

Exercise 13.1

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Question 1: 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) $-2x + 3y = 12$ (ii) $x - y/2 - 5 = 0$ (iii) $2x + 3y = 9.35$
(iv) $3x = -7y$ (v) $2x + 3 = 0$ (vi) $y - 5 = 0$
(vii) $4 = 3x$ (viii) $y = x/2$

Solution:

(i) Given equation, $-2x + 3y = 12$

$$\text{Or } -2x + 3y - 12 = 0$$

Comparing the given equation with $ax + by + c = 0$
We get, $a = -2$; $b = 3$; $c = -12$

(ii) Given equation, $x - y/2 - 5 = 0$

Comparing the given equation with $ax + by + c = 0$,

We get, $a = 1$; $b = -1/2$, $c = -5$

(iii) Given equation, $2x + 3y = 9.35$

$$\text{or } 2x + 3y - 9.35 = 0$$

Comparing the given equation with $ax + by + c = 0$

We get, $a = 2$; $b = 3$; $c = -9.35$

(iv) Given equation, $3x = -7y$

$$\text{or } 3x + 7y = 0$$

Comparing the given equation with $ax + by + c = 0$,

We get, $a = 3$; $b = 7$; $c = 0$

(v) Given equation, $2x + 3 = 0$
or $2x + 0y + 3 = 0$

Comparing the given equation with $ax + by + c = 0$,

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

(vi) Given equation, $y - 5 = 0$
or $0x + y - 5 = 0$

Comparing the given equation with $ax + by + c = 0$,

We get, $a = 0$; $b = 1$; $c = -5$

(vii) Given equation, $4 = 3x$

or $3x + 0y - 4 = 0$

Comparing the given equation with $ax + by + c = 0$,

We get, $a = 3$; $b = 0$; $c = -4$

(viii) Given equation, $y = x/2$

Or $x - 2y = 0$

Or $x - 2y + 0 = 0$

Comparing the given equation with $ax + by + c = 0$,

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

Question 2: Write each of the following as an equation in two variables:

(i) $2x = -3$ (ii) $y = 3$ (iii) $5x = 7/2$ (iv) $y = 3/2x$

Solution:

(i) Given equation, $2x = -3$

The above equation can be written in two variables as,

$2x + 0y + 3 = 0$

(ii) Given equation, $y = 3$

The above equation can be written in two variables as,

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

(iii) Given equation, $5x = 7/2$

The above equation can be written in two variables as,

$$5x + 0y - 7/2 = 0$$

$$\text{or } 10x + 0y - 7 = 0$$

(iv) Given equation, $y = 3/2 x$

The above equation can be written in two variables as,

$$2y = 3x$$

$$3x - 2y = 0$$

$$3x - 2y + 0 = 0$$

Question 3: The cost of ball pen is Rs 5 less than half of the cost of fountain pen. Write this statement as a linear equation in two variables.

Solution:

Let the cost of a fountain pen be y and cost of a ball pen be x .

According to the given statement,

$$x = y/2 - 5$$

$$\text{or } 2x = y - 10$$

$$\text{or } 2x - y + 10 = 0$$

Which is required linear equation.

Exercise 13.2

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Question 1: Write two solutions for each of the following equations:

(i) $3x + 4y = 7$

(ii) $x = 6y$

(iii) $x + \pi y = 4$

(iv) $2/3x - y = 4.$

Solution:

(i) $3x + 4y = 7$ (1)

Step 1: Isolate above equation in y.

Subtract $3x$ from both the sides,

$$3x + 4y - 3x = 7 - 3x$$

$$4y = 7 - 3x$$

Divide each side by 4

$$y = 1/4 \times (7 - 3x) \text{(2)}$$

Step 2: Find Solutions

Substituting $x = 1$ in (2)

$$y = 1/4 \times (7 - 3) = 1/4 \times 4 = 1$$

Thus $x = 1$ and $y = 1$ is the solution of $3x + 4y = 7$

Again, Substituting $x = 2$ in (2)

$$y = 1/4 \times (7 - 3 \times 2) = 1/4 \times 1 = 1/4$$

Thus $x = 2$ and $y = 1/4$ is the solution of $3x + 4y = 7$

Therefore, $(1, 1)$ and $(2, 1/4)$ are two solution of $3x + 4y = 7$.

(ii) Given: $x = 6y$

Substituting $x = 0$ in the given equation,

$$0 = 6y$$

$$\text{or } y = 0$$

Thus (0,0) is one solution

Again, substituting $x=6$

$$6 = 6y$$

$$\text{or } y = 1$$

Thus, (6, 1) is another solution.

Therefore, (0, 0) and (6, 1) are two solutions of $x = 6y$.

(iii) Given: $x + \pi y = 4$

$$\text{Substituting } x = 0 \Rightarrow 0 + \pi y = 4 \Rightarrow y = 4/\pi$$

$$\text{Substituting } y = 0 \Rightarrow x + 0 = 4 \Rightarrow x = 4$$

Therefore, (0, $4/\pi$) and (4, 0) are two solutions of $x + \pi y = 4$.

(iv) Given: $2/3 x - y = 4$

$$\text{Substituting } x = 0 \Rightarrow 0 - y = 4 \Rightarrow y = -4$$

$$\text{Substituting } x = 3 \Rightarrow 2/3 \times 3 - y = 4 \Rightarrow 2 - y = 4 \Rightarrow y = -2$$

Therefore, (0, -4) and (3, -2) are two solutions of $2/3 x - y = 4$.

Question 2: Write two solutions of the form $x = 0$, $y = a$ and $x = b$, $y = 0$ for each of the following equations :

(i) $5x - 2y = 10$

(ii) $-4x + 3y = 12$

(iii) $2x + 3y = 24$

Solution:

(i) Given: $5x - 2y = 10$

Substituting $x = 0 \Rightarrow 5 \times 0 - 2y = 10 \Rightarrow -2y = 10 \Rightarrow -y = 10/2 \Rightarrow y = -5$

Thus $x = 0$ and $y = -5$ is the solution of $5x - 2y = 10$

Substituting $y = 0 \Rightarrow 5x - 2 \times 0 = 10 \Rightarrow 5x = 10 \Rightarrow x = 2$

Thus $x = 2$ and $y = 0$ is a solution of $5x - 2y = 10$

(ii) Given, $-4x + 3y = 12$

Substituting $x = 0 \Rightarrow -4 \times 0 + 3y = 12 \Rightarrow 3y = 12 \Rightarrow y = 4$

Thus $x = 0$ and $y = 4$ is a solution of the $-4x + 3y = 12$

Substituting $y = 0 \Rightarrow -4x + 3 \times 0 = 12 \Rightarrow -4x = 12 \Rightarrow x = -3$

