# NCERT Solutions for Class 9

# Mathematics

# Chapter 4-Linear Equations in Two Variables

## Exercise 4.1

**1. Construct a linear equation in two variables to express the following statement.**
**The cost of a textbook is twice the cost of an exercise book.**

**Ans:** Let the cost of a textbook be $x$ rupees and the cost of an exercise book be $y$ rupees.

The given statement: Cost of Notebook is twice the cost of Pen.

So, in order to form a linear equation,

the cost of the textbook $=2\times$ the cost of an exercise book.

$\Rightarrow x=2y$

$\Rightarrow x-2y=0$.

**2. Determine the values of $a$, $b$, $c$ from the following linear equations by expressing each of them in the standard form $ax+by+c=0$.**

**(i) $2x+3y=9.\overline{35}$**

**Ans:** The given linear equation is

$2x+3y=9.\overline{35}$

Subtracting $9.\overline{35}$ from both sides of the equation gives

$2x+3y-9.\overline{35}=0$

Now, by comparing the above equation with the standard form of the linear equation, $ax+by+c=0$, the values of $a,b,$ and $c$ are obtained as

$a=2$,

$b=3$, and

$c=-9.\overline{35}$

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

**Ans:** The given linear equation is

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

Now, by comparing the above equation with the standard form of the linear equation, $ax+by+c=0$, the values of $a, b,$ and $c$ are obtained as

$a=1,$

$b=-\frac{1}{5}$, and

$c=-10$.

**(iii)** $\mathbf{-2x+3y=6}$

**Ans:** The given linear equation is

$$-2x+3y=6$$

Subtracting $6$ from both sides of the equation gives

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

Now, by comparing the above equation with the standard form of the linear equation, $ax+by+c=0$, the values of $a, b,$ and $c$ are obtained as

$a=-2$,

$b=3$, and

$c=-6$.

**(iv)** $\mathbf{x=3y}$

**Ans:** The given linear equation can be written as

$$1x=3y$$

Subtracting $3y$ from both sides of the equation gives

$1x-3y+0=0$

Now, by comparing the above equation with the standard form of the linear equation $ax+by+c=0$, the values of $a, b,$ and $c$ are obtained as

$a=1,$

$b=-3$, and

$c=0$.

**(v) $2x = -5y$**

**Ans:** The given linear equation is

$2x=-5y$.

Adding $5y$ on both sides of the equation gives

$2x+5y+0=0$.

Now, by comparing the above equation with the standard form of the linear equation, $ax+by+c=0$, the values of $a, b,$ and $c$ are obtained as

$a=2$,

$b=5$, and

$c=0$.

**(vi) $3x+2=0$**

**Ans:** The given linear equation is

$3x+2=0$.

Rewriting the equation gives

$3x+0y+2=0$

Now, by comparing the above equation with the standard form of linear equation $ax+by+c=0$, the values of $a, b,$ and $c$ are obtained as

$a=3,$

$b=0$, and

$c=2$.

**(vii) $y-2=0$**

**Ans:** The given linear equation is

$y-2=0$

The equation can be expressed as

$0x+1y-2=0$

Now, by comparing the above equation with the standard form of the linear equation, $ax+by+c=0$, the values of $a,b,$ and $c$ are obtained as

$a=0$,

$b=1$, and

$c=-2$.

**(viii) $5=2x$**

**Ans:** The given linear equation is

$5=2x$.

The equation can be written as

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

Now, by comparing the above equation with the standard form of the linear equation $ax+by+c=0$, the values of $a,b,$ and $c$ are obtained as

$a=-2$,

$b=0$, and

$c=5$.

**Exercise 4.2**

**1. Complete the following statement by choosing the appropriate answer and explain why it should be chosen?**
**$y=3x+5$ has ____________.**

**(a) A unique solution,**

**(b) Only two solutions,**

**(c) Infinitely many solutions.**

**Ans:** Observe that, $y = 3x+5$ is a linear equation.

Now, note that, for $x = 0$, $y = 0+5=5$.

So, $(0,5)$ is a solution of the given equation.

If $x=1$, then $y = 3\times1+5 = 8$.

That is, $(1,8)$ is another solution of the equation.

Again, when $y = 0$, $x = -\frac{5}{3}$ .

Therefore, $\left(-\frac{5}{3},0\right)$ is another solution of the equation.

Thus, it is noticed that for different values of $x$ and $y$, different solutions are obtained for the given equation.

So, there are countless different solutions exist for the given linear equation in two variables. Therefore, a linear equation in two variables has infinitely many solutions.

Hence, option (c) is the correct answer.

**2. Determine any four solutions for each of equations given below.**
**(i) $2x + y = 7$.**

**Ans:** The given equation

$2x+y = 7$ is a linear equation.

Solving the equation for $y$ gives

$y=7-2x$.

Now substitute $x=0,1,2,3$ in succession into the above equation.

For $x=0$,

$2(0)+y=7$

$\Rightarrow y=7$

So, one of the solutions obtained is $(x,y)=(0,7)$.

For $x=1$,

$2(1)+y=7$

$\Rightarrow y=5$

Therefore, another solution obtained is $(x,y)=(1,5)$.

For $x=2$,

$2(2)+y=7$

$\Rightarrow y=3$

That is, a solution obtained is $(x,y)=(3,1)$.

Also, for $x=3$,

$2(3)+y=7$

$\Rightarrow y=1$

So, another one solution is $(x,y)=(3,1)$.

Thus, four solutions obtained for the given equations are $(0,7)$, $(1,5)$, $(2,3)$, $(3,1)$.

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

**Ans:** The given equation

$\pi x+y=9$ …… (a)

is a linear equation in two variables.

By transposing, the above equation (a) can be written as

$y=9-\pi x$.

Now substitute $x=0,1,2,3$ in succession into the above equation.

For $x=0$,

$y=9-\pi(0)$

$\Rightarrow y=9$

Therefore, one of the solutions obtained is $(x,y)=(0,9)$.

For $x=1$,

$y=9-\pi(1)$

$\Rightarrow y=9-\pi$.

So, another solution obtained is $(x,y)=(1,9-\pi)$.

For $x=2$,

$y=9-\pi(2)$

$\Rightarrow y=9-2\pi$

That is, another solution obtained is $(x,y)=(2,9-2\pi)$.

Also, for $x=3$,

$y=9-\pi(3)$

$\Rightarrow y=9-3\pi$.

Therefore, another one solution is $(x,y)=(3,9-3\pi)$.

Thus, four solutions obtained for the given equations are $(0,9)$, $(1,9,-\pi)$, $(2,9-2\pi)$, $(3,9-3\pi)$.

**(iii) $\mathbf{x=4y}$.**

**Ans:** The given equation

$x=4y$ is a linear equation in two variables.

