = k$.

Solution:

Given that $(2, 1)$ is a solution of the equation $2x + 3y = k$

$$\Rightarrow 2(2) + 3(1) = k$$

$$\Rightarrow k = 4 + 3 = 7$$

Therefore, if $x = 2, y = 1$ is a solution of equation $2x + 3y = k$, then $k = 7$.

Exercise: 4.3

1. Draw the graph of each of the following linear equations in two variables:

(i) $x + y = 4$

(ii) $x - y = 2$

(iii) $y = 3x$

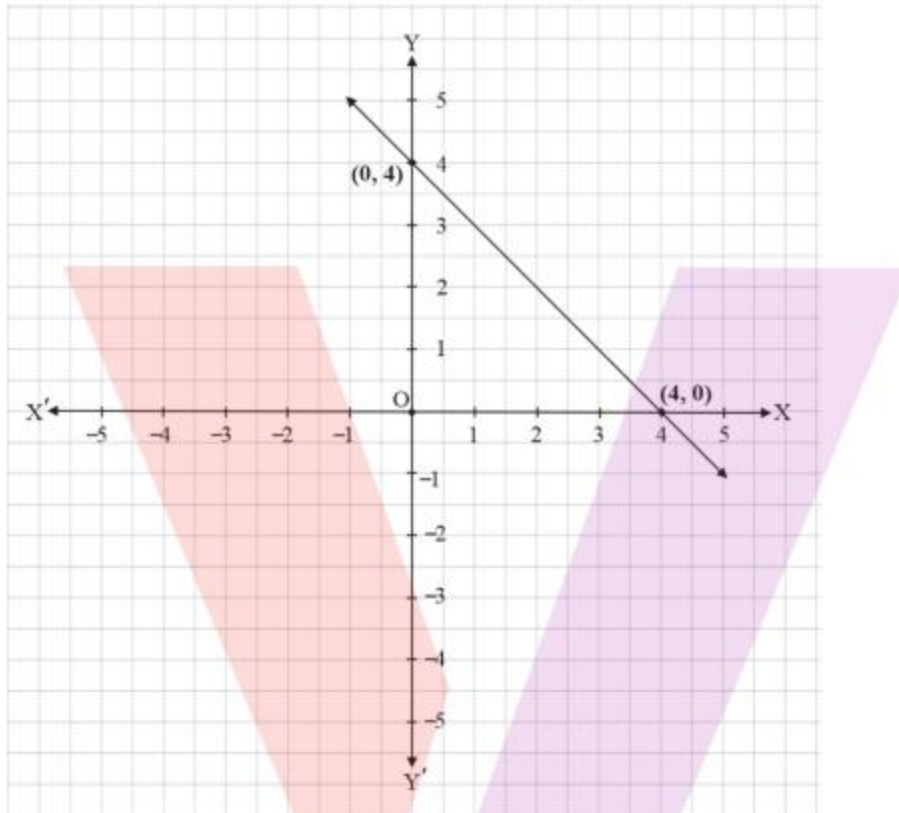
(iv) $3 = 2x + y$

Solution: Given equation, $x + y = 4$

$$\Rightarrow y = 4 - x$$

At $x = 0$ and $x = 4$ we get $y = 4$ and $y = 0$ respectively.