Thus $x = -3$ and $y = 0$ is a solution of $-4x + 3y = 12$

(iii) Given, $2x + 3y = 24$

Substituting $x = 0 \Rightarrow 2 \times 0 + 3y = 24 \Rightarrow 3y = 24 \Rightarrow y = 8$

Thus $x = 0$ and $y = 8$ is a solution of $2x + 3y = 24$

Substituting $y = 0 \Rightarrow 2x + 3 \times 0 = 24 \Rightarrow 2x = 24 \Rightarrow x = 12$

Thus $x = 12$ and $y = 0$ is a solution of $2x + 3y = 24$

Question 3: Check which of the following are solutions of the equation $2x - y = 6$ and which are not:

(i) $(3, 0)$

(ii) $(0, 6)$

(iii) $(2, -2)$

(iv) $(\sqrt{3}, 0)$

(v) $(1/2, -5)$

Solution:

(i) Check for (3, 0)

Put $x = 3$ and $y = 0$ in equation $2x - y = 6$

$$2(3) - (0) = 6$$

$$6 = 6$$

True statement.

$\Rightarrow (3, 0)$ is a solution of $2x - y = 6$.

(ii) Check for (0, 6)

Put $x = 0$ and $y = 6$ in $2x - y = 6$

$$2 \times 0 - 6 = 6$$

$$-6 = 6$$

False statement.

$\Rightarrow (0, 6)$ is not a solution of $2x - y = 6$.

(iii) Check for (2, -2)

Put $x = 2$ and $y = -2$ in $2x - y = 6$

$$2 \times 2 - (-2) = 6$$

$$4 + 2 = 6$$

$$6 = 6$$

True statement.

$\Rightarrow (2, -2)$ is a solution of $2x - y = 6$.

(iv) Check for ($\sqrt{3}$, 0)

Put $x = \sqrt{3}$ and $y = 0$ in $2x - y = 6$

$$2 \times \sqrt{3} - 0 = 6$$

$$2\sqrt{3} = 6$$

False statement.

$\Rightarrow (\sqrt{3}, 0)$ is not a solution of $2x - y = 6$.

(v) Check for ($1/2$, -5)

Put $x = 1/2$ and $y = -5$ in $2x - y = 6$

$$2 \times (1/2) - (-5) = 6$$

$$1 + 5 = 6$$

$$6 = 6$$

True statement.

$\Rightarrow (1/2, -5)$ is a solution of $2x - y = 6$.

Question 4: If $x = -1$, $y = 2$ is a solution of the equation $3x + 4y = k$, find the value of k .

Solution:

Given, $3x + 4y = k$

$(-1, 2)$ is the solution of $3x + 4y = k$, so it satisfies the equation.

Substituting $x = -1$ and $y = 2$ in $3x + 4y = k$, we get

$$3(-1) + 4(2) = k$$

$$-3 + 8 = k$$

$$k = 5$$

The value of k is 5.

Question 5: Find the value of λ , if $x = -\lambda$ and $y = 5/2$ is a solution of the equation $x + 4y - 7 = 0$

Solution:

Given, $(-\lambda, 5/2)$ is a solution of equation $3x + 4y = k$

Substituting $x = -\lambda$ and $y = 5/2$ in $x + 4y - 7 = 0$, we get

$$-\lambda + 4(5/2) - 7 = 0$$

$$-\lambda + 10 - 7 = 0$$

$$\lambda = 3$$

Question 6: If $x = 2\alpha + 1$ and $y = \alpha - 1$ is a solution of the equation $2x - 3y + 5 = 0$, find the value of α .

Solution:

Given, $(2\alpha + 1, \alpha - 1)$ is the solution of equation $2x - 3y + 5 = 0$.

Substituting $x = 2\alpha + 1$ and $y = \alpha - 1$ in $2x - 3y + 5 = 0$, we get

$$2(2\alpha + 1) - 3(\alpha - 1) + 5 = 0$$

$$4\alpha + 2 - 3\alpha + 3 + 5 = 0$$

$$\alpha + 10 = 0$$

$$\alpha = -10$$

The value of α is -10.

Question 7: If $x = 1$ and $y = 6$ is a solution of the equation $8x - ay + a^2 = 0$, find the values of a .

Solution:

Given, $(1, 6)$ is a solution of equation $8x - ay + a^2 = 0$

Substituting $x = 1$ and $y = 6$ in $8x - ay + a^2 = 0$, we get

$$8 \times 1 - a \times 6 + a^2 = 0$$

$$\Rightarrow a^2 - 6a + 8 = 0 \text{ (quadratic equation)}$$

Using quadratic factorization

$$a^2 - 4a - 2a + 8 = 0$$

$$a(a - 4) - 2(a - 4) = 0$$

$$(a - 2)(a - 4) = 0$$

$$a = 2, 4$$

Values of a are 2 and 4.

Exercise 13.3

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

- (i) $x + y = 4$ (ii) $x - y = 2$ (iii) $-x + y = 6$
(iv) $y = 2x$ (v) $3x + 5y = 15$ (vi) $x/2 - y/3 = 2$
(vii) $(x-2)/3 = y - 3$ (viii) $2y = -x + 1$

Solution:

(i) Given : $x + y = 4$

or $y = 4 - x$,

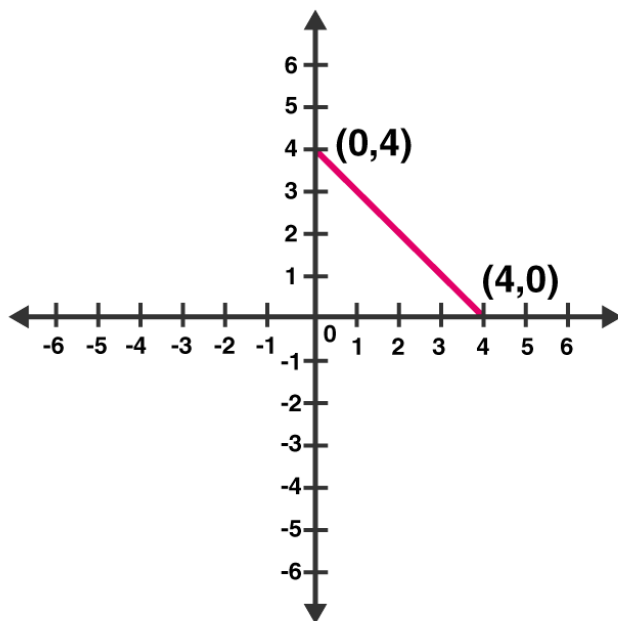
Find values of x and y :

Putting $x = 0 \Rightarrow y = 4$

Putting $x = 4 \Rightarrow y = 0$

Graph:

Mark points $(0, 4)$ and $(4, 0)$ on the graph and join them.