By transposing, the above equation can be written as

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

Now substitute $x=0,1,2,3$ in succession into the above equation.

For $x=0$,

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

Therefore, one of the solutions is $(x,y)=(0,0)$.

For $x=1$,

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

So, another solution of the given equation is $(x,y)=\left(1,\frac{1}{4}\right)$.

For $x=2$,

$y = \frac{2}{4} = \frac{1}{2}$.

That is, another solution obtained is $(x,y)=\left(2,\frac{1}{2}\right)$.

Also, for $x=3$,

$y = \frac{3}{4}$.

Therefore, another one solution is $(x,y)=\left(3,\frac{3}{4}\right)$.

Thus, four solutions obtained for the given equations are $(0,0)$, $\left(1,\frac{1}{4}\right)$, $\left(2,\frac{1}{2}\right)$, $\left(3,\frac{3}{4}\right)$.

**3. Identify the actual solutions of the linear equation $x-2y=4$ from each of the following solutions.**

**(i) $(0,2)$**

**Ans:** Substituting $x=0$ and $y=2$ in the Left-hand-side of the equation $x-2y=4$ gives

$$\begin{aligned} x\text{-}2y &= 0-2(2) \\ &= -4 \\ &\neq 4. \end{aligned}$$

Therefore, Left-hand-side is not equal Right-hand-side of the given equation for $(x,y)=(0,2)$.

Hence, $(0,2)$ is not a solution of the equation $x\text{-}2y=4$.

**(ii)** $(\mathbf{2,0})$

**Ans:** Substituting $x=2$ and $y=0$ in the Left-hand-side of the equation $x\text{-}2y=4$ gives

$$\begin{aligned} x\text{-}2y &= 2-2(0) \\ &= 2 \\ &\neq 4. \end{aligned}$$

Therefore, Left-hand-side is not equal Right-hand-side of the given equation for $(x,y)=(2,0)$.

Hence, $(2,0)$ is not a solution of the equation $x\text{-}2y=4$.

**(iii)** $(\mathbf{4,0})$

**Ans:** Substituting $x=4$ and $y=0$ in the Left-hand-side of the equation $x\text{-}2y=4$ gives

$$\begin{aligned} x\text{-}2y &= 4-2(0) \\ &= 4. \end{aligned}$$

Therefore, Left-hand-side is equal Right-hand-side of the given equation for $(x,y)=(4,0)$.

Hence, $(4,0)$ is a solution of the equation $x\text{-}2y=4$.

**(iv)** $(\mathbf{\sqrt{2},4\sqrt{2}})$

**Ans:** Substituting $x=\sqrt{2}$ and $y=4\sqrt{2}$ in the Left-hand-side of the equation $x\text{-}2y=4$ gives

$$x\text{-}2y = \sqrt{2} - 2\left(4\sqrt{2}\right)$$
$$= \sqrt{2} - 8\sqrt{2}$$
$$= -7\sqrt{2}$$
$$\neq 4.$$

Therefore, Left-hand-side is not equal Right-hand-side of the given equation for $\left(x,y\right) = \left(\sqrt{2}, 4\sqrt{2}\right)$.

Hence, $\left(\sqrt{2}, 4\sqrt{2}\right)$ is not a solution of the equation $x\text{-}2y=4$.

**(v)** $\mathbf{(1,1)}$

**Ans:** Substituting $x=1$ and $y=1$ in the Left-hand-side of the equation $x\text{-}2y=4$ gives

$$x\text{-}2y = 1 - 2(1)$$
$$= 1 - 2$$
$$= -1$$
$$\neq 4.$$

Therefore, Left-hand-side is not equal Right-hand-side of the given equation for $\left(x,y\right) = (1,1)$.

Hence, $(1,1)$ is not a solution of the equation $x\text{-}2y=4$.

**4. If $\left(x,y\right) = \left(2,1\right)$ is a solution of the equation $2x+3y=k$, then what is the value of $k$?**

**Ans:** By substituting $x=2$, $y=1$ and into the equation

$2x+3y=k$ gives

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

$$\Rightarrow 4+3=k$$

$$\Rightarrow k=7.$$

Hence, the value of $k$ is $7$.

## Exercise 4.3

**1. Graph each of the linear equations given below.**

**(i) $x+y=4$**

**Ans:** The given linear equation is

$x+y=4$

$\Rightarrow y=4-x$ …… (a)

Substitute $x=0$ into the equation (a) gives

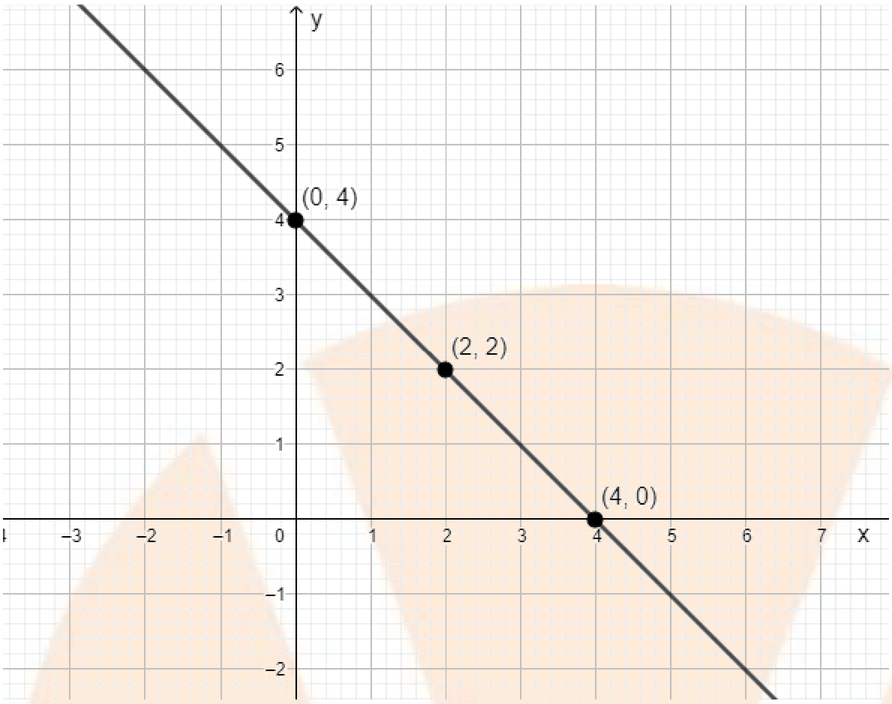
$y=4-0=4.$

Similarly, substituting $x=2,4$ in succession into the equation (a), the following table of $y$ -values are obtained:

| | | | |
|---|---|---|---|
| **x** | 0 | 2 | 4 |
| **y** | 4 | 2 | 0 |

Now, Plot the points $(0,4)$, $(2,2)$ and $(4,0)$ on a graph paper and connect the points by a straight line.

