

**EXERCISE 4.1****PAGE: 68**

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

(Take the cost of a notebook to be ₹  $x$  and that of a pen to be ₹  $y$ ) Solution:

Let the cost of a notebook be = ₹  $x$

Let the cost of a pen be = ₹  $y$

According to the question,

The cost of a notebook is twice the cost of a pen.

i.e., cost of a notebook =  $2 \times$  cost of a pen

$$x = 2 \times y$$

$$x = 2y$$

$$x - 2y = 0$$

$x - 2y = 0$  is the linear equation in two variables to represent the statement, 'The cost of a notebook is twice the cost of a pen.'

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

**Solution:**

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

Re-arranging the equation, we get,

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

The equation  $2x + 3y - 9.3\bar{5} = 0$  can be written as,

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

Now comparing  $2x + 3y + (-9.3\bar{5}) = 0$  with  $ax + by + c = 0$

We get,

$$a = 2$$

$$b = 3$$

$$c = -9.3\bar{5}$$

(ii)  $x - (y/5) - 10 = 0$

Solution:

The equation  $x - (y/5) - 10 = 0$  can be written as,



$$1x + (-1/5)y + (-10) = 0$$

Now comparing  $x + (-1/5)y + (-10) = 0$  with  $ax + by + c = 0$

We get,  $a = 1$

$$b = -1/5$$

$$c = -10$$

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

Solution:

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

Re-arranging the equation, we get,

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

The equation  $-2x + 3y - 6 = 0$  can be written as,

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

Now, comparing  $(-2)x + 3y + (-6) = 0$  with  $ax + by + c = 0$

We get,  $a = -2$

$$b = 3$$

$$c = -6$$

**(iv)  $x = 3y$**

Solution:

$$x = 3y$$

Re-arranging the equation, we get,  $x - 3y$

$$= 0$$

The equation  $x - 3y = 0$  can be written as,

$$1x + (-3)y + (0)c = 0$$

Now comparing  $1x + (-3)y + (0)c = 0$  with  $ax + by + c = 0$  We get  $a = 1$

$$b = -3$$

$$c = 0$$



(v)  $2x = -5y$  Solution:  $2x = -5y$

$b = 0$   $c = 2$

(vii)  $y - 2 = 0$

Solution:  $y -$

$2 = 0$

The equation  $y - 2 = 0$  can be written as,  $0x + 1y + (-2) = 0$

Now comparing  $0x + 1y + (-2) = 0$  with  $ax + by + c = 0$

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

(viii)  $5 = 2x$

## EXERCISE 4.2

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

$y = 3x + 5$  has

$(2 \times 0) + y =$

$7$   $y = 7$

$(0, 7)$

Let  $x = 1$

Then,

$2x + y = 7$

$(2 \times 1) + y = 7$

$2 + y = 7$   $y =$

$7 - 2$   $y = 5$



(1,5)

$y = 3$

(2,3)

The solutions are (0, 7), (1,5), (3,1), (2,3)

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

Solution:

To find the four solutions of  $\pi x + y = 9$ , we substitute different values for x and y.

Let  $x = 0$

Then,  $\pi x + y$

$= 9$

$(\pi \times 0) + y = 9$

$y = 9$  (0,9)

Then,  $\pi x$

$+ y = 9$

$(\pi \times -1) + y = 9$

$-\pi + y = 9$

$y = 9 + \pi$

(-1,  $9 + \pi$ )

The solutions are (0,9), (1,  $9 - \pi$ ), ( $9/\pi$ , 0), (-1,  $9 + \pi$ )

**(iii)  $x = 4y$**

Solution:

To find the four solutions of  $x = 4y$ , we substitute different values for x and y.

Let  $x = 0$  Then,



$$x = 4y$$

$$x = 4 \times 4$$

$$= 16$$

$$(16, 4)$$

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

Then,

$$x = 4y$$

$$= 4 \times 1$$

$$= 4$$

$$(4, 1)$$

The solutions are  $(0, 0)$ ,  $(1, 1/4)$ ,  $(16, 4)$ ,  $(4, 1)$

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

$$(x, y) = (2, 0)$$

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

Substituting the values of  $x$  and  $y$  in the equation  $x - 2y = 4$ , we get,

$$-2y = 4$$

$$\Rightarrow 2 - (2 \times 0) = 4$$

$$\Rightarrow 2 - 0 = 4$$

But,  $2 \neq 4$

$(2, 0)$  is **not** a solution of the equation  $x - 2y = 4$

**(iii)  $(4, 0)$**

Solution:

$$(x, y) = (4, 0)$$

Here,  $x = 4$  and  $y = 0$

$(\sqrt{2}, 4\sqrt{2})$  is **not** a solution of the equation  $x - 2y = 4$



(v) (1, 1)