(ii) Given: $x - y = 2$

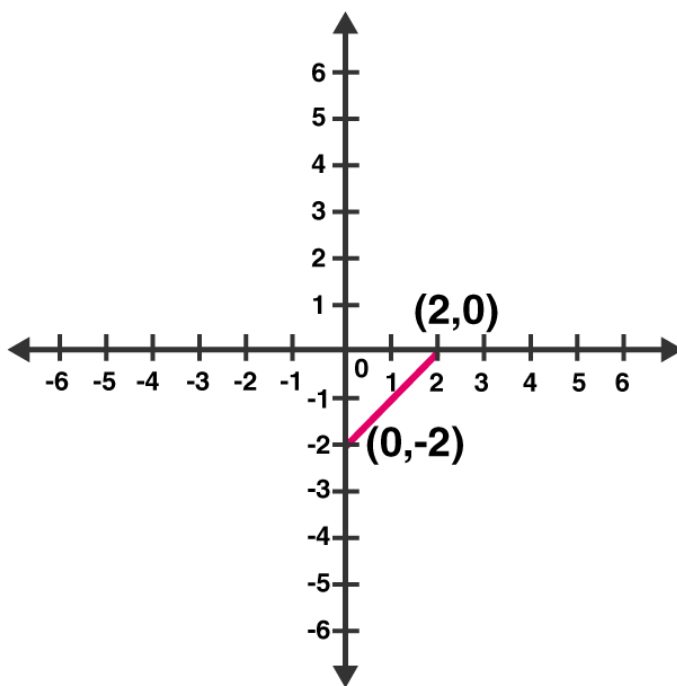
So, $y = x - 2$

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

Putting $x = 2 \Rightarrow y = 0$

Graph:

Mark points $(0, -2)$ and $(2, 0)$ on the graph and join them.



(iii) Given: $-x + y = 6$

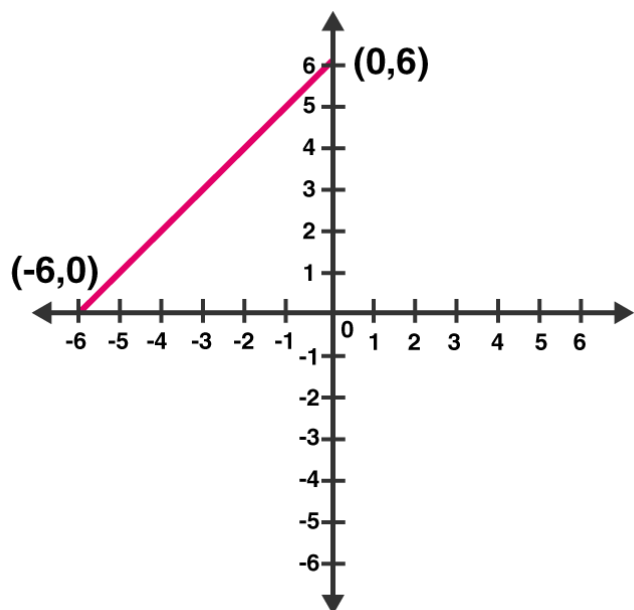
So, $y = 6 + x$

Putting $x = 0 \Rightarrow y = 6$

Putting $x = -6 \Rightarrow y = 0$

Graph:

Mark points $(0, 6)$ and $(-6, 0)$ on the graph and join them.



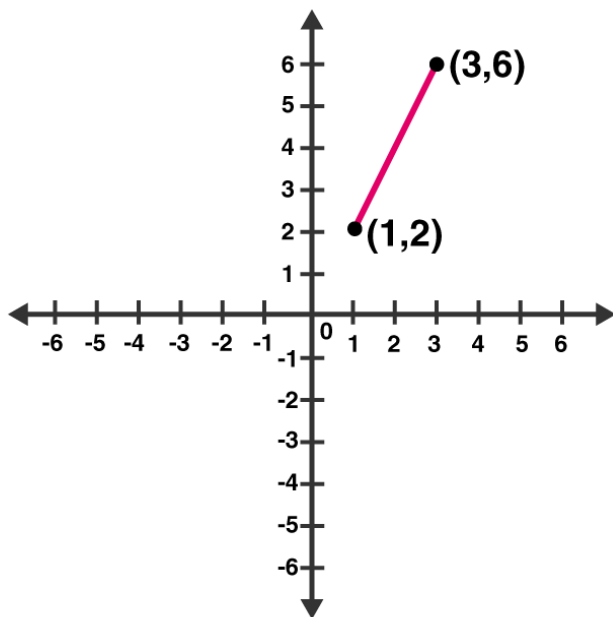
(iv) Given: $y = 2x$

Put $x = 1 \Rightarrow y = 2$

Put $x = 3 \Rightarrow y = 6$

Graph:

Mark points (1, 2) and (3, 6) on the graph and join them.



(v) Given: $3x + 5y = 15$

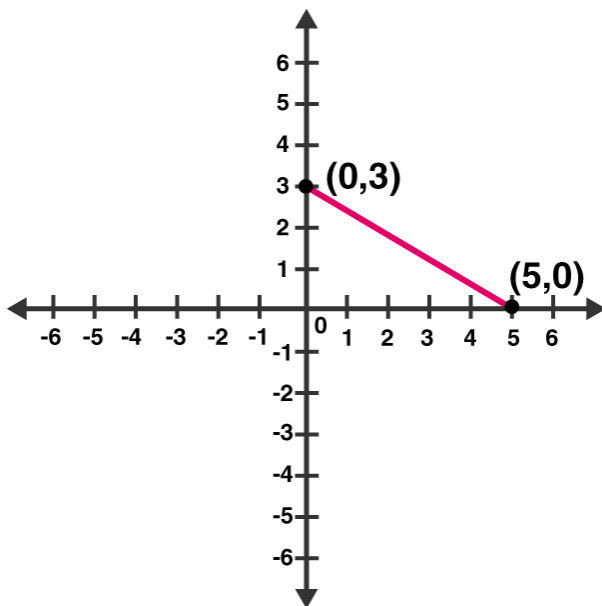
Or $5y = 15 - 3x$

Putting $x = 0 \Rightarrow 5y = 15 \Rightarrow y = 3$

Putting $x = 5 \Rightarrow 5y = 0 \Rightarrow y = 0$

Graph:

Mark points $(0, 3)$ and $(5, 0)$ on the graph and join them.