Thus, the following graph of the straight line represents the required graph of the linear equation $x+y=4$.




**(ii) x–y=2**

**Ans:** The given linear equation is

$x\text{-}y = 2$

$\Rightarrow y = x - 2 \ldots\ldots \text{(a)}$

Substitute $x = 0$ into the equation (a) gives

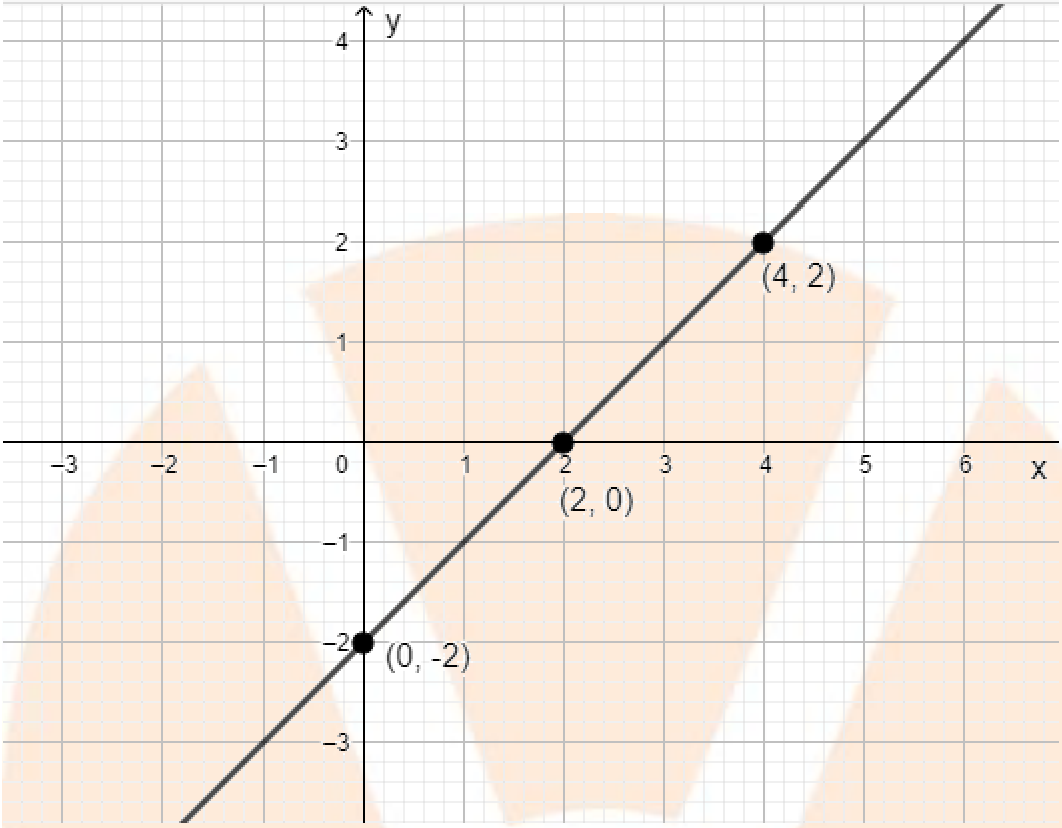
$y = 0 - 2 = -2.$

Similarly, substituting $x = 2, 4$ in succession into the equation (a), the following table of $y$ -values are obtained:

| | | | |
|---|---|---|---|
| **x** | 0 | 2 | 4 |
| **y** | –2 | 0 | 2 |

Now, Plot the points $(0,-2)$, $(2,0)$ and $(4,2)$ on a graph paper and connect the points by a straight line.

Thus, the following graph of the straight line represents the required graph of the linear equation $x - y = 2$.




**(iii) y=3x**

**Ans:** The given linear equation is

$y = 3x \ldots\ldots$ (a)

Substitute $x = 0$ into the equation (a) gives

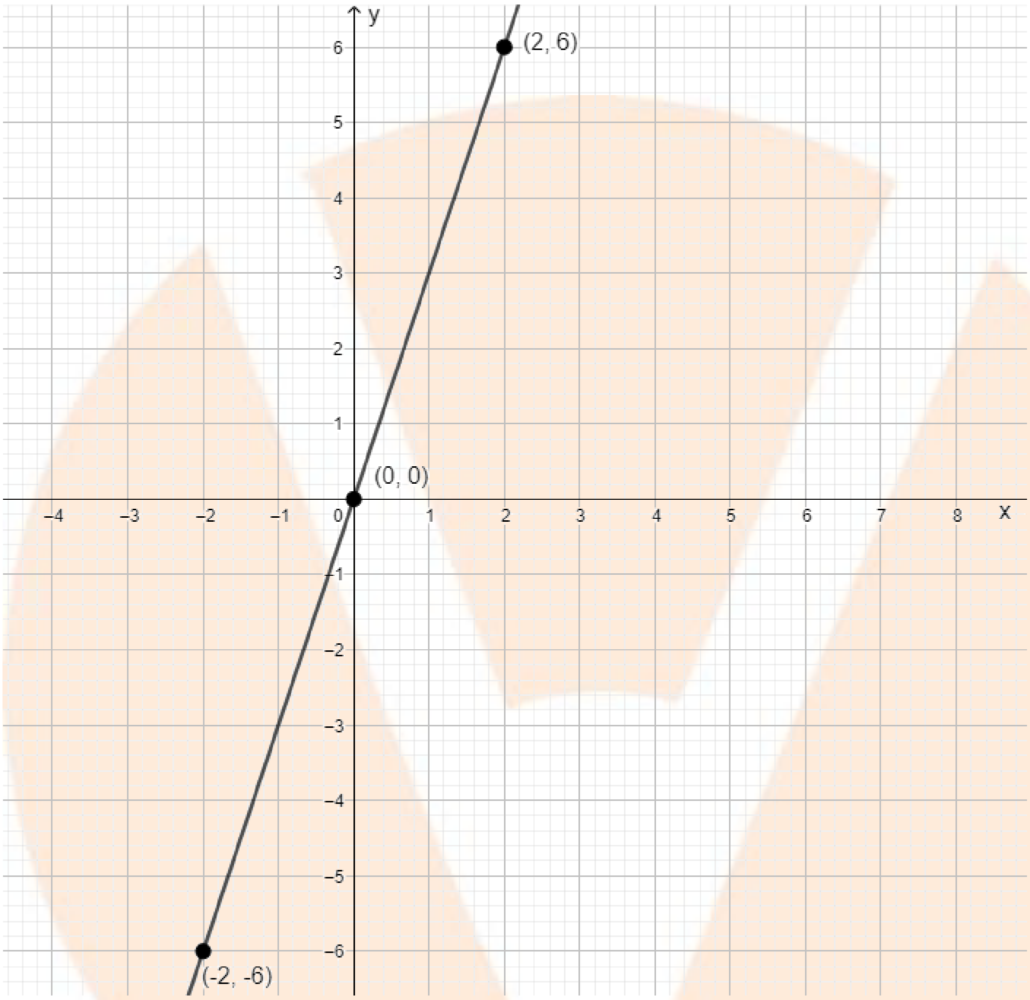
$y = 3(0) = 0.$

Similarly, substituting $x = 2, -2$ in succession into the equation (a), the following table of $y$ -values are obtained:

| | | | |
|---|---|---|---|
| **x** | 0 | 2 | –2 |
| **y** | 0 | 6 | –6 |

Now, Plot the points $(0,0)$, $(2,6)$ and $(-2,-6)$ on a graph paper and connect the points by a straight line.

Thus, the following graph of the straight line represents the required graph of the linear equation $y = 3x$.




**(iv) 3=2x+y**

**Ans:** The given linear equation is

$$3 = 2x + y$$

$\Rightarrow y = 3 - 2x$ …… (a)

Substitute $x = 0$ into the equation (a) gives

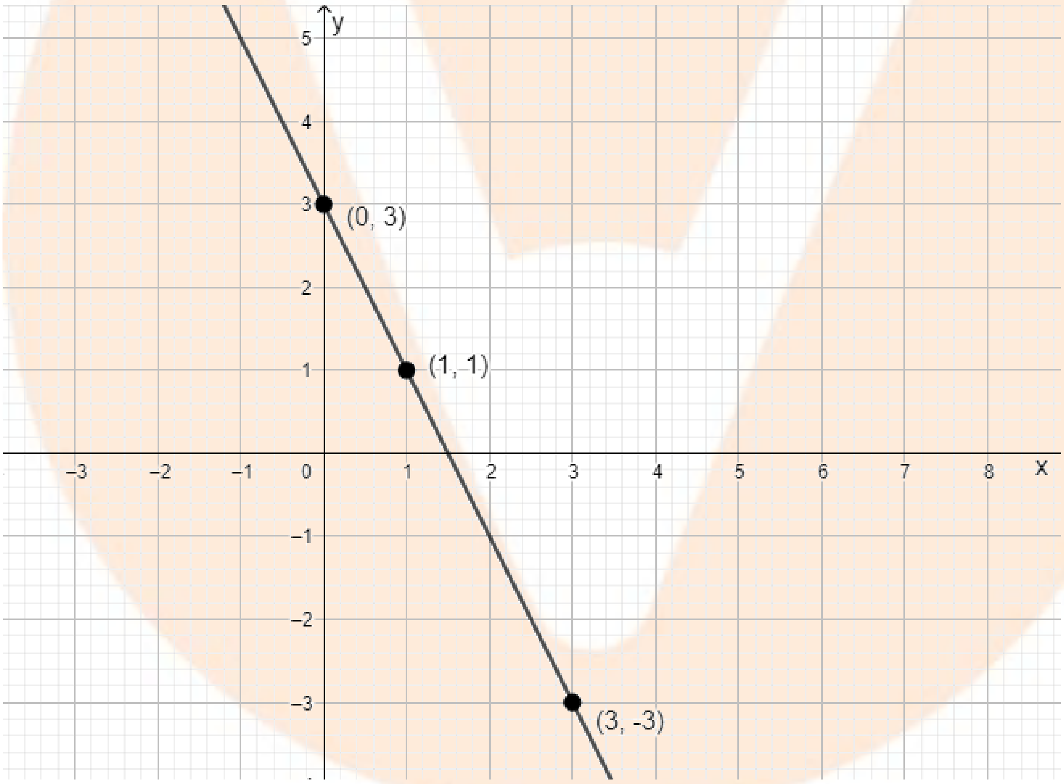
$y = 3 - 2(0) = 3.$

Similarly, substituting $x = 1,3$ in succession into the equation (a), the following table of $y$ -values are obtained:

| | | | |
|---|---|---|---|
| **x** | 0 | 1 | 3 |
| **y** | 3 | 1 | $-3$ |

Now, Plot the points $(0,3)$, $(1,1)$ and $(3,-3)$ on a graph paper and connect the points by a straight line.

Thus, the following graph of the straight line represents the required graph of the linear equation $3 = 2x + y$.




**2. Provided that the equations of two lines passing through the point $(2,14)$. Can there exist more than two equations of such type? If it is, then state the reason.**

**Ans:** Provided that equations of two lines passing through $(2,14)$.

It can be noted that the point $(2,14)$ satisfies the equation $7x\text{-}y=0$ and $x\text{-}y+12=0$.

So, the equations $7x\text{-}y=0$ and $x\text{-}y+12=0$ represent two lines passing through point $(2,14)$.

Now, since we know that through infinite number of lines can pass through any one point, so, there are infinite number such type of lines exist that passes through the point $(2,14)$.

Hence, there exist more than two equations whose graph passes through the point $(2,14)$.

**3. Determine the value of $a$ in the linear equation $3y=ax+7$ if the point $(3,4)$ lies on the graph of the equation.**

**Ans:** Given that $3y=ax+7$ is a linear equation and the point $(3,4)$ lies on the equation.

Substituting $x=3,\ y=4$ in the equation gives

$$3y=ax+7$$

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

$$\Rightarrow 3a=5$$

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

Hence, the value of $a$ is $\frac{5}{3}$.

**4. Derive a linear equation for the following situation:**
**For the first kilometre, a cab take rent $8$ rupees and for the subsequent distances it becomes $5$ rupees per kilometre. Assume the distance covered is $x$ km and total rent is $y$ rupees. Hence, draw the graph of the linear equation.**

**Ans:** Let the total distance covered $=x$ km and the total cost for the distance travelled $= y$ rupees.

It is given that the rent for 1st kilometre is $8$ rupees and for the subsequent km, it is $5$ rupees per kilometre.

Therefore, rent for the rest of the distance $= (x\text{-}1)5$ rupees.

Total cost for travelling $x$ km is given by

$$y=[8+(x-1)5]$$

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

$\Rightarrow y=5x+3......\ (1)$

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

which is the required linear equation.