$\therefore (0, 4)$ and $(4, 0)$ are solutions of $x + y = 4$

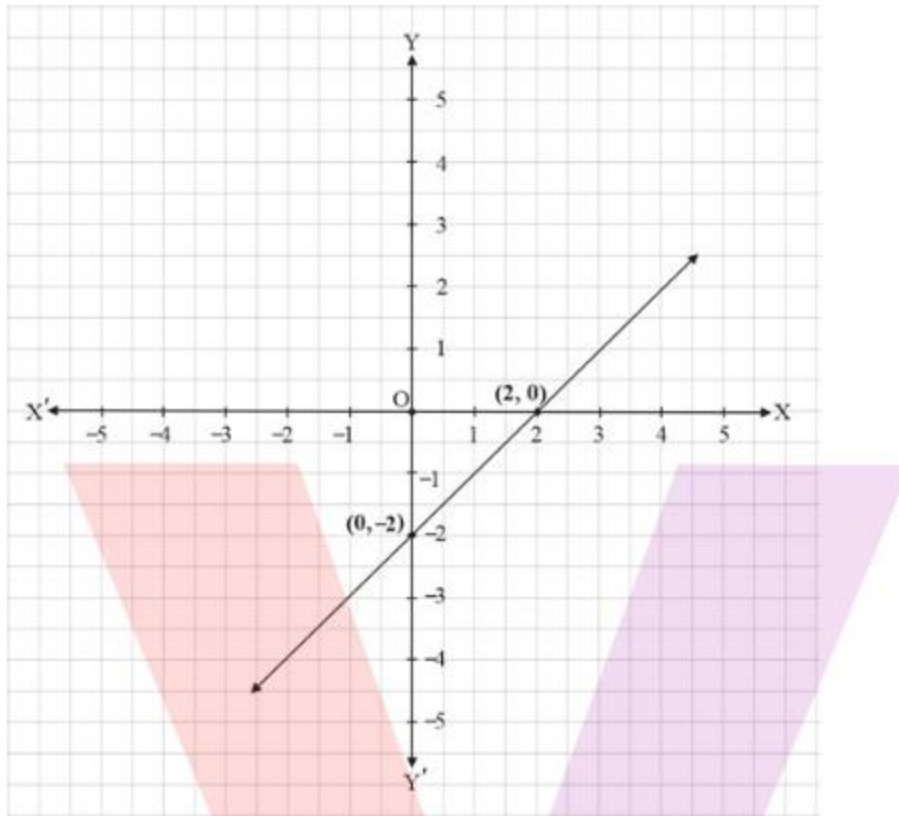


Given equation, $x - y = 2$

$$\Rightarrow x = y + 2$$

At $y = 0$ and $y = 2$ we get $x = 2$ and $x = 0$ respectively.

$\therefore (2, 0)$ and $(0, -2)$ are solutions of $x - y = 2$

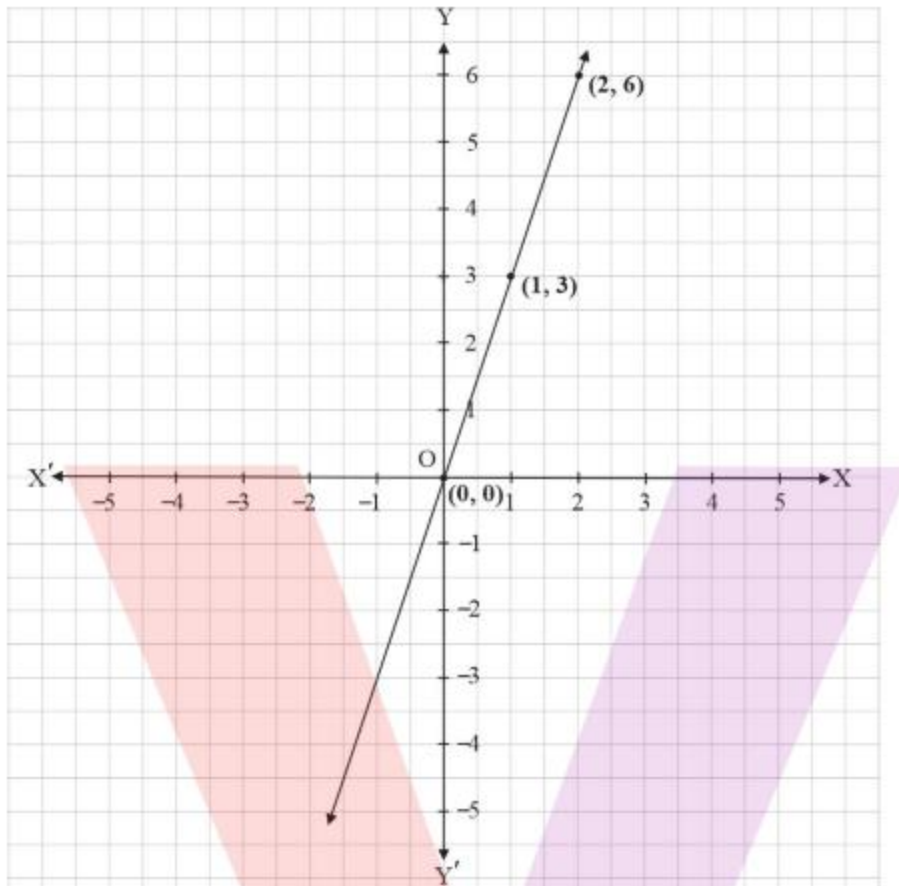


Given equation, $y = 3x$.