(vi) Given: $x/2 - y/3 = 2$

$$3x - 2y = 12$$

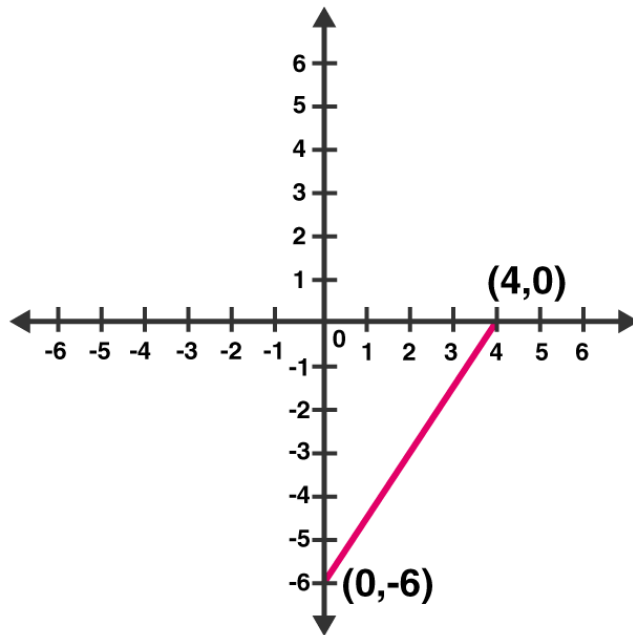
$$y = (3x - 12)/2$$

Putting $x = 0 \Rightarrow y = -6$

Putting $x = 4 \Rightarrow y = 0$

Graph:

Mark points $(0, -6)$ and $(4, 0)$ on the graph and join them.



(vii) Given: $(x - 2)/3 = y - 3$

$$x - 2 = 3(y - 3)$$

$$x - 2 = 3y - 9$$

$$x = 3y - 7$$

Now, put $x = 5$ in $x = 3y - 7$

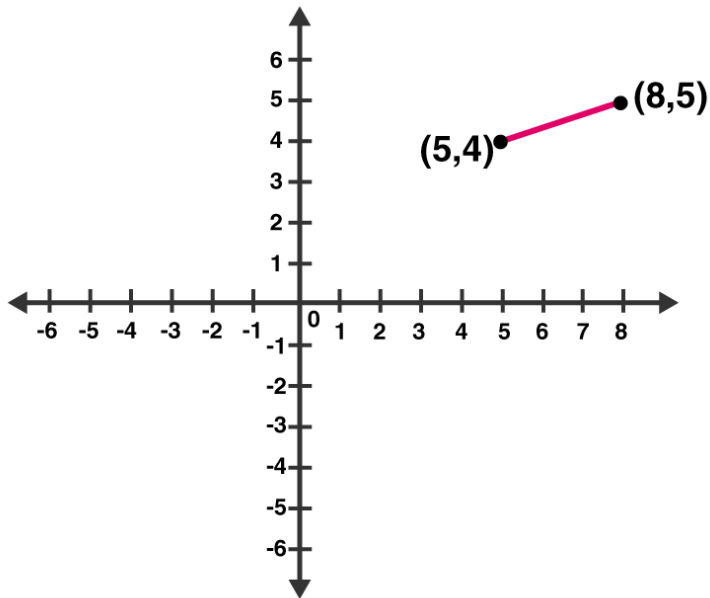
$$y = 4$$

Putting $x = 8$ in $x = 3y - 7$,

$$y = 5$$

Graph:

Mark points (5, 4) and (8, 5) on the graph and join them.



(viii) Given: $2y = -x + 1$

$$2y = 1 - x$$

Now, putting $x = 1$ in $2y = 1 - x$, we get;

$$y = 0$$

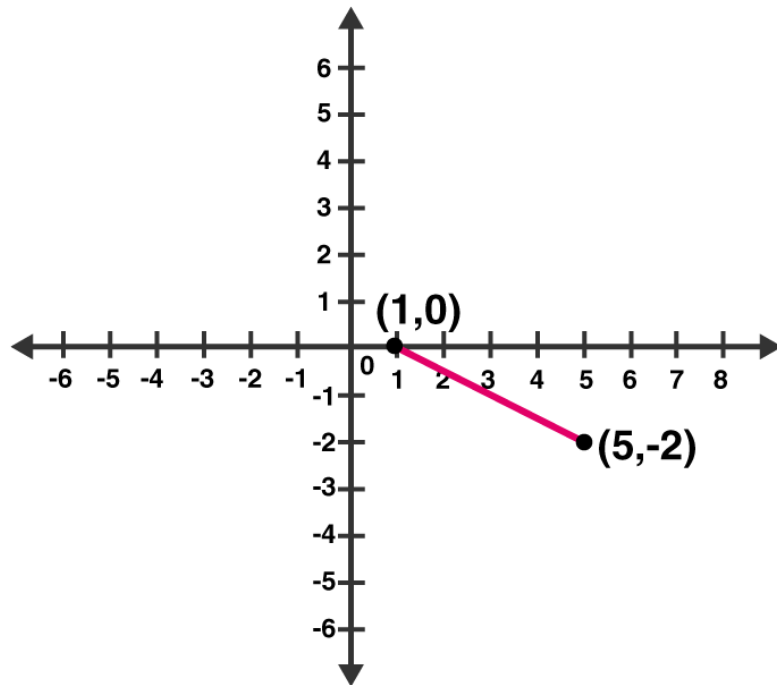
Again, putting $x = 5$ in $2y = 1 - x$, we get;

$$y = -2$$

Graph:

Mark points $(1, 0)$ and $(5, -2)$ on the graph and join them.

RD Sharma Solutions for Class 9 Maths Chapter 13 Linear Equations in Two Variables



Question 2: Give the equations of two lines passing through (3, 12). How many more such lines are there, and why?

Solution:

Since $a = 3$ and $b = 12$ is the solution of required equations. So we have to find the set of any two equations which satisfy this point.

Consider $4a - b = 0$ and $3a - b + 3 = 0$ set of lines which are passing through (3, 12).

We know, infinite lines can be pass through a point.

So, there are infinite lines passing through (3, 12).

Question 3: A three-wheeler scooter charges Rs 15 for first kilometer and Rs 8 each for every subsequent kilometer. For a distance of x km, an amount of Rs y is paid. Write the linear equation representing the above information.

Solution:

Let, total fare for covering the distance of ' x ' km is given by Rs y

As per the given statement;

$$y = 15 + 8(x - 1)$$

$$y = 15 + 8x - 8$$

$$y = 8x + 7$$

Above equation represents the linear equation for the given information.

Question 4: A lending library has a fixed charge for the first three days and an additional charge for each day thereafter. Aarushi paid Rs 27 for a book kept for seven days. If fixed charges are Rs x and per day charges are Rs y . Write the linear equation representing the above information.

Solution:

Aarushi paid Rs 27, of which Rs. x for the first three days and Rs. y per day for 4 more days is given by

$$x + (7 - 3)y = 27$$

$$x + 4y = 27$$

Above equation represents the linear equation for the given information.