Solution:

$$(x,y) = (1, 1)$$

Here,  $x= 1$  and  $y= 1$

Substituting the values of  $x$  and  $y$  in the equation  $x-2y = 4$ , we get,  $x -2y = 4$

$$\Rightarrow 1 -(2 \times 1) = 4$$

$$\Rightarrow 1-2 = 4$$

But,  $-1 \neq 4$

(1, 1) is **not** a solution of the equation  $x-2y = 4$

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

### EXERCISE 4.3

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

(i)  $x+y = 4$

Solution:

To draw a graph of linear equations in two variables, let us find out the points to plot.

To find out the points, we have to find the values which  $x$  and  $y$  can have, satisfying the equation.

$$2-y = 2$$

$$-y = 2-2$$

$$-y = 0 \quad y$$

$$= 0$$

Substituting the values for  $x$ ,

When  $x = 0$ ,  $y = 3x$   $y = 3 \times 0$



$y = 0$  When

$x = 1, y =$

$3x y = 3 \times 1$

Solution:

To draw a graph of linear equations in two variables, let us find out the points to plot.

To find out the points, we have to find the values which  $x$  and  $y$  can have, satisfying the equation.

Here,

$3 = 2x + y$

Substituting the values for  $x$ ,

When  $x = 0$ ,

$3 = 2x + y$

$3 = 2 \times 0 + y$

Let another equation be  $4x = y - 6$

$4x - y + 6 = 0$

When  $x = 2$  and  $y = 14$

$(4 \times 2 - 14 + 6 = 0$

$8 - 14 + 6 = 0$

$0 = 0$

L.H.S. = R.H.S.

Since both the equations satisfy the point  $(2, 14)$ , then we can say that the equations of two lines passing through  $(2, 14)$  are  $7x = y$  and  $4x = y - 6$

We know that an infinite number of line passes through one specific point. Since there is only one point  $(2, 14)$  here, there can be infinite lines that pass through the point.

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

Solution:



Total distance covered =  $x$

Total fare =  $y$

Fare for the first kilometre = 8 per km

Fare after the first 1km = 5 per km

If  $x$  is the total distance, then the distance after one km =  $(x-1)$ km

i.e., fare after the first km =  $5(x-1)$

According to the question,

The total fare = Fare of first km+ fare after the first km

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

The points to be plotted are  $(0, 3)$  and  $(-3/5, 0)$

(iii)  $y = 2x$

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

$$0 = 0$$

$$(-1, 1) \Rightarrow 1 = 2 \times (-1)$$

$1 \neq -2$  ————— equation not satisfied

$$(1, -1) \Rightarrow -1 = 2 \times 1$$

$-1 \neq 2$  ————— equation not satisfied (iv)  $2+3y = 7x$

$$(0,0) \Rightarrow 2+(3 \times 0) = 7 \times 0$$

$2 \neq 0$  ————— equation not satisfied

$$(-1, 1) \Rightarrow 2+(3 \times 1) = 7 \times -1$$

$5 \neq -7$  ————— equation not satisfied

$$(1, -1) \Rightarrow 2+(3 \times -1) = 7 \times 1$$



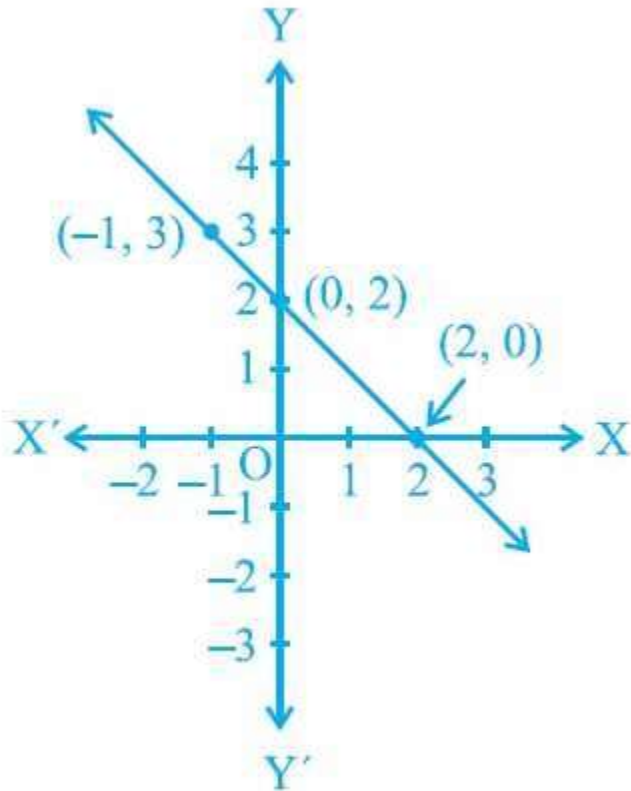


Fig. 4.7

Solution:

The points given in figure 4.7 are (0,2), (2,0), (-1,3)

Substituting the values for x and y from these points in the equations, we get,

(i)  $y = x + 2$

$(0, 2) \Rightarrow 2 = 0 + 2$

$2 = 2$

$(2, 0) \Rightarrow 0 = 2 + 2$

$0 \neq 4$  ————— equation not satisfied

$(-1, 3) \Rightarrow 3 = -1 + 2$

$3 \neq 1$  ————— equation not satisfied

(ii)  $y = x - 2$



$$(0,2) \Rightarrow 2 = 0-2$$

$2 \neq -2$  ————— equation not satisfied

$$(2, 0) \Rightarrow 0 = 2-2$$

$$0 = 0$$

$$(-1, 3) \Rightarrow 3 = -1-2$$

$3 \neq -3$  ————— equation not satisfied

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

**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 unit**

Solution:

Let the distance travelled by the body be  $x$  and the force applied on the body be  $y$ .

It is given that,

The work done by a body is directly proportional to the distance travelled by the body.

According to the question,  $y \propto x$

$$y = 5x \text{ (5 is a constant of proportionality)}$$

**7. Yamini and Fatima, two students of Class IX of a school, together contributed ₹ 100 towards the Prime Minister's Relief Fund to help the earthquake victims. Write a linear equation which satisfies this data (You may take their contributions as ₹  $x$  and ₹  $y$ ). Draw the graph of the same.**

Solution:

Let Yamini's donation be ₹ $x$  and Fatima's donation be ₹ $y$

According to the question,  $x+y = 100$

We know that, when

$$x = 0, y = 100 \text{ when}$$



$x = 50, y = 50$  when

$x = 100, y = 0$

The points to be plotted are  $(0,100), (50,50), (100,0)$

**(iii) If the temperature is  $95^{\circ}\text{F}$ , what is the temperature in Celsius?**

**(iv) If the temperature is  $0^{\circ}\text{C}$ , what is the temperature in Fahrenheit, and if the temperature is  $0^{\circ}\text{F}$ , 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) According to the question,

$$F = (9/5)C + 32$$

Solving the equation,

We get,

$$\text{When } C = 0, F = 32$$

$$\text{When } C = -10, F = 14$$

The points to be plotted are  $(0, 32), (-10, 14)$

$$= 86^{\circ}\text{F}$$

(iii) When  $F = 95$ ,

$$95 = (9/5)C + 32$$

$$(9/5)C = 95 - 32$$

$$(9/5)C = 63$$

$$C = (63 \times 5) / 9$$

$$= 35^{\circ}\text{C}$$

(iv) When  $C = 0$ ,

$$F = (9/5)C + 32$$

$$F = (9 \times 0) / 5 + 32$$



$$=0+32$$

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

**EXERCISE 4.4****PAGE: 77****1. Give the geometric representations of  $y = 3$  as an equation****(i) in one variable****(ii) in two variables**

Solution:

1. In one variable,  $y = 3$ **2. Give the geometric representations of  $2x+9 = 0$  as an equation****(i) in one variable****(ii) in two variables**

Solution:

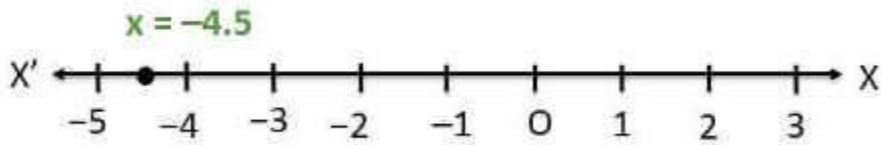
(i) In one variable,

$$2x+9 = 0$$

$$2x = -9$$

$$x = -9/2$$

$$x = -4.5$$



(ii) In two variables,

$$2x + 9 = 0$$

$$2x + 0y + 9 = 0$$

When  $y = 0$ ,  $x = -4.5$

When  $y = 1$ ,  $x = -4.5$