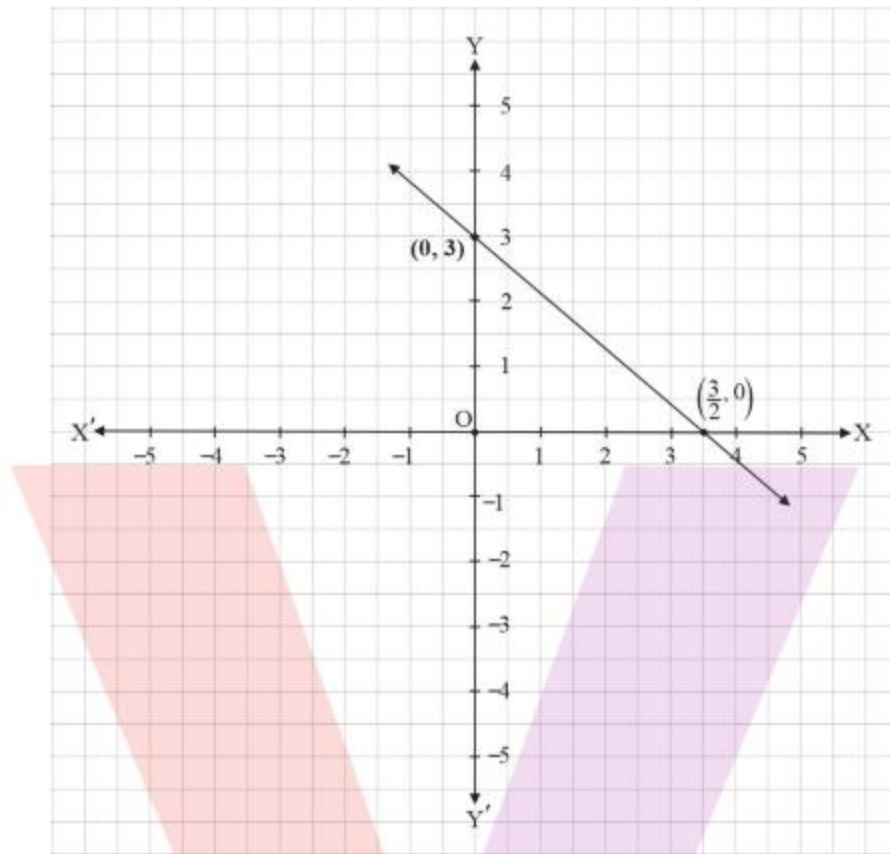
At $x = 0$ we get $y = 0$

Similarly, at $x = 1$ and $x = 2$ we get $y = 3$ and $y = 6$ respectively.

$\therefore (0, 0)$, $(1, 3)$ and $(2, 6)$ are the solutions of $y = 3x$.



- (iv) Given equation, $3 = 2x + y$.
 $\Rightarrow y = 3 - 2x$
At $x = 0$ and $x = \frac{3}{2}$ we get $y = 3$ and $y = 0$ respectively.
 $\therefore (0, 3)$ and $(\frac{3}{2}, 0)$ are solutions of $3 = 2x + y$.



2. Give the equations of two lines passing through $(2, 14)$. How many more such lines are there, and why?

Solution:

Given point $(2, 14)$

Let $x = 2$ and $y = 14$

We can write $14 = 7 \times 2$

$\Rightarrow y = 7x$ is a line passing through $(2, 14)$.

Similarly, $14 = 2 + 12$

$\Rightarrow y = x + 12$ is a line passing through $(2, 14)$.

$\therefore y = 7x$ and $y = x + 12$ are two lines passing through $(2, 14)$.

From above process we can say that there are different possible combinations of lines which passing through $(2, 14)$.

Therefore, from a given point $(2, 14)$, there are infinite lines passing through it.

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

Solution:

Given that point (3, 4) lies on graph of the equation $3y = ax + 7$

$$\Rightarrow 3(4) = a(3) + 7$$

$$\Rightarrow 12 = 3a + 7$$

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

Therefore, if (3, 4) is the solution of equation $3y = ax + 7$ then $a = \frac{5}{3}$

4. The taxi fare in a city is as follows: For the first kilometer, the fare is ₹ 8 and for the subsequent distance it is ₹ 5 per km. Taking the distance covered as x km and total fare as ₹ y . write a linear equation for this information and draw its graph.

Solution:

Given

Total distance covered = x km

Total fare = ₹ y

Fare for first km = ₹ 8

Fare for subsequent distance = ₹ 5

Total fare = Fare for first kilometer + Fare for rest of the distance.

$$\Rightarrow y = 8 + (x - 1)5$$

$$\Rightarrow y = 8 + 5x - 5$$

$$\Rightarrow y = 5x + 3$$

$$\Rightarrow 5x - y + 3 = 0$$

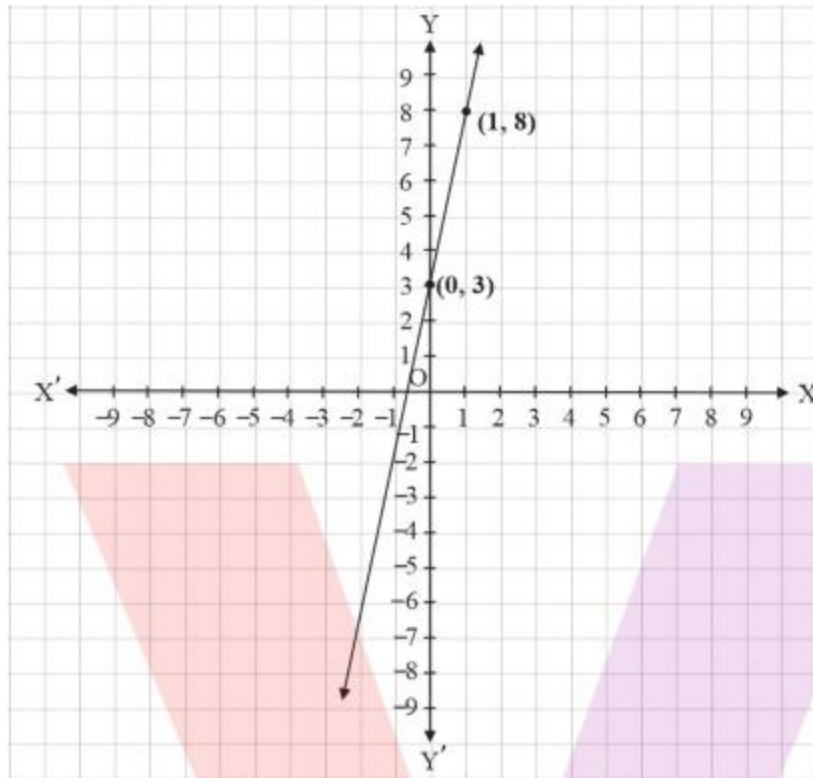
Therefore, $5x - y + 3 = 0$ is the linear equation for the given information.

Graph of $5x - y + 3 = 0$

$$\Rightarrow y = 3 + 5x$$

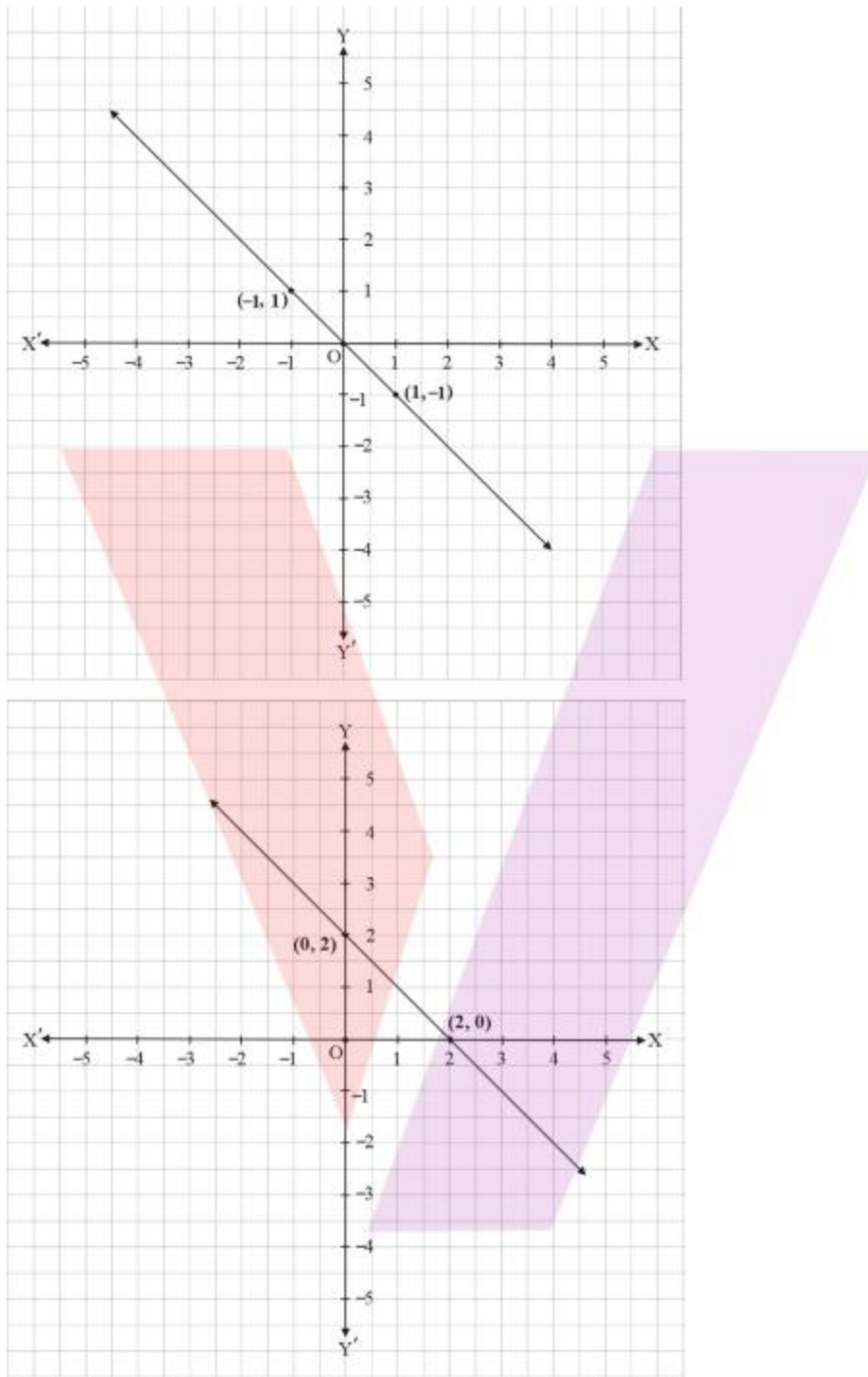
At $x = 0$ and $x = 1$ we get $y = 3$ and $y = 8$ respectively.

$\therefore (0, 3)$ and $(1, 8)$ are the solutions of $5x - y + 3 = 0$.



5. From the choices given below, choose the equation whose graphs are given below

(A)	(B)
(i) $y = x$	(i) $y = x + 2$
(ii) $y + x = 0$	(ii) $y = x - 2$
(iii) $y = 2x$	(iii) $y = -x + 2$
(iv) $2 + 3y = 7x$	(iv) $x + 2y = 5$



Solution:

(A) (ii) is correct

In given graph, $(0, 0)$, $(1, -1)$, $(-1, 1)$ are points. The equation satisfying all these points are $x + y = 0$.

(B) (iii) is correct

$(2,0), (0,2), (-1,1)$ lies on given graph.

The line equation which satisfies both these points are $x + y = 2$

$$y = -x + 2.$$

6. If the work done by a body on application of a constant force is directly proportional to the distance travelled by the body, express this in the form of an equation in two variables and draw the graph of the same by taking the constant force as 5 units. Also read from the graph the work done when the distance travelled by the body is

(i) 2 units

(ii) 0 units

Solution:

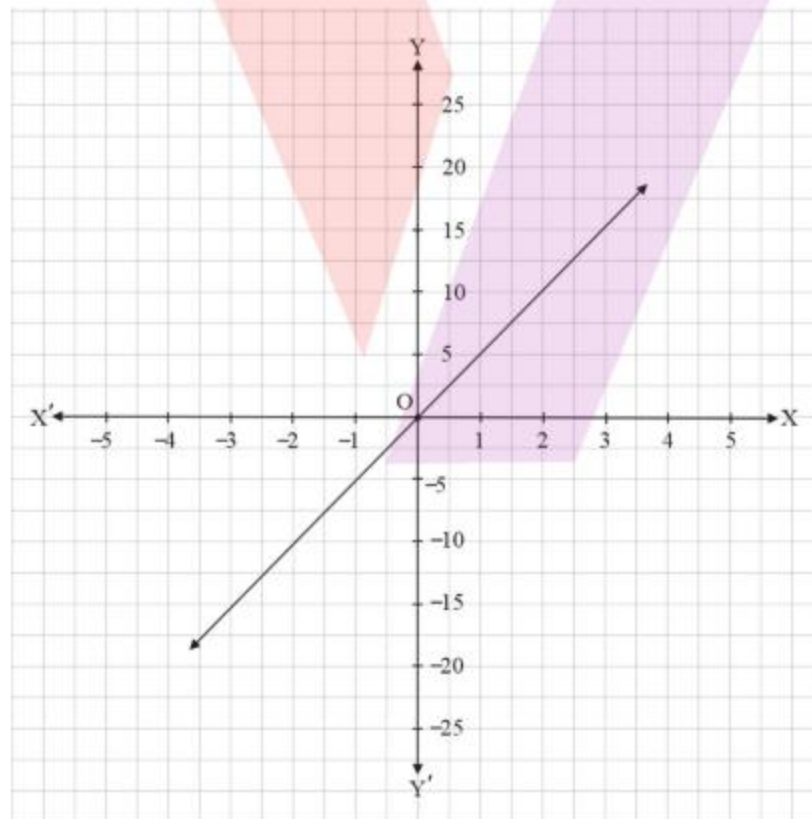
Let distance travelled be x km and work done be y units

Given that y directly proportional to x

$$y = kx, \text{ where } k \text{ is an arbitrary constant}$$

Given $k = 5$ units

$$y = 5x$$



- (i) From the graph, work done by the body, when distance travelled by it is 2 units, is 10 units.
- (ii) From the graph, work done by the body, is 0 units when distance travelled by it is 0 units.
7. Yamini and Fatima, two students of class IX of school, together contributed ₹ 100 towards the prime minister's relief fund to help the earthquake victims. Write a linear equation which satisfies this data.

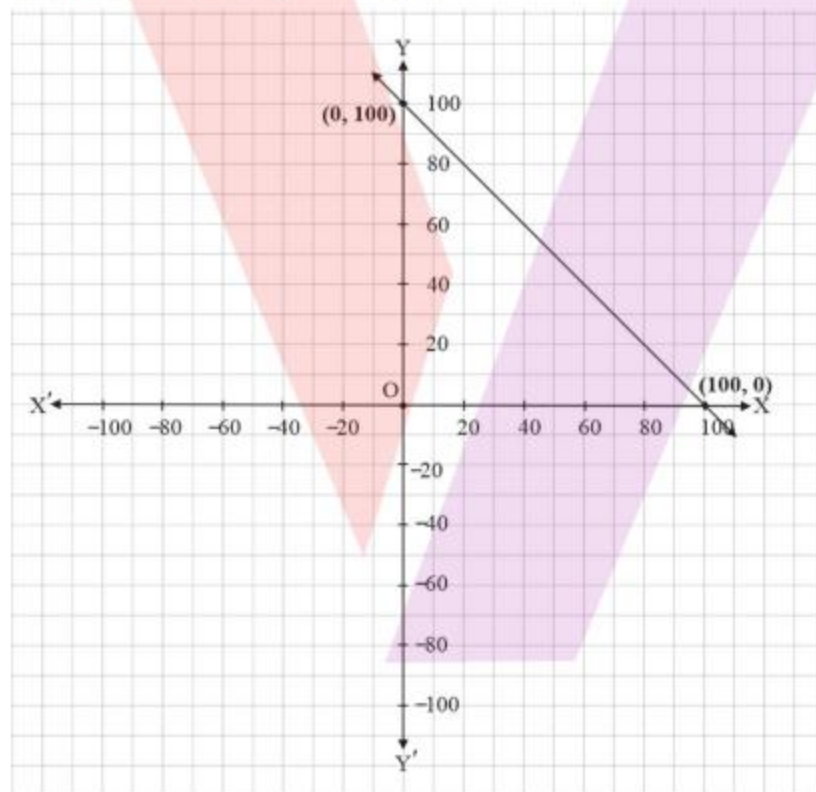
Solution:

Let Yamini contributed be ₹ x and Fatima contributed be ₹ y

$$x + y = 100$$

Graph:

$(0, 100)$ and $(100, 0)$ lies on graph



8. In countries like USA and Canada, temperature is measured in Fahrenheit, where in countries like India, it is measured in Celsius. Here is a linear equation that converts Fahrenheit to Celsius.

$$F = \left(\frac{9}{5}\right)C + 32$$

- (i) Draw the graph of the linear equation above using Celsius for x -axis and Fahrenheit for y -axis.

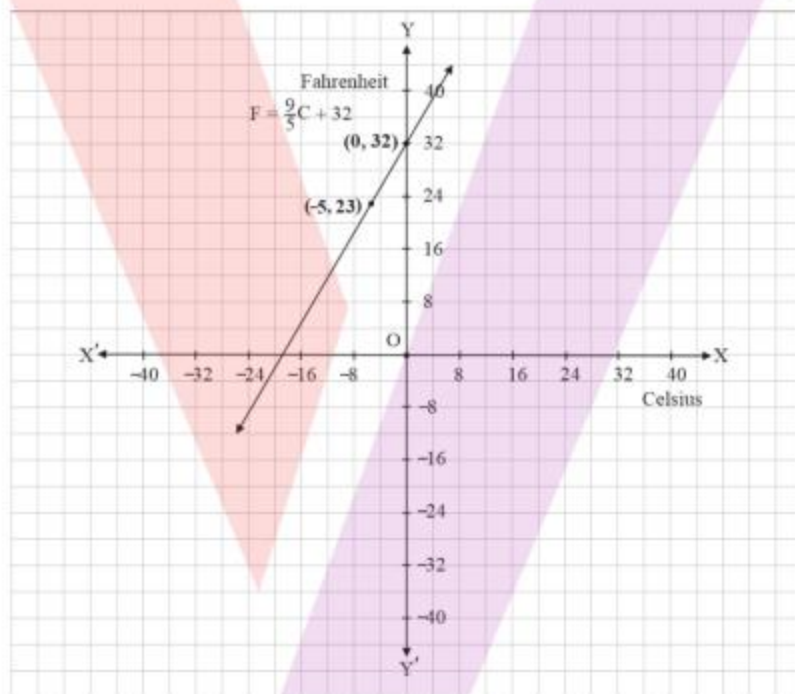
- (ii) If the temperature is 30°C , what is the temperature in Fahrenheit?
- (iii) If the temperature is 95°F , what is the temperature in Celsius?
- (iv) If the temperature is 0°C , what is the temperature in Fahrenheit and if the temperature is 0°F , what is the temperature in Celsius?
- (v) Is there a temperature which is numerically the same in both Fahrenheit and Celsius? If yes, find it.

Solution:

(i) Given equation is $F = \left(\frac{9}{5}\right)C + 32$

At $C = 0$ and $C = -5$ we get $F = 32$ and $F = 23$

So, $(0, 32)$ and $(-5, 23)$ are the solutions of equation $F = \left(\frac{9}{5}\right)C + 32$



(ii) Given temperature = 30°C

$$F = \left(\frac{9}{5}\right)30 + 32$$

$$\Rightarrow F = 54 + 32 = 86^{\circ}\text{F}$$

(iii) Given temperature = 95°F

$$\Rightarrow F = \left(\frac{9}{5}\right)30 + 32$$

$$\Rightarrow 95 = \left(\frac{9}{5}\right)C + 32$$

$$\Rightarrow \left(\frac{9}{5}\right)C = 63$$

$$\therefore C = 35^\circ$$

\therefore Temperature in Celsius = 35°C

(iv) (a) Given temperature = 0°C

$$F = \left(\frac{9}{5}\right)C + 32$$

$$= 0 + 32$$

$$= 32^\circ\text{F}$$

\therefore Temperature in Fahrenheit = 32°F at temperature = 0°C

(b) Given temperature = 0°F

$$F = \left(\frac{9}{5}\right)C + 32$$

$$0 = \left(\frac{9}{5}\right)C + 32$$

$$\Rightarrow C = \left(-\frac{160}{9}\right)^\circ\text{C}$$

\therefore Temperature in Celsius = $\left(-\frac{160}{9}\right)^\circ\text{C}$ at temperature = 0°F