Question 5: A number is 27 more than the number obtained by reversing its digits. If its unit's and ten's digit are x and y respectively, write the linear equation representing the statement.

Solution:

Given: The original number is 27 more than the number obtained by reversing its digits

The given number is in the form of $10y + x$.

Number produced by reversing the digits of the number is $10x + y$.

As per statement:

$$10y + x = 10x + y + 27$$

$$10y - y + x - 10x = 27$$

$$9y - 9x = 27$$

$$9(y - x) = 27$$

$$y - x = 3$$

$$x - y + 3 = 0$$

Above equation represents the required linear equation.

Question 6: The Sum of a two digit number and the number obtained by reversing the order of its digits is 121. If units and ten's digit of the number are x and y respectively, then write the linear equation representing the above statement.

Solution:

As per the statement given, the number is $10y + x$.

On reversing the digits of the number, we get, $10x + y$

Sum of the two numbers is 121. (Given)

$$10y + x + 10x + y = 121$$

$$11x + 11y = 121$$

$$x + y = 11$$

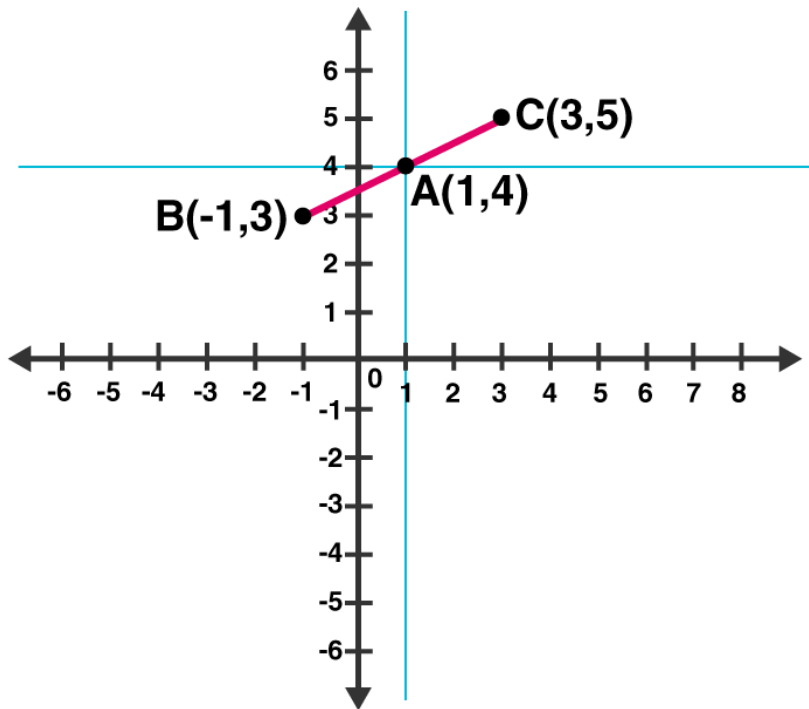
Which represents the required linear equation.

Question 7: Plot the Points (3, 5) and (-1, 3) on a graph paper and verify that the straight line passing through the points, also passes through the point (1, 4).

Solution:

Plot points (3, 5), (-1, 3) and (1, 4) on a graph.

Let A(1, 4), B(3, 5) and C(-1, 3)

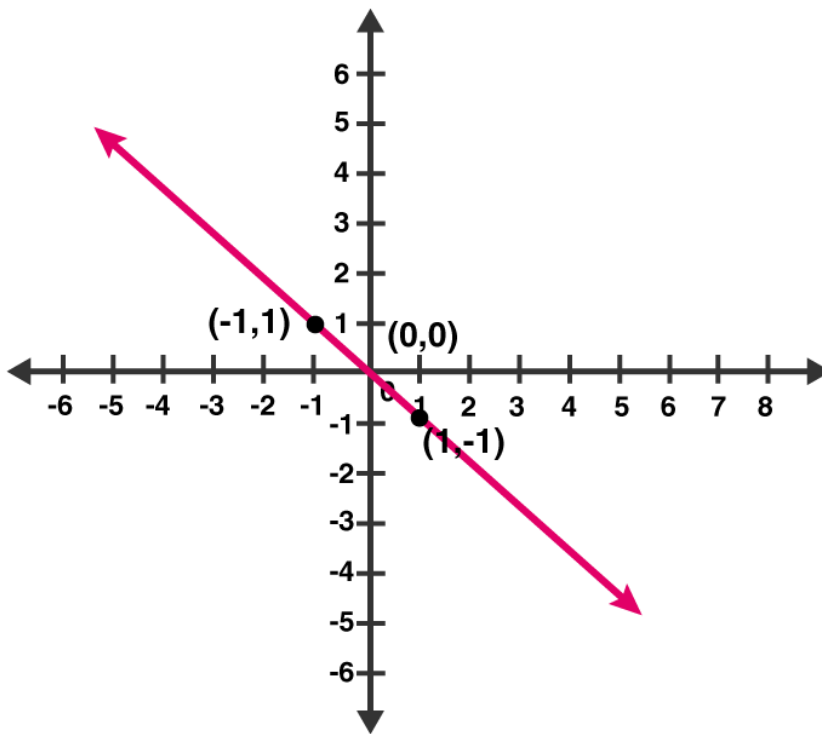


From above graph, we can see that, Point A (1, 4) is already plotted on the graph, and a point of intersection of two intersecting lines.

Hence, it is proved that the straight line passing through (3, 5) and (-1, 3) and also passes through A (1, 4).

Question 8: From the choices given below, choose the equations whose graph is given in figure.

(i) $y = x$ (ii) $x + y = 0$ (iii) $y = 2x$ (iv) $2 + 3y = 7x$

**Solution:**

From graph, co-ordinates (1, -1) and (-1, 1) are solutions of one of the equations.

We will put the value of all the co-ordinates in each equation and check which equation satisfy them.

(i) $y = x$

Put $x = 1$ and $y = -1$,

Thus, $1 \neq -1$

L.H.S \neq R.H.S

Putting $x = -1$ and $y = 1$,

$-1 \neq 1$

L.H.S \neq R.H.S

Therefore, $y = x$ does not represent the graph in the given figure.

(ii) $x + y = 0$

Putting $x = 1$ and $y = -1$,

$$\Rightarrow 1 + (-1) = 0$$

$$\Rightarrow 0 = 0$$

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

Putting $x = -1$ and $y = 1$,

$$(-1) + 1 = 0$$

$$0 = 0$$

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

Thus, the given solutions satisfy this equation.

(iii) $y = 2x$

Putting $x = 1$ and $y = -1$

$$-1 = 2 \text{ (Not True)}$$

Putting $x = -1$ and $y = 1$

$$1 = -2 \text{ (Not True)}$$

Thus, the given solutions does not satisfy this equation.