Now, substituting $x=0$ into the equation (1) gives

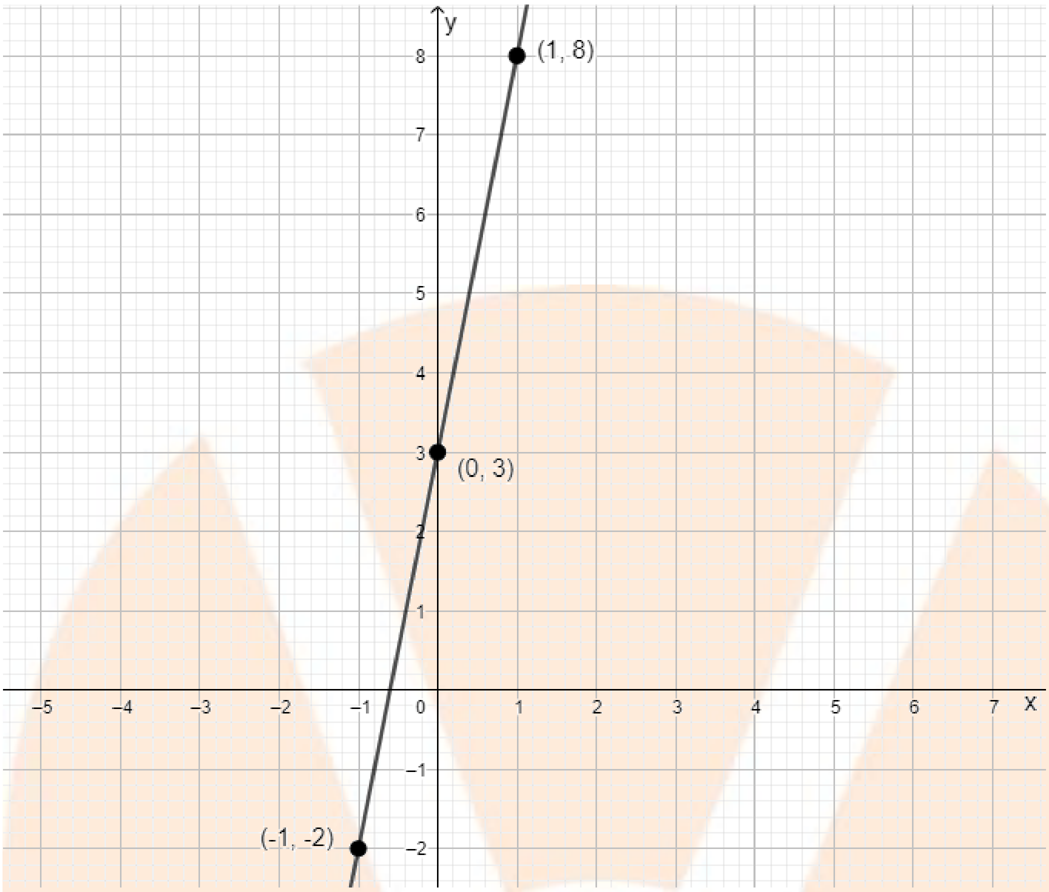
$y=5(0)+3=3.$

Similarly, substituting $x=1,-1$ in succession into the equation (1), the following table of $y$ -values are obtained:

| | | | |
|---|---|---|---|
| x | 0 | 1 | −1 |
| y | 3 | 8 | −2 |

Now, Plot the points $(0,3)$, $(1,8)$ and $(-1,-2)$ on a graph paper and connect the points by a straight line.

Thus, the following graph of the straight line represents the required graph of the linear equation $5x\text{-}y+3=0$.




It is concluded by observing the graph of the linear equations that the variable $x$ and $y$ represent the distance travelled by the car and the total cost of rent for the distance respectively. Therefore, $x$ and $y$ are non-negative quantities.

Thus, only the first quadrant of the graph of the linear equation $5x\text{-}y\text{+}3\text{=}0$ is only valid.

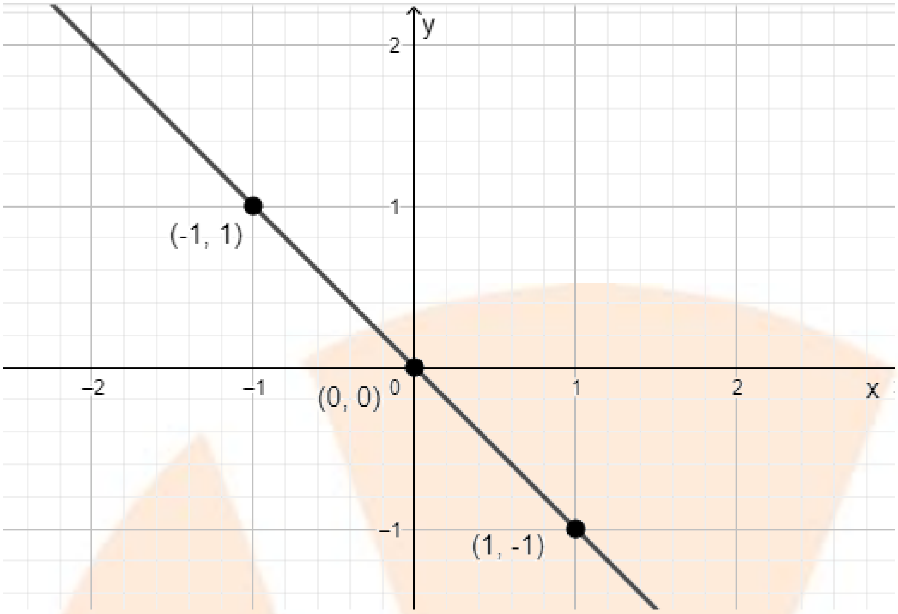
**5. Choose the correct linear equation for the given graphs in (a) and (b).**

**(a) (i) $y = x$**

**(ii) $x + y = 0$**

**(iii) $y = 2x$**

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




**Ans:** It is observed in the given graph that the points $(-1,1)$, $(0,0)$, and $(1,-1)$ lie on the straight line. Also, the coordinates of the points satisfy the equation $x+y=0$.

So, $x+y=0$ is the required linear equation corresponding to the given graph.