(v) Yes, there is a temperature which is numerically the same in both Fahrenheit and Celsius.

$$F = \left(\frac{9}{5}\right)C + 32$$

$$\Rightarrow F = \left(\frac{9}{5}\right)F + 32$$

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

$$\Rightarrow F = -40^\circ\text{F}$$

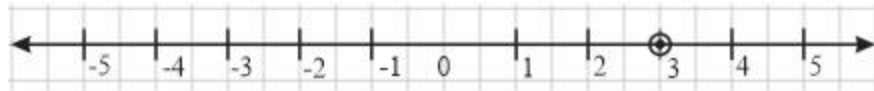
-40°F or -40°C is a temperature which is numerically the same in both Fahrenheit and Celsius.

Exercise: 4.4

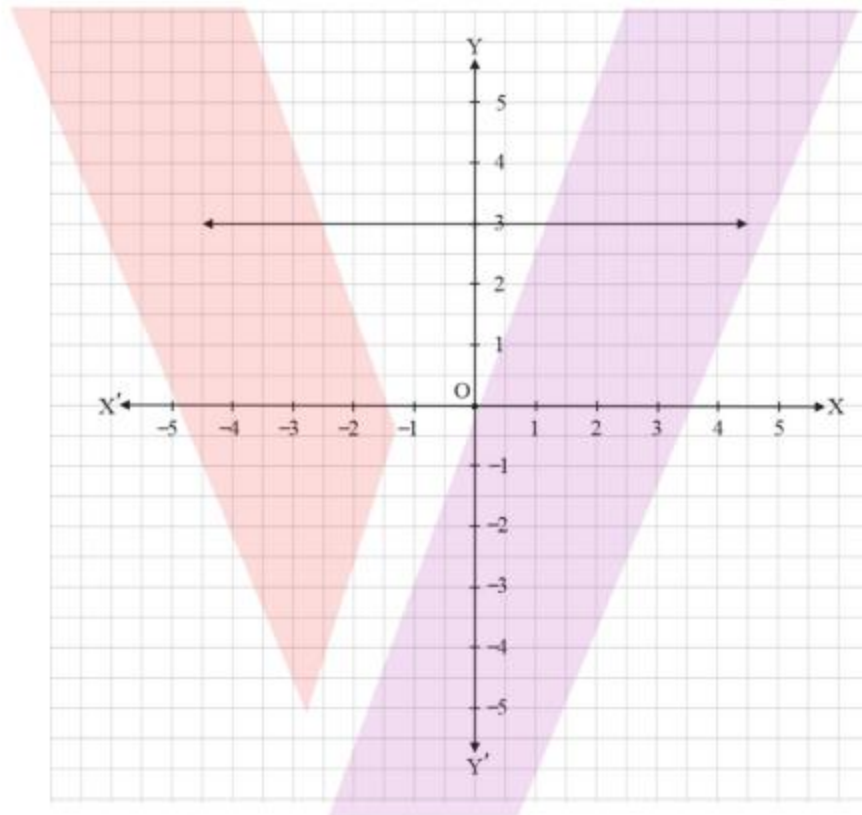
1. Give the geometric representation of $y = 3$ as an equation.
- (i) in one variable
 - (ii) in two variables.

Solution:

- (i) In one variable $y = 3$ represents as a point.



- (ii) In two variables, $y = 3$ represents as a line.

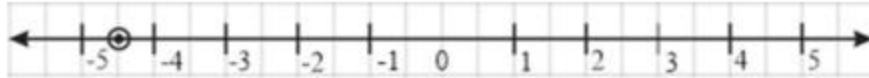


2. Give the geometric representations of $2x + 9 = 0$ as an equation
- (i) in one variable
 - (ii) in two variables

Solution:

- (i) $2x + 9 = 0$

$$x = -\frac{9}{2} = -4.5$$



(ii)