(iv) $2 + 3y = 7x$

Putting $x = 1$ and $y = -1$

$$2 - 3 = 7$$

$$-1 = 7 \text{ (Not true)}$$

Putting $x = -1$ and $y = 1$

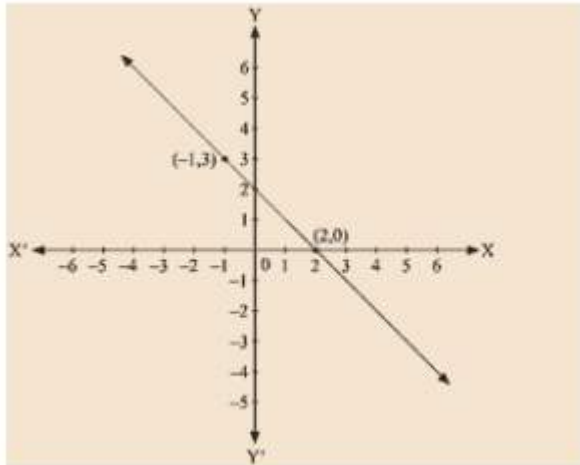
$$2 + 3 = -7$$

$$5 = -7 \text{ (Not True)}$$

Thus, the given solutions does not satisfy this equation.

Question 9: From the choices given below, choose the equation whose graph is given fig:

(i) $y = x + 2$ (ii) $y = x - 2$ (iii) $y = -x + 2$ (iv) $x + 2y = 6$



Solution:

Given: $(-1, 3)$ and $(2, 0)$ are the solution of one of the following given equations.
Check which equation satisfy both the points.

(i) $y = x + 2$

Putting, $x = -1$ and $y = 3$

$$3 \neq -1 + 2$$

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

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

$$0 \neq 4$$

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

Thus, this solution does not satisfy the given equation.

(ii) $y = x - 2$

Putting, $x = -1$ and $y = 3$

$$3 \neq -1 - 2$$

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

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

$$0 = 0$$

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

Thus, the given solutions does not satisfy this equation completely.

(iii) $y = -x + 2$

Putting, $x = -1$ and $y = 3$

$$3 = -(-1) + 2$$

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

Putting $x = 2$ and $y = 0$

$$0 = -2 + 2$$

$$0 = 0$$

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

Therefore, $(0, 2)$ and $(-1, 3)$ satisfy this equation.

Hence, this is the graph for equation $y = -x + 2$.

Question 10 : If the point $(2, -2)$ lies on the graph of linear equation, $5x + ky = 4$, find the value of k .

Solution:

Point $(2, -2)$ lies on the given linear equation, which implies $(2, -2)$ satisfy this equation $5x + ky = 4$.

Now, putting $x = 2$ and $y = -2$ in $5x + ky = 4$

$$5 \times 2 + (-2)k = 4$$

$$10 - 2k = 4$$

$$2k = 10 - 4$$

$$2k = 6$$

$$k = 6/2 = 3$$

The value of k is 3.

Exercise 13.4

Page No: 13.32

Question 1: Give the geometric representations of the following equations

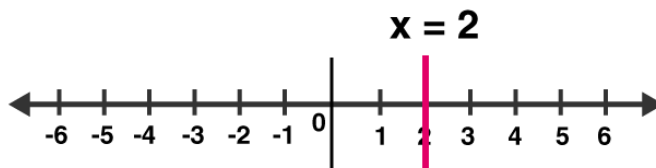
(a) on the number line (b) on the Cartesian plane:

(i) $x = 2$ (ii) $y + 3 = 0$ (iii) $y = 3$ (iv) $2x + 9 = 0$ (v) $3x - 5 = 0$

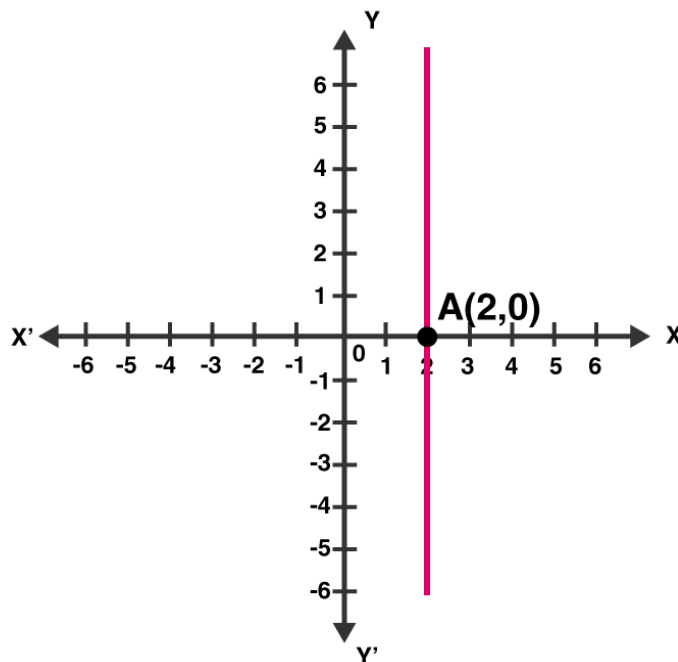
Solution:

(i) $x = 2$

The representation of equation on the number line:



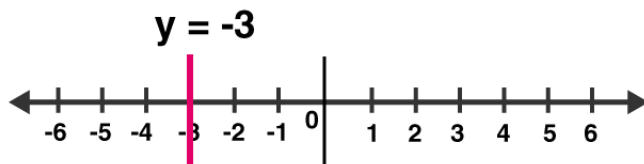
The representation of equation on the Cartesian plane:



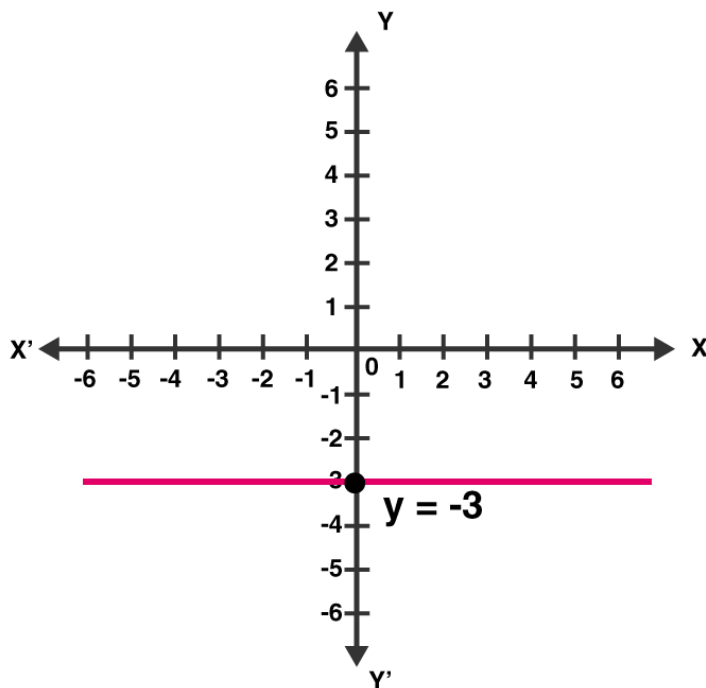
(ii) $y + 3 = 0$

or $y = -3$

The representation of equation on the number line:

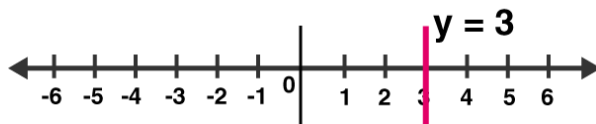


The representation of equation on the Cartesian plane:



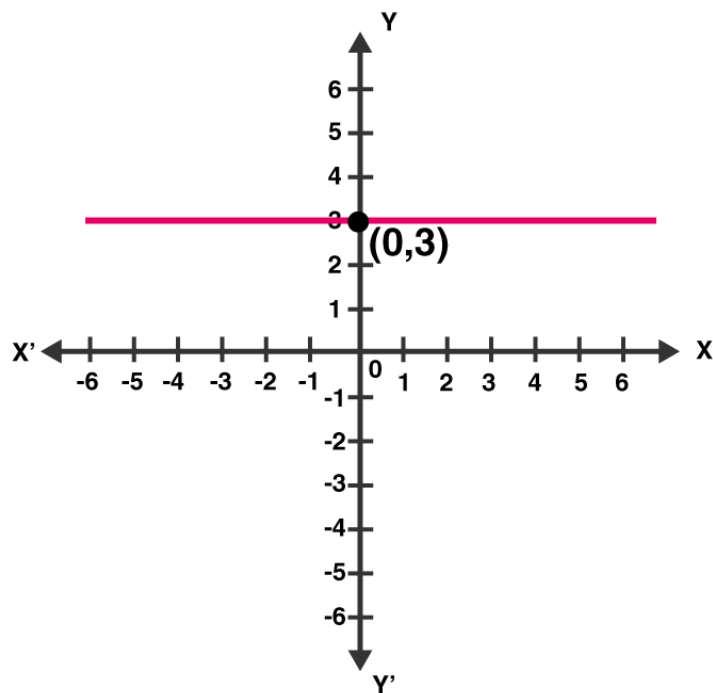
(iii) $y = 3$

The representation of equation on the number line:



The representation of equation on the Cartesian plane:

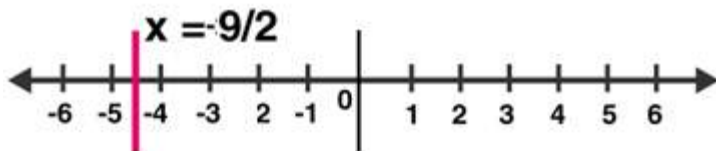
RD Sharma Solutions for Class 9 Maths Chapter 13 Linear Equations in Two Variables



(iv) $2x + 9 = 0$

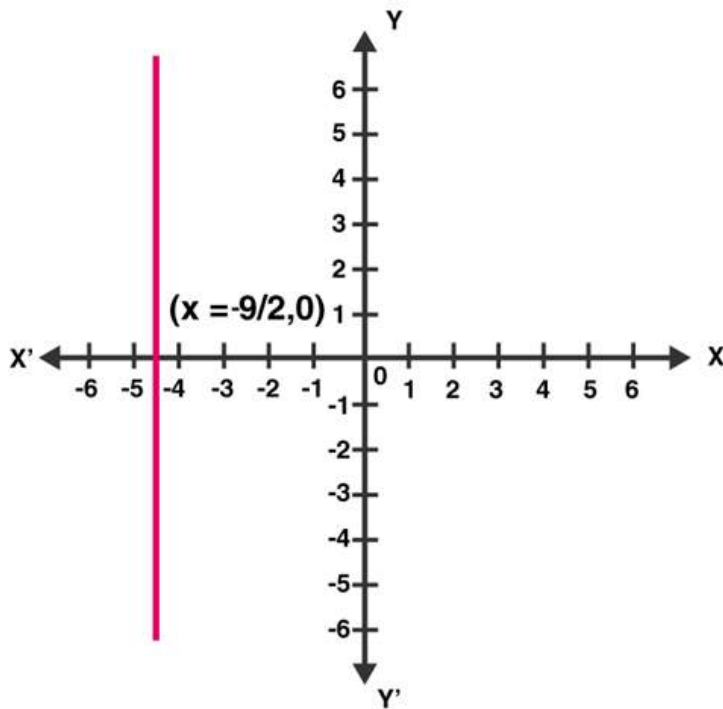
or $x = -9/2$

The representation of equation on the number line:



The representation of equation on the Cartesian plane:

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(v) $3x - 5 = 0$

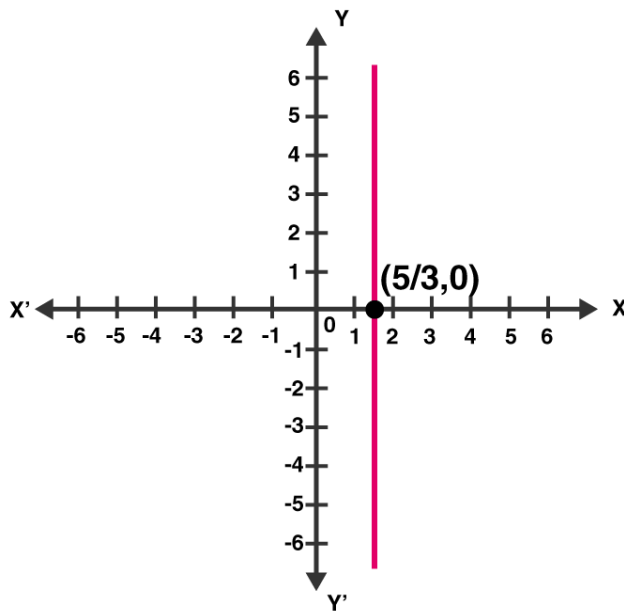
or $x = 5/3$

The representation of equation on the number line:



The representation of equation on the Cartesian plane:

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Question 2 : Give the geometrical representation of $2x + 13 = 0$ as an equation in