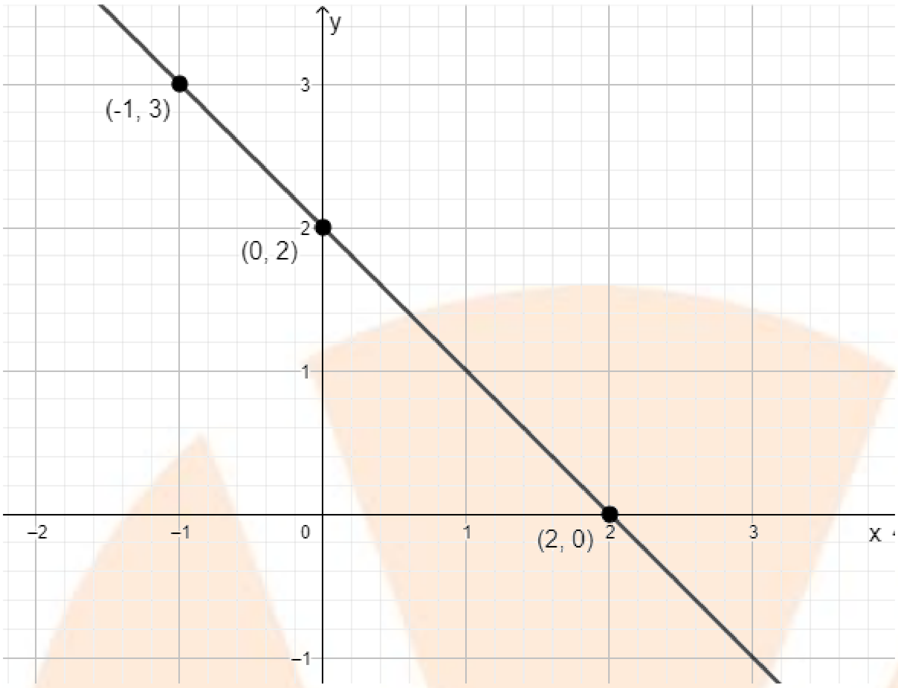
Hence, option (ii) is the correct answer

**(b) (i)** $\mathbf{y = x + 2}$

**(ii)** $\mathbf{y = x - 2}$

**(iii)** $\mathbf{y = -x + 2}$

**(iv)** $\mathbf{x + 2y = 6}$




**Ans:** It is observed in the given graph that the points $(-1,3)$, $(0,2)$, and $(2,0)$ lie on the straight line. Also, the coordinates of the points satisfy the equation $y=-x+2$.

So, $y=-x+2$ is the required linear equation corresponding to the given graph.

Hence, option (iii) is the correct answer.

**6. The work done by a body on the application of a constant force is proportional to the distance moved by the body. Formulate this relation by a linear equation and graph the same by using a constant force of five units. Hence from the graph, determine the work done when the distance moved by the body is**

**(i) $2$ units**

**(ii) $0$ unit.**

**Ans:** Let the distance moved by the body be $x$ units and the work done be $y$ units.

Now, given that, work done is proportional to the distance.

Therefore, $y \propto x$.

$\Rightarrow y=kx, \ldots\ldots$ (a)

where, $k$ is a constant.

By considering constant force of five units, the equation (a) becomes

$y = 5x$ …… (b)

Now, substituting $x = 0$ into the equation (b) gives

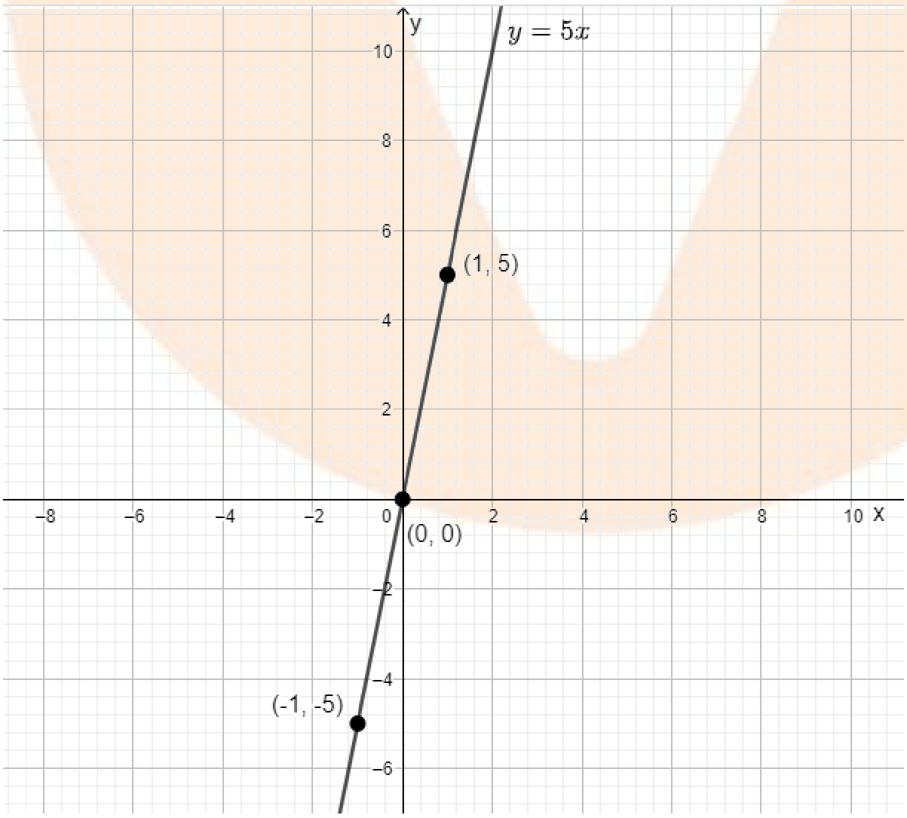
$y = 5(0) = 0$.

Similarly, substituting $x = 1, -1$ in succession into the equation (b), gives the following table of $y$-values.

| | | | |
|---|---|---|---|
| x | 0 | 1 | $-1$ |
| y | 0 | 5 | $-5$ |

Now, Plot the points $(0,0)$, $(1,5)$ and $(-1,-5)$ on a graph paper and connect the points by a straight line.

Thus, the following graph of the straight line represents the required graph of the linear equation $y = 5x$.



It can be concluded by observing the graph of the linear equation that the value of $y$ corresponding to $x=2$ is $10$. Thus, when the distance moved by the body is $2$ units, then the work done by it is $10$ units.

Also, the value of $y$ corresponding to $x=0$ is $0$. So, when the distance travelled by the body is $0$ unit, then the work done by it is $0$ unit.

**7. Derive a linear equation that satisfies the following data and graph it. Sujata and Suhana, two students of Class X of a school, together donated $100$ rupees to the Prime Minister's Relief Fund for supporting the flood victims.**

**Ans:** Let Sujata and Suhana donated $x$ rupees and $y$ rupees respectively to the Prime Minister's Relief fund.

Given that, the amount donated by Sujata and Suhana together is $100$ rupees.