(i) one variable (ii) two variables

Solution:

$$2x + 13 = 0$$

(i) Isolate given equation in x

Subtract 13 from both the sides

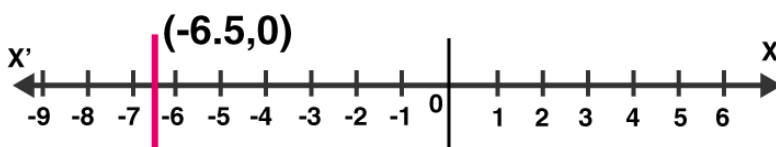
$$2x + 13 - 13 = 0 - 13$$

$$2x = -13$$

Divide each side by 2

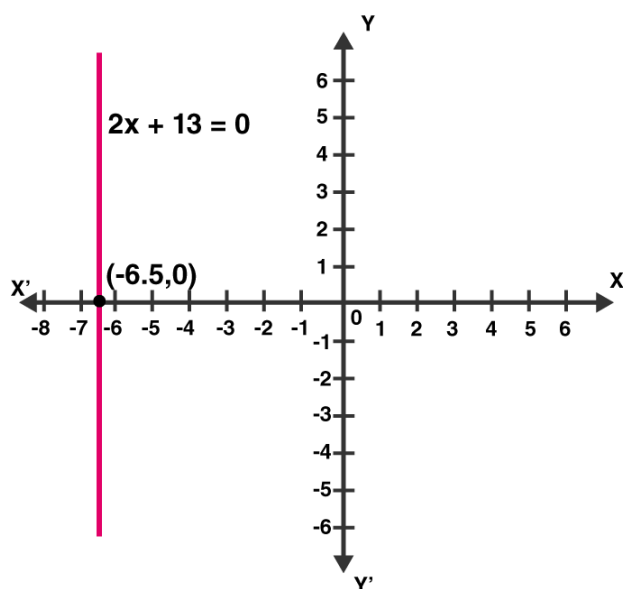
$$x = -13/2 = -6.5$$

Which is an equation in one variable.



(ii) $2x + 13 = 0$ can be written as $2x + 0y + 13 = 0$

The representation of the solution on the Cartesian plane: A line parallel to y axis passing through the point $(-13/2, 0)$:



Exercise VSAQs

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Question 1: Write the equation representing x-axis.

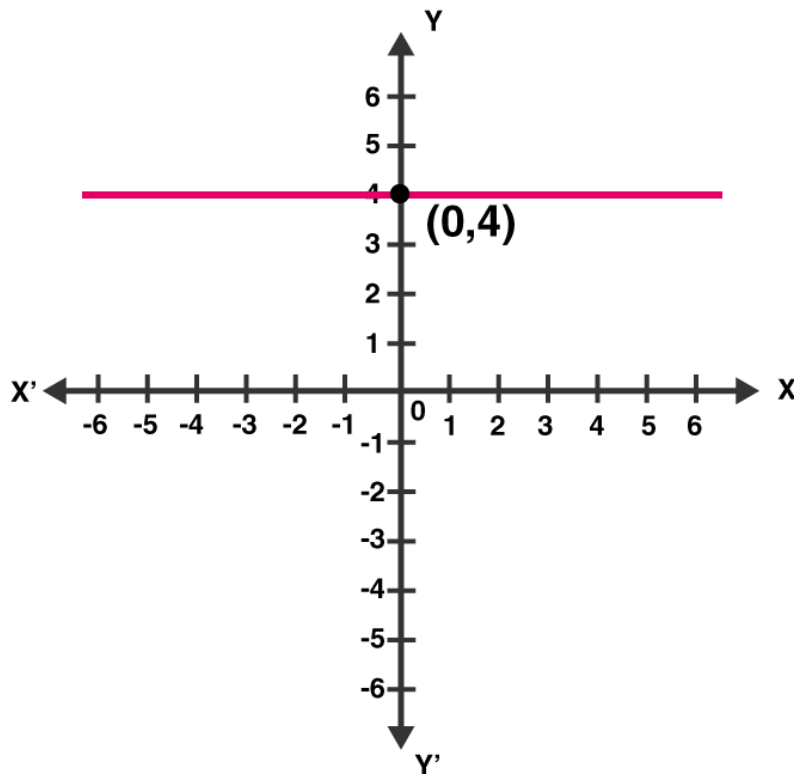
Solution: $y = 0$

Question 2: Write the equation representing y-axis.

Solution: $x = 0$

Question 3: Write the equation of a line passing through the point $(0, 4)$ and parallel to x-axis.

Solution: Here, x-coordinate is zero and y-coordinate is 4, so equation of line passing through the point $(0, 4)$ is $y = 4$.

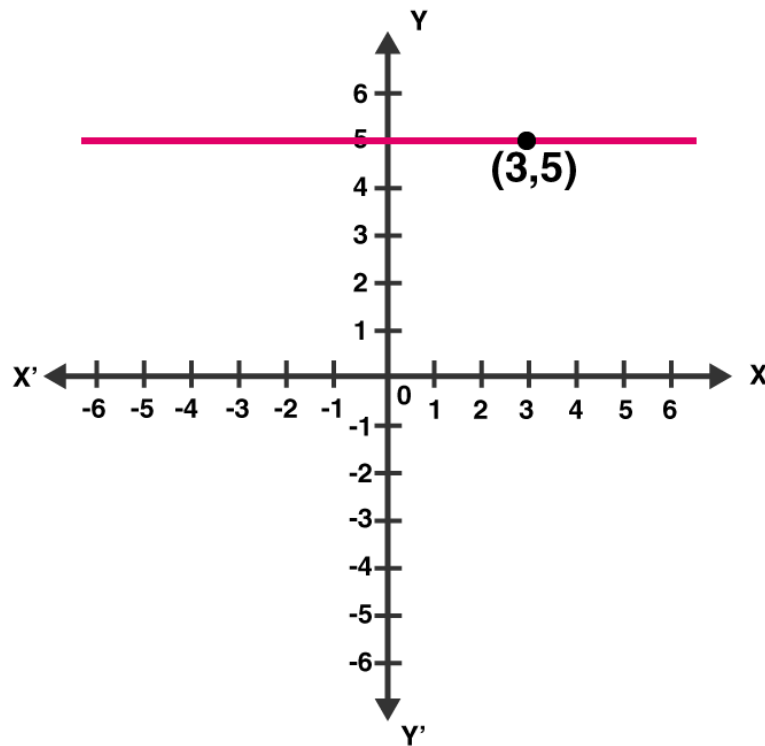


Question 4: Write the equation of a line passing through the point $(3, 5)$ and parallel to x-axis.

Solution: Here x-coordinate = 3 and y-coordinate = 5

Since required line is parallel to x-axis, so equation of line is $y = 5$.

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Question 5: Write the equation of a line parallel to y-axis and passing through the point $(-3, -7)$

Solution:

Here x-coordinate = -3 and y-coordinate = -7

Since required line is parallel to y-axis, so equation of line is $x = -3$.