Therefore, $x+y=100$.

$$\Rightarrow y=100-x \text{ ...... (a)}$$

Now, substituting $x=0$ into the equation (a) gives

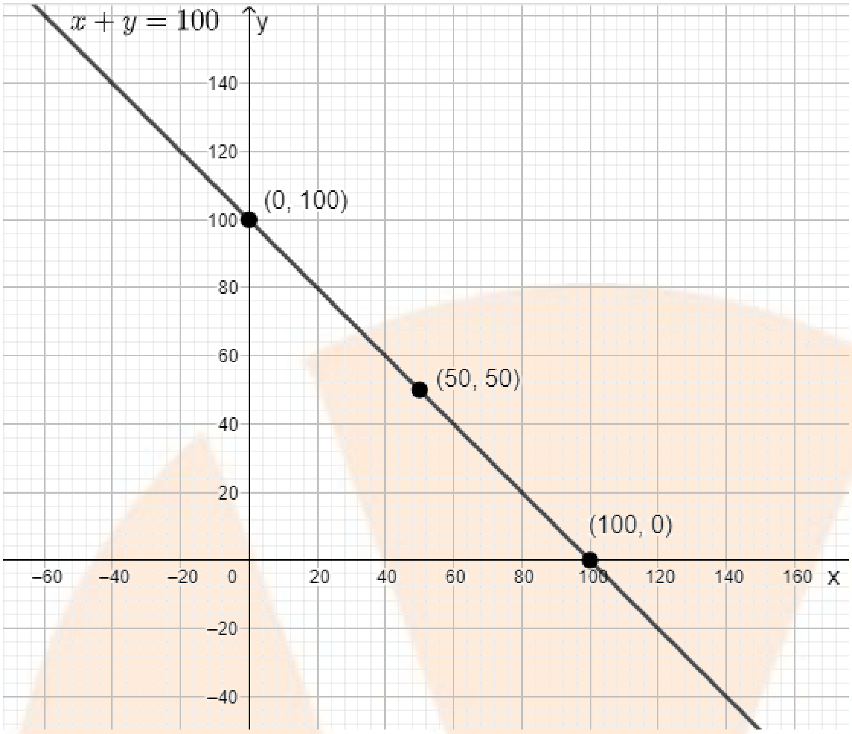
$y=100-0=100$.

Similarly, substituting $x=50,100$ in succession into the equation (a), gives the following table of $y$-values.

| | | | |
|---|---|---|---|
| x | 0 | 50 | 100 |
| y | 100 | 50 | 0 |

Now, Plot the points $(0,100)$, $(50,50)$ and $(100,0)$ on a graph paper and connect the points by a straight line.

Thus, the following graph of the straight line represents the required graph of the linear equation $x+y=100$.




It is concluded by observing the graph of the linear equation that the variable $x$ and $y$ are showing the amount donated by Sujata and Suhana respectively and so, $x$ and $y$ are nonnegative quantities.

Hence, the values of $x$ and $y$ lying in the first quadrant will only be considered.

**8. The following linear equation converts Fahrenheit to Celsius:**

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

**where $F$ denotes the measurement of temperature in Fahrenheit and $C$ in Celsius unit.**
**Then do as directed in the following questions.**
**(i) Graph the linear equation given above by taking $x$-axis as Celsius and $y$-axis as Fahrenheit.**

**Ans:** The given linear equation is

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

Now, substituting $C = 0$ into the equation (a) gives

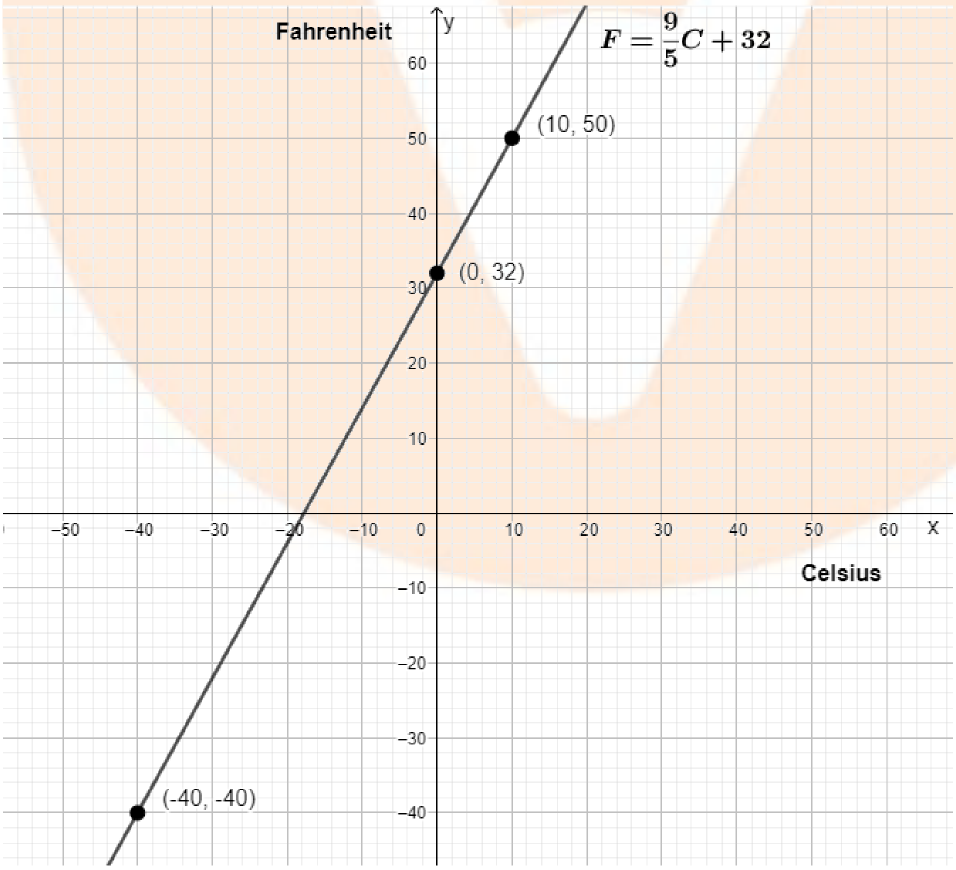
$$F = \left(\frac{9}{5}\right)(0) + 32 = 32.$$

Similarly, substituting $C = -40, 10$ in succession into the equation (a) gives the following table of $F$-values.

| | | | |
|---|---|---|---|
| C | 0 | –40 | 10 |
| F | 32 | –40 | 50 |

Now, Plot the points $(0, 32)$, $(-40, -40)$ and $(10, 50)$ on a graph paper and connect the points by a straight line.

Thus, the following graph of the straight line represents the required graph of the linear equation $F = \left(\frac{9}{5}\right)C + 32$.



**(ii) Determine the temperature in Fahrenheit if it is $30^{o}C$ in Celsius.**

**Ans:** Given that the temperature $=30^{\circ}C$.

Now, it is also provided that, $F=\left(\frac{9}{5}\right)C+32$.

Substitute $C=32$, in the above linear equation.

Then,

$$F=\left(\frac{9}{5}\right)30+32=54+32=86.$$

Hence, the temperature in Fahrenheit obtained is $86\ °F$.

**(iii) Determine the temperature in Celsius if it is $95^{o}F$ in Fahrenheit.**
**Ans:** The given temperature $=95^{\circ}F$.

- F=?

It is provided that, $F=\left(\frac{9}{5}\right)C+32$

Now, substitute $F=95$, into the above linear equation.

Then it gives

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

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

$$\Rightarrow C=35.$$

Hence, the temperature in Celsius obtained is $35^{\circ}C$.

**(iv) Calculate the temperature in Fahrenheit when it is $0^{o}C$ in Celsius. Also, determine the temperature in Celsius when it is $0^{o}F$ in Fahrenheit.**
**Ans:** It is known that,

$$F=\left(\frac{9}{5}\right)c+32.... \text{ (a)}$$

Now, substituting $C=0$ in the above linear equation gives,

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

So, if $C=0^{o}C$, then $F=32^{\circ}F$.

Again, substituting $F=0$ into the equation (a) gives

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

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

$$\Rightarrow C=\frac{-160}{9}=-17.77$$

Hence, if $F=0^{\circ}F$, then $C=-17.8^{\circ}C$.

**(v) Does there exist a temperature that numerically gives the same value in both Fahrenheit and Celsius? If it is, then show it.**

**Ans:** It is provided that,

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

Let assume that $F=C$.

Then,

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

$$\Rightarrow\left(\frac{9}{5}-1\right)F+32=0$$

$$\Rightarrow\left(\frac{4}{5}\right)F=-32$$

$\Rightarrow F = -40$.

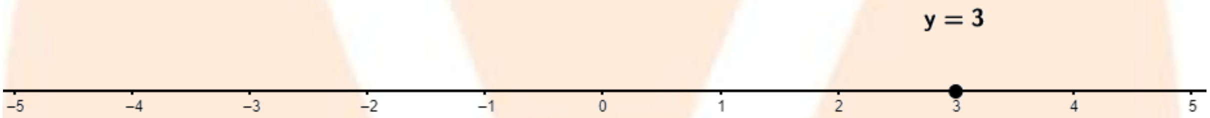
Yes, there exists a temperature $-40°$ that gives numerically the same value in both Fahrenheit and Celsius.

**Exercise 4.4**

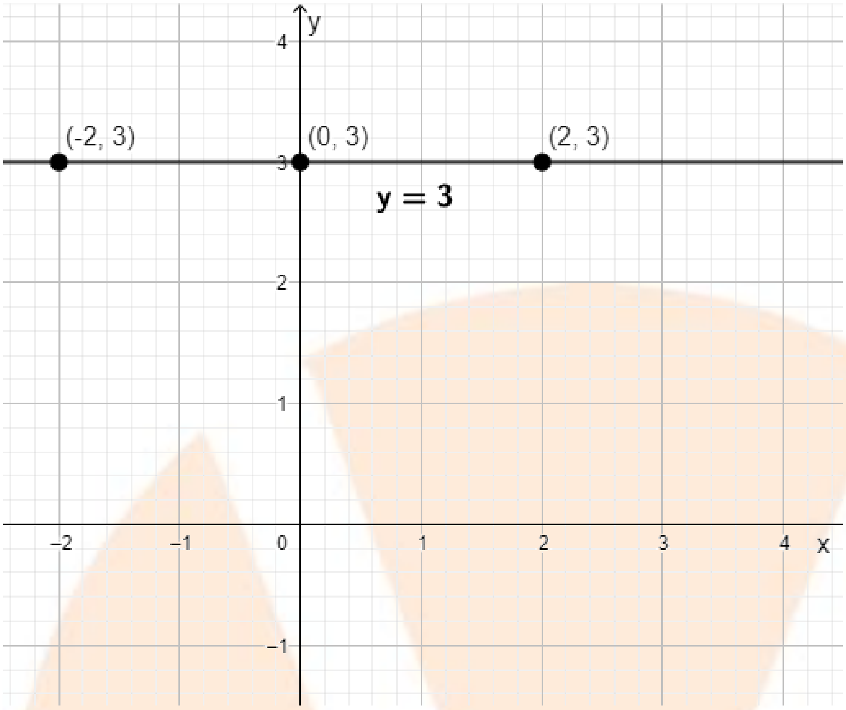
**1. Describe the geometric representation of $y=3$ as an equation**
**(i) in one variable**

**Ans:** The given equation is $y=3$.

Note that, when $y=3$ is considered as an equation in one variable, then actually it represents a number in the one-dimensional number line as shown in following figure.




**(ii) in two variables.**
**Ans:** The given equation is $y=3$.
The above equation can be written as $0.x+y=0$.
Note that when $y=3$ is considered in two variables, then it represents a straight line passing through point $(0,3)$ and parallel to the $x$-axis. Therefore, all the points in the graph having the $y$-coordinate as $3$, contained in the collection.
Hence, at $x=0$, $y=3$;
at $x=2$, $y=3$; and
at $x=-2$, $y=3$ are the solutions for the given equation.
Now, Plot the points $(0,3)$, $(2,3)$ and $(-2,3)$ on a graph paper and connect the points by a straight line. The graphical representation is shown below:




**2. Give the geometric representations of $2x+9=0$ as an equation**

**(i) in one variable**

**Ans:** The given equation is $2x+9=0$.

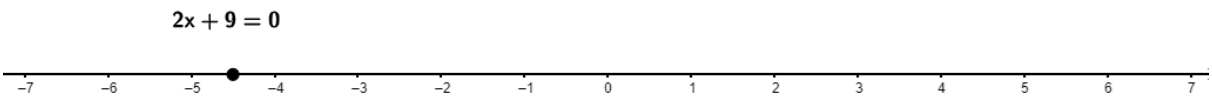
Now, the equation can be written as

$2x+9=0$

$\Rightarrow 2x=9$

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

Hence, when $2x+9=0$ is considered as an equation in one variable, then actually it represents a number $x=-4.5$ in the one-dimensional number line as shown in following figure



**(ii) in two variables**

**Ans:** The given equation is $2x+9=0$.

The above equation can be written as $2x+0y=-9$.

Note that when $2x+9=0$ is considered in two variables, then it represents a straight line passing through point $(-4.5,0)$ and parallel to the $y$-axis. Therefore, all the points in the graph having the $x$-coordinate as $-4.5$, contained in the collection.

Hence, at $y=3$, $x=-4.5$;

at $y=-1$, $x=-4.5$; and

at $y=1$, $x=-4.5$ are the solutions for the given equation.

Now, Plot the points $(-4.5,3)$, $(-4.5,-1)$ and $(-4.5,1)$ on a graph paper and connect the points by a straight line. The graphical representation is shown below: