RD SHARMA

Solutions

Class 9 Maths

Chapter 13

Ex *13.1*

Q 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 ;

A 1 :

(i) We are given

– 2x + 3y = 12

– 2x + 3y – 12 = 0

Comparing the given equation with ax+ by+ c = O

We get, a = – 2; b = 3; c = -12

(ii) We are given

x – y/2 – 5= 0

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

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

(iii) We are given

2x + 3y = 9.35

2x + 3y – 9.35 =0

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

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

(iv) We are given

3x =-7y

3x + 7y = 0

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

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

(v) We are given

2x + 3 = 0

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

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

(vi) We are given

Y – 5 = 0

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

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

(vii) We are given

4 = 3x

3x-4=0

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

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

(viii) We are given

Y = x/2

Taking L.C.M => x — 2y = 0

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

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

Q 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

A 2:

(i) We are given,

2x = —3

Now, in two variable forms the given equation will be

2x + 0y + 3=0

(ii) We are given,

y=3

Now, in two variable forms the given equation will be

0 x + y – 3 = 0

(iii) We are given,

5x = -7/2

Now, in two variable forms the given equation will be

5x + Oy +7/2 = 0

10x + Oy – 7 = 0

(iv) We are given,

$y = \frac{3}{2}x$ (Taking L.C.M on both sides)

Now, in two variable forms the given equation will be

3x – 2y + 0 = 0

Q 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.

A 3:

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

According to the given equation, we have

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

=> 2x = y – 10

=> 2x –y + 10 = 0

Here y is the cost of one fountain pen and x is that of one ball pen.

RD SHARMA

Solutions

Class 9 Maths

Chapter 13

Ex *13.2*

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

(i)5x – 2y = 7

(ii) x = 6y

(iii) x +πy = 4

(iv) 2/3x – y = 4.

A 1 :

(i) We are given,

3x + 4y =7

Substituting x = 1

In the given equation,

We get

3 x1 + 4y = 7

4y = 7 – 3 4 = 4Y

Y = I

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

Substituting x = 2 in the given equation,

we get 3×2 + 4y = 7

4y = 7 – 6

y = 1/4

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

(ii) We are given, x = 6y

Substituting x =0 in the given equation,

we get 0 = 6y

6 y = 0

y = 0

Thus x = 0, => Solution (0,0)

Substituting x=6

6 = 6y

y = 6/6

y = 1 => Solution (6,1)

(iii) We are given $x + \pi y = 4$

Substituting x = 0 in the given equation,

We get $0 + \pi y = 4$

$\pi y = 4$

$y = \frac{4}{\pi}$

=> Solution = $(0, \frac{4}{\pi})$

Substituting y = 0 in the given equation, we get

x + 0 = 4

x = 4

=> Solution = (4, 0)

(iv) We are given $\frac{2}{3}x - y = 4$

Substituting x = 0 in the given equation, we get

0 – y = 4

y = – 4

Thus x = 0 and y = – 4 is a solution

Substituting x = 3 in the given equation, we get

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

2 – y = 4

y = 2 – 4

y = -2

Thus x = 3 and y = -2 is a solution

Q 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

A 2 :

(i) We are given,

5x – 2y = 10

Substituting x = 0 in the given equation,

We get;

5×0 – 2y = 10

– 2y = 10

– y = 10/2

y= – 5

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

Substituting y = 0 in the given equation, we get 5x —2 x 0 = 10

5x = 10

x = 10/2

x = 2

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

(ii) We are given, – 4x + 3y = 12

Substituting x = 0 in the given equation,

we get;

-4×0 + 3y = 12

3y = 12

y = 4

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

Substituting y = 0 in the given equation, we get;

-4 x + 3 x 0 = 12

– 4x = 12

x =-12/4

x = -3

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

(iii) We are given, 2x + 3y = 24

Substituting x = 0 in the given equation, we get;

2 x 0 + 3y = 24

3y =24

y = 24/3

y = 8

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

Substituting y = 0 in the given equation, we get;

2x +3 x 0 = 24

2x = 24

x = 24/2

x =12

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

Q3: 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)*** $(\frac{1}{2}, -5)$

A3:

We are given, 2x – y = 6

(i) In the equation 2 x – y = 6,

We have L.H.S = 2x — y and R.H.S = 6

Substituting x = 3 and y = 0 in 2x – y ,

We get L.H.S = 2 x 3 – 0 = 6

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

=>(3,0) is a solution of 2x — y = 6.

(ii) In the equation 2x — y = 6,

We have L.H.S= 2x— y and R.H.S=6

Substituting x = 0 and y = 6 in 2x — y

We get L.H.S = 2 x 0 – 6 = – 6

=> L.H.S$\neq$ R.H.S

=> (0,6) is not a solution of 2x — y = 6.

(iii) In the equation 2x — y = 6,

We have L.H.S = 2x – y and R.H.S = 6

Substituting x = 2 and y = – 2 in 2x — y,

We get L.H.S = 2 x 2 – (-2) = 6

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

=> (2,-2) is a solution of 2x — y = 6.

(iv) In the equation 2x — y = 6,

We have L.H.S = 2x- y and R.H.S=6

Substituting x = $\sqrt{3}$ and y = 0 in 2x — y,

We get L.H.S = 2 x $\sqrt{3}$ – 0

=> L.H.S $\neq$ R.H.S

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

(v) In the equation 2x — y = 6,

We have L.H.S = 2x – y and R.H.S = 6

Substituting x = 1/2 and y = in 2x — y, we get

L.H.S = 2 x(1/2) – (-5)

=>1 + 5 = 6

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

=> ($\frac{1}{2}$,-5) is a solution of 2x — y = 6.

Q4: If x = -1, y = 2 is a solution of the equation 3x + 4y = k, find the value of k.

A4 :

We are given, 3 x + 4 y = k

Given that, (-1,2) is the solution of equation 3x + 4y = k.

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

We get; 3x – 1 + 4 x 2 = k

K = – 3 + 8

k =5

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

A 5 :

We are given,

x + 4y – 7 = 0

(-λ,- 5)is a solution of equation 3x + 4y = k

Substituting x = – λ and y = $\frac{5}{2}$ in x + 4y – 7 = 0 ,

We get; – λ + 4 x ($\frac{5}{2}$) – 7 =0

$-\lambda$ + 4 x $\frac{5}{2}$ – 7 = 0

λ = 10 – 7

λ = 3

Q 6 : If x = 2a + 1 and y = a -1 is a solution of the equation 2x – 3y + 5 = 0, find the value of a.

A 6:

We are given, 2x —3y +5 = 0

(2a + 1, a – 1) is the solution of equation 2x – 3y + 5 = 0.

Substituting x = 2a + 1 and y = a – 1 in 2x – 3y + 5 = 0,

We get 2 x 2a + (1- 3) x a – 1 + 5 = 0

=> 4a + 2 – 3a + 3 + 5 = 0

=> a + 10 = 0

=> a = – 10

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

A 7 :

We are given,

8x − ay + a^2 = 0

(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 x 1 − a x 6 + a^2 = 0

=> a^2 − 6a + 8 = 0

Using quadratic factorization

a^2 − 4a − 2a + 8 = 0

a(a − 4) − 2 (a − 4) = 0

(a − 2) (a − 4)= 0

a = 2, 4

RD SHARMA

Solutions

Class 9 Maths

Chapter 13

Ex *13.3*

Q 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) $\frac{x}{2} - \frac{y}{3} = 2$ ***(vii)*** $\frac{x-2}{3}$ ***= y- 3***

(viii) 2y = -x +1

A 1 :

(i) We are given, x + y = 4

We get, y = 4 − x,

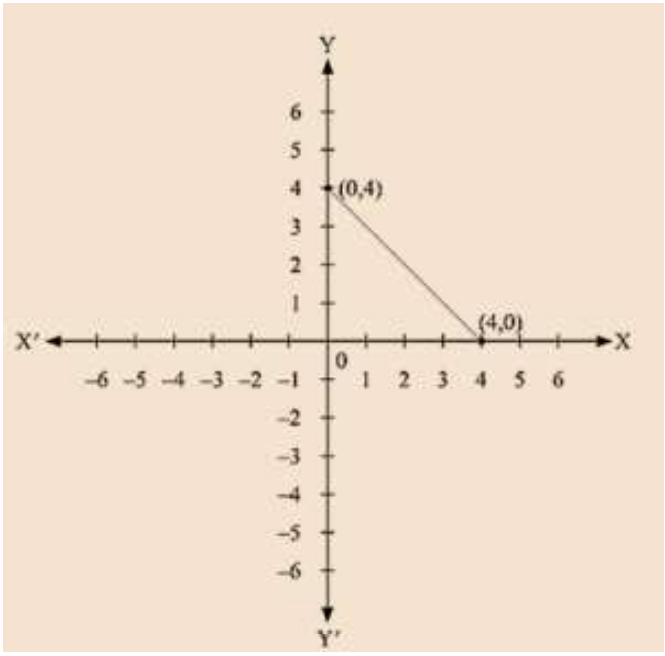
Now, substituting x = 0 in y = 4 − x,

we get y = 4

Substituting x = 4 in y = 4 — x, we get y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given table

X	0	4
Y	4	0



(ii) We are given, x − y = 2

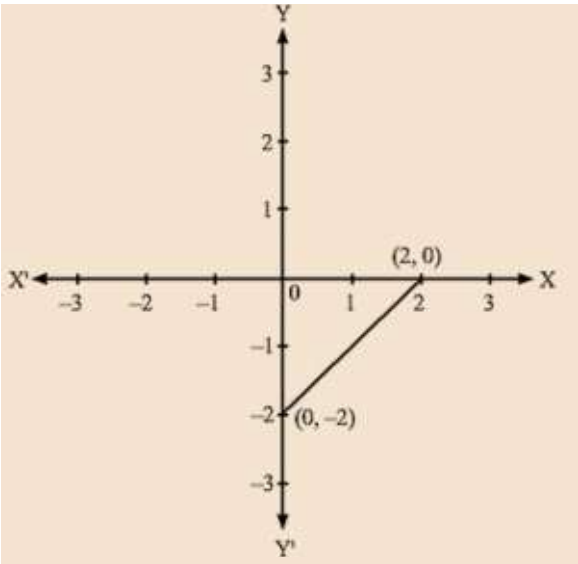
We get, y = x − 2

Now, substituting x = 0 in y= x − 2, we get y = − 2

Substituting x = 2 in y = x − 2, we get y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	2
Y	-2	0



(iii) We are given, – x + y = 6

We get, y = 6 + x

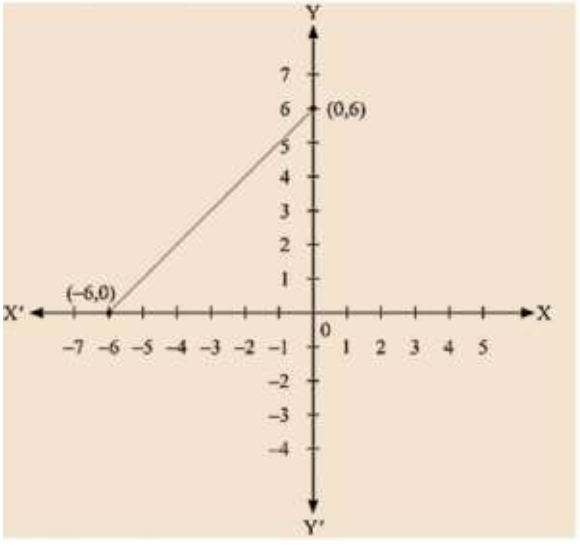
Now, substituting x = 0 in y = 6 + x,

We get y =6

Substituting x = -6 in y = 6+ x, we get y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation.

X	0	-6
Y	6	0



(iv) We are given, y = 2x

Now, substituting x = 1 in y = 2x

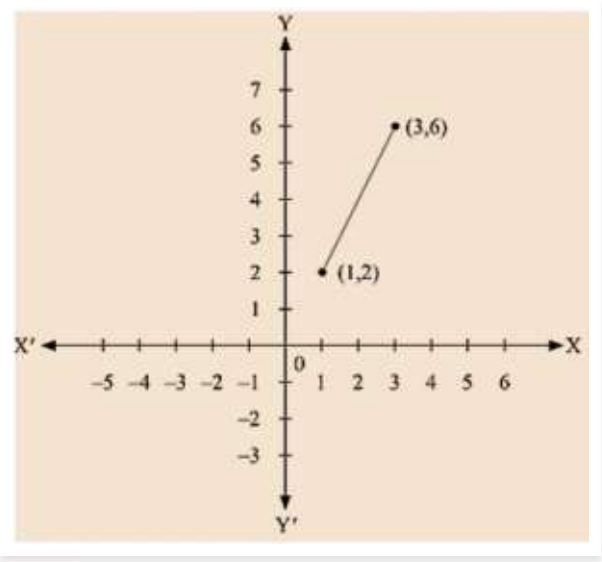
We get y = 2

Substituting x = 3 in y = 2x

We get y = 6

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	1	3
Y	2	6



(v) We are given, 3x + 5y = 15

We get, 15 – 3x = 5y

Now, substituting x = 0 in 5y = 15 – 3x,

We get; 5y = 15

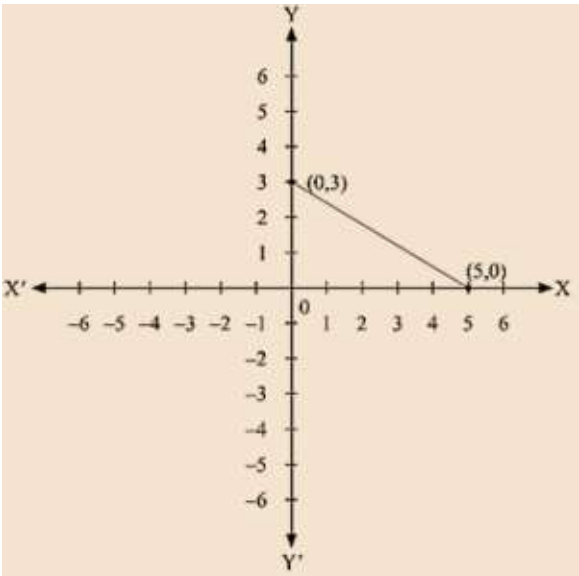
y =3

Substituting x = 5 in 5y = 15 – 3x

we get 5 y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	5
Y	3	0



(vi) we are given.

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

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

3x – 2y = 12

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

Now, substituting x = 0 in $\frac{3x-12}{2} = y$

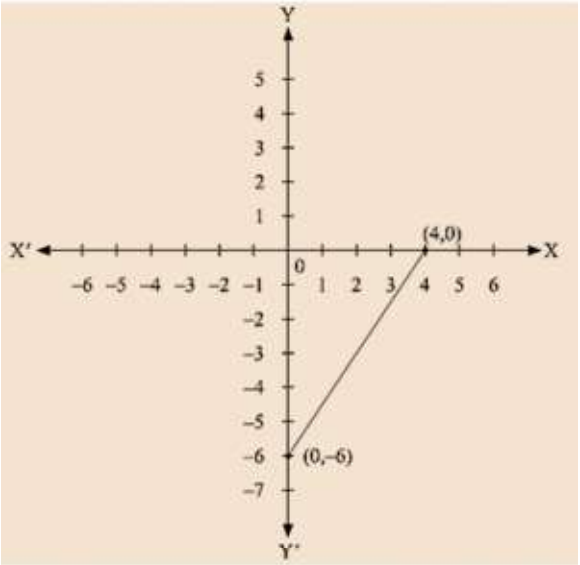
We get y = -6

Substituting x = 4 in $\frac{3x-12}{2} = y$

We get y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	4
Y	-6	0



(vii) We are given,

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

We get, x-2 = 3(Y-3)

x – 2 = 3y – 9

x = 3y – 7

Now, substituting x = 5 in x = 3y – 7,

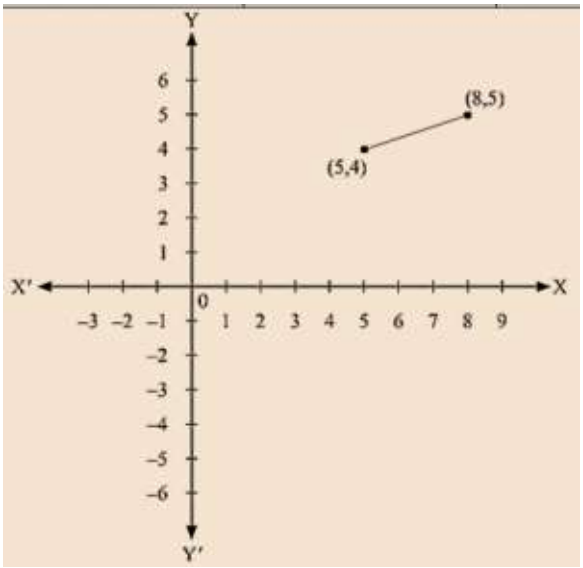
We get; y = 4

Substituting x = 8 in x = 3y – 7 ,

We get; y = 5

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	5	8
Y	4	5



(viii) We are given, 2y = – x +1

We get, 1 – x = 2Y

Now, substituting x =1 in1 – x = 2Y, we get

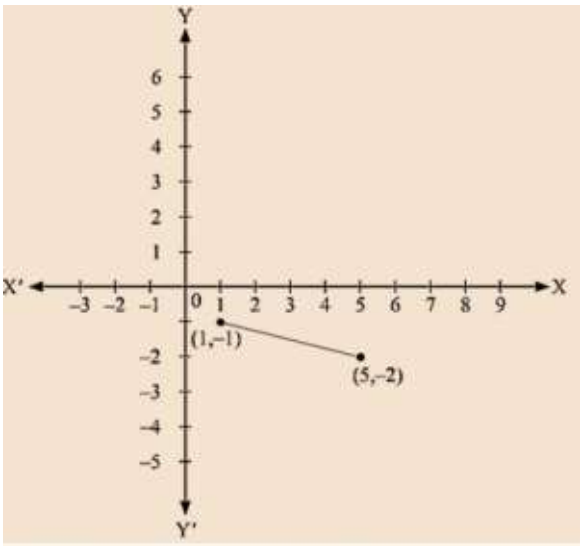
y = 0

Substituting x = 5 in 1 – x = 2Y , we get

y = – 2

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	1	5
Y	0	-2



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

A 2:

We observe that x = 3 and y = 12 is the solution of the following equations

4x – y = 0 and 3x – y + 3 = 0

So, we get the equations of two lines passing through (3, 12) are, 4x – y = 0 and 3x – y + 3 = 0.

We know that passing through the given point infinitely many lines can be drawn.

So, there are infinitely many lines passing through (3, 12)

Q 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.

A 3 :

Total fare of Rs y for covering the distance of x km is given by

y = 15 + 8(x – 1)

y = 15 + 8x – 8

y = 8x + 7

Where, Rs y is the total fare (x – 1) is taken as the cost of first kilometer is already given

Rs 15 and 1 has to subtracted from the total distance travelled to deduct the cost of first

Kilometer.

Q 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.***

A 4 :

Total charges of Rs 27 of which Rs x for first three days and Rs y per day for 4 more days is given by

x + y (7 – 3) = 27

x + 4y = 27

Here, (7 –3) is taken as the charges for the first three days are already given at Rs x and we have to find the charges for the remaining four days as the book is kept for the total of 7 days.

Q5: 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.

A5:

The number given to us is in the form of ' yx ',

Where y represents the ten's place of the number

And x represents the unit's place of the number.

Now, the given number is 10y + x

Number obtained by reversing the digits of the number is 10x + y

It is given to us that the original number is 27 more than the number obtained by reversing its digits

So, 10y + x = 10x + y + 27

10y – y + x – 10x = 27

9y – 9x = 27

9 (y – x) = 27

y – x = 27/9 = 3

x – y + 3 = 0

Q6: The Sum of a two digit number and the number obtained by reversing the order of its digits is 121. If units and tens digit of the number are x and y respectively, then write the linear equation representing the above statement.

A6 :

The number given to us is in the form of ' yx' ,

Where y represents the ten's place of the number and x represents the units place of the number

Now, the given number is 10y + x

Number obtained by reversing the digits of the number is 10x+ y

It is given to us that the sum of these two numbers is 121

So, (10y + x)+ (I0x + y) = 121

10y + y + x + 10x = 121

11y + 11x = 121

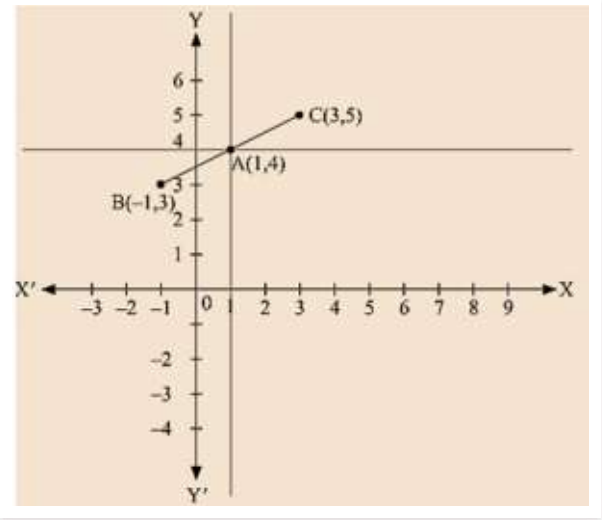
11 (y + x) = 121

x + y = 121/11 = 11

x + y = 11

Q7 : 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)

A7:



By plotting the given points (3, 5) and (-1, 3) on a graph paper, we get the line BC.

We have already plotted the point A (1, 4) on the given plane by the intersecting lines.

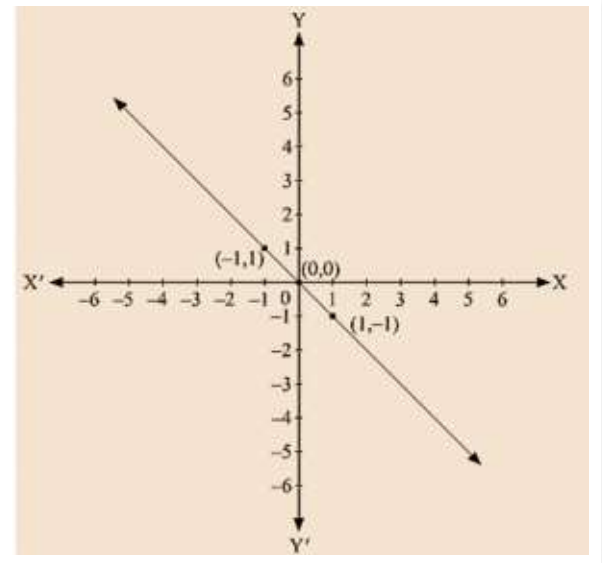
Therefore, it is proved that the straight line passing through (3, 5) and (-1, 3) also passes through A (1, 4).

Q8: From the choices given below, choose the equations whose graph is given in fig

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

Ans: We are given co-ordinates (1, – 1) and (-1, 1) as the solution of one of the following equations.

We will substitute the value of both co-ordinates in each of the equation and find the equation which satisfies the given co-ordinates.



(i) We are given, y = x

Substituting x =I and y = -1 ,

we get; 1 ≠ -1

L.H.S ≠ R.H.S

Substituting x = -1 and y = 1 ,

we get; -1 ≠1

L.H.S ≠R.H.S

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

(ii) We are given,

x + y = 0

Substituting x =1 and y = -1 , we get

=> 1 + (-1) = 0

=> 0 = 0

L.H.S = R.H.S

Substituting x = —1 and y = 1 ,we get

(-1)+ 1 = 0

0 = 0

L.H.S = R.H.S

Therefore, the given solutions satisfy this equation.

Thus, it is the equation whose graph is given.

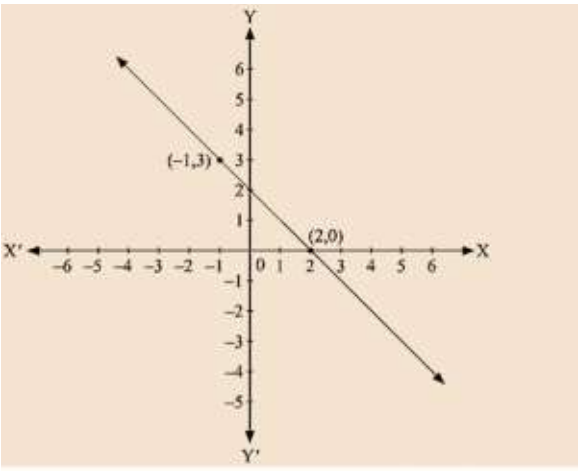
Q9: From the choices given below, choose the equation whose graph is given fig:

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

A9:

We are given co-ordinates (-1, 3) and (2, 0) as the solution of one of the following equations.

We will substitute the value of both co-ordinates in each of the equation and find the equation which satisfies the given co-ordinates.



(i) We are given, y=x+2

Substituting x = − 1 and y = 3 ,we get

3 ≠ − 1 + 2

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

Substituting x = 2 and y = 0 ,we get

0 $\neq$ 4

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

Therefore, the given solution does not satisfy this equation.

(ii) We are given, y = x – 2

Substituting x = —1 and y = 3 ,we get

3 = – 1 – 2

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

Substituting x = 2 and y = 0 ,we get

0 = 0

L.H.S = R.H.S

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

(iii) We are given, y = – x + 2

Substituting x = – 1 and y = 3,we get

3 = – (– 1) + 2

L.H.S = R.H.S

Substituting x = 2 and y = 0 ,we get

0 = -2 + 2

0 = 0

L.H.S = R.H.S

Therefore, the given solutions satisfy this equation.

Thus, it is the equation whose graph is given.

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

A10 :

It is given that the point (2,-2) lies on the given equation,

5x + ky = 4

Clearly, the given point is the solution of the given equation.

Now, Substituting x = 2 and y = – 2 in the given equation, we get 5x + ky = 4

5 x 2 + (– 2) k = 4

2k = 10 – 4

2k = 6

k = 6/2

k = 3

Q 11 : Draw the graph of equation 2x + 3y = 12. From the graph, find the co ordinates of the point:

(i) whose y-coordinate is 3 (ii)whose x coordinate is -3

A11:

We are given,

2x +3y =12

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

Substituting, x = 0 in $y = \frac{12-2x}{3}$, we get

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

y = 4

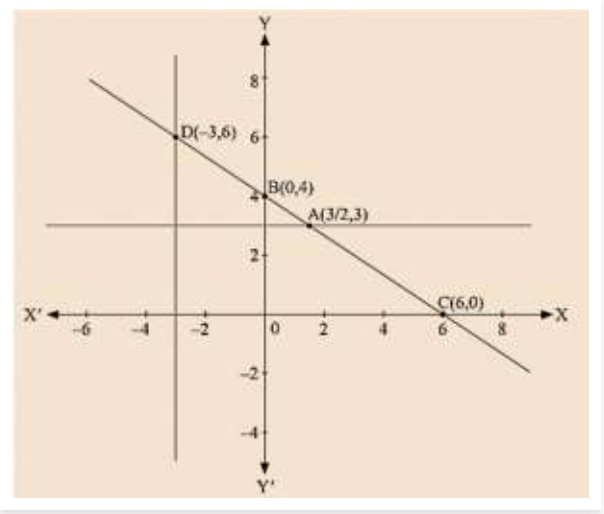
Substituting x = 6 in $y = \frac{12-2x}{3}$

$y = \frac{12-2\times6}{3}$

y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	6
Y	4	0



By plotting the given equation on the graph, we get the point B (0, 4) and C (6,0).

(i) Co-ordinates of the point whose y axis is 3 are A (3/2, 3)

(ii) Co-ordinates of the point whose x -coordinate is −3 are D (-3, 6)

Q 12: Draw the graph of each of the equations given below. Also, find the coordinates of the points where the graph cuts the coordinate axes:

(i) 6x − 3y = 12 (ii) − x + 4y = 8 (iii) 2x + y = 6 (iv) 3x + 2y + 6 = 0

A12 :

(i) We are given,

6x − 3y = 12 We get,

y = (6x —12) /3

Now, substituting x = 0 in y = − (6x − 12)/3 we get

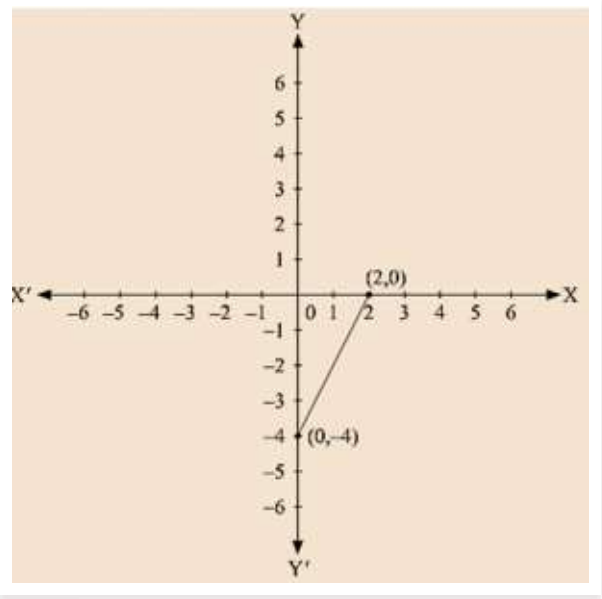
y =- 4

Substituting x = 2 in y = (- 6x —12)/3, we get

y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

x	0	2
y	-4	0



Co-ordinates of the points where graph cuts the co-ordinate axes are y = − 4 at y axis and x = 2 at x axis. (ii) We are given,

− x + 4y = 8

We get,

$y = \frac{8+x}{4}$

Now, substituting x = 0 in $y = \frac{8+x}{4}$, we get

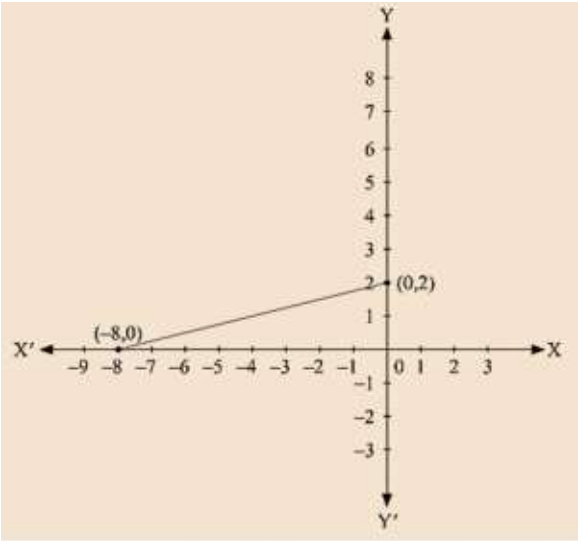
y = 2

Substituting x = -8 in $y = \frac{8+x}{4}$,we get

y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	-8
Y	2	0



Co-ordinates of the points where graph cuts the co-ordinate axes are y = 2 at y axis and x = —8 at x axis.

(iii) We are given,

2x + y = 6

We get, y = 6 – 2x

Now, substituting x = 0 in y = 6 -2x we get

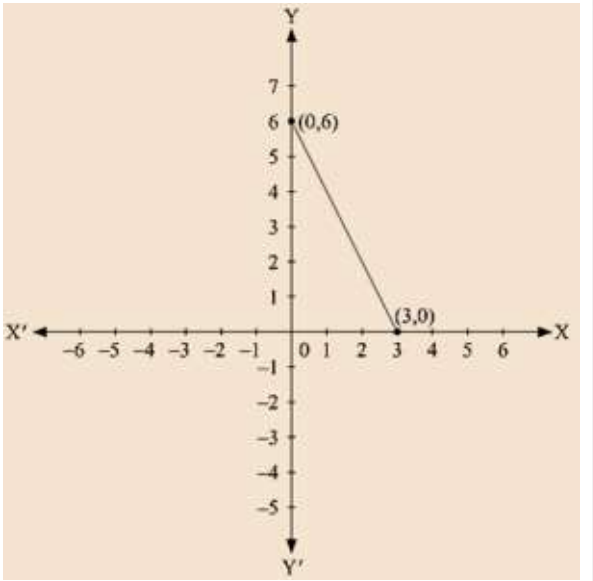
y = 6

Substituting x = 3 in y=6-2x, we get

y=0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	3
Y	6	0



Co-ordinates of the points where graph cuts the co-ordinate axes are y = 6 at y axis and x =3 at x axis.

(iv) We are given,

3x+2y+6=0

We get, $y = \frac{-(6+3x)}{2}$

Now, substituting x = 0 in $y = \frac{-(6+3x)}{2}$,we get

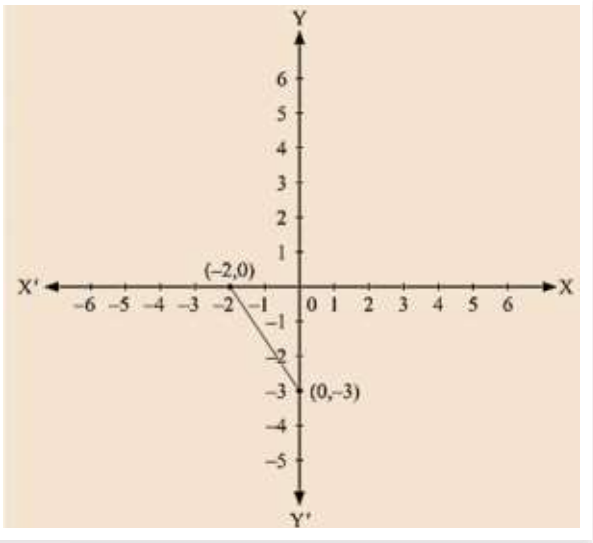
y= – 3

Substituting x = –2 in $y = \frac{-(6+3x)}{2}$, we get

y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	-2
y	-3	0



Co-ordinates of the points where graph cuts the co-ordinate axes are y = – 3 at y axis and x = – 2 at x axis.

Q 13 : Draw the graph of the equation 2x + y = 6. Shade the region bounded by the graph and the coordinate axes. Also, find the area of the shaded region.

A13 :

We are given,

2x + y = 6

We get,

y = 6 – 2x

Now, substituting x = 0 in y = 6 – 2x,

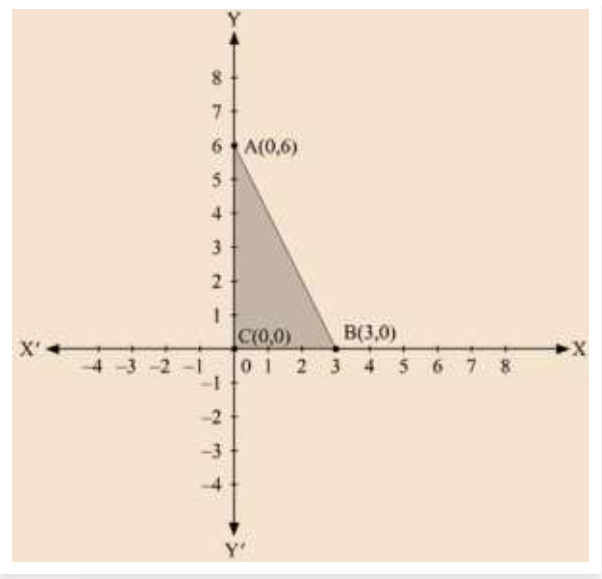
we get y = 6

Substituting x =3 in y = 6— 2x,

we get y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	3
Y	6	0



The region bounded by the graph is ABC which forms a triangle.

AC at y axis is the base of triangle having AC = 6 units on y axis.

BC at x axis is the height of triangle having BC = 3 units on x axis.

Therefore, Area of triangle ABC, say A is given by A = (Base x Height)/2

A = (AC x BC)/2

A = (6 x 3)/2

A = 9 sq. units

Q 14 : Draw the graph of the equation $\frac{x}{3} + \frac{y}{4} = 1$ ***. Also, find the area of the triangle formed by 3 4 the line and the coordinates axes.***

A14:

We are given.

$\frac{x}{3} + \frac{y}{4} = 1$

4x +3y =12

We get,

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

Now, substituting x = 0 in $y = \frac{12-4x}{3}$,we get

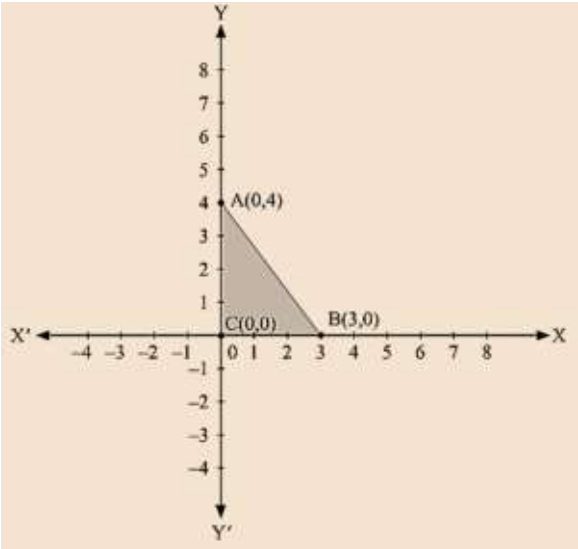
y =4

Substituting x=3 in $y = \frac{12-4x}{3}$, we get

y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	3
Y	4	0



The region bounded by the graph is ABC which forms a triangle.

AC at y axis is the base of triangle having AC = 4 units on y axis.

BC at x axis is the height of triangle having BC = 3 units on x axis.

Therefore,

Area of triangle ABC, say A is given by

A = (Base x Height)/2

A= (AC x BC)/2

A = (4 x 3)/2

A = 6 sq. units

Q 15 : Draw the graph of y = | x |.

A15:

We are given,

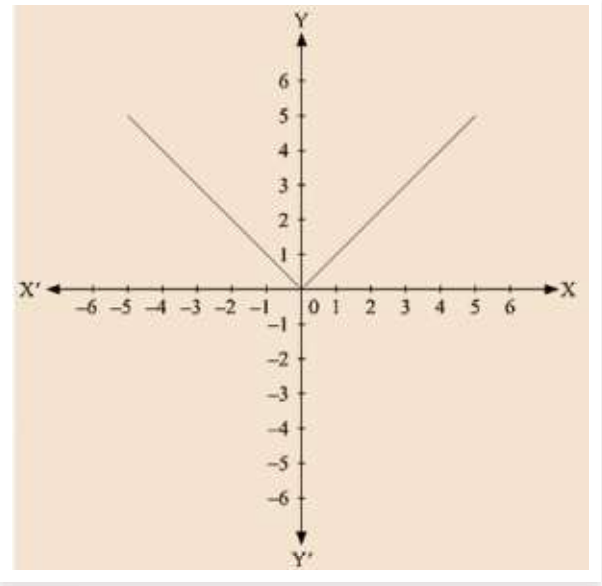
y = |x|

Substituting x = 1 , we get y = 1

Substituting x = -1, we get y = 1

Substituting x = 2, we get y = 2

Substituting x = -2, we get y = 2



For every value of x, whether positive or negative, we get y as a positive number.

Q 16: Draw the graph of y = |x| + 2.

A16:

We are given,

Y = |x|+2

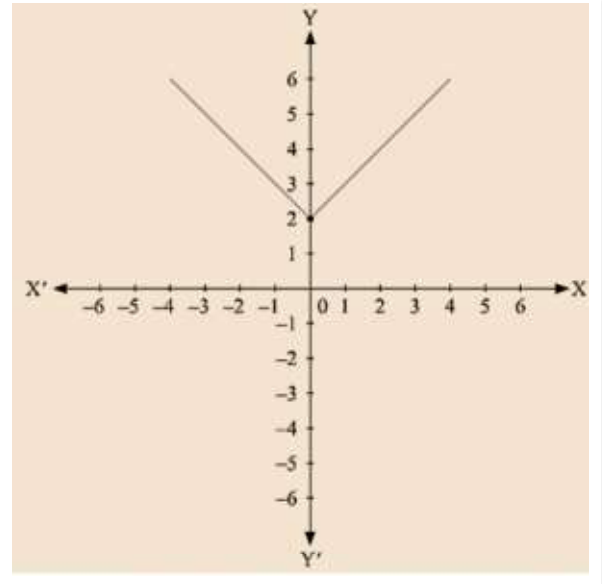
Substituting x = 0 we get y=2

Substituting x = I , we get y=3

Substituting x =-1 , we get Y = 3

Substituting x = 2, we get y = 4

Substituting x = -2, we get y = 4



For every value of x, whether positive or negative, we get y as a positive number and the minimum value of y is equal to 2 units.

Q 17 : Draw the graphs of the following linear equations on the same graph paper: 2x + 3y = 12, x − y = 1 Find the coordinates of the vertices of the triangle formed by the two straight lines and the y-axis. Also, find the area of the triangle.

A17:

We are given,

2x +3y =12

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

Now, substituting x = 0 in $y = \frac{12-2x}{3}$, we get

y =4

Substituting x=6 in $y = \frac{12-2x}{3}$, we get

y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	6
Y	4	0

Plotting A(0,4) and E(6,0) on the graph and by joining the points , we obtain the graph of equation

2x+3y=12.

We are given,

x − y = 1

We get, y = x − 1

Now, substituting x = 0 in y=x-1,

we get y = -1

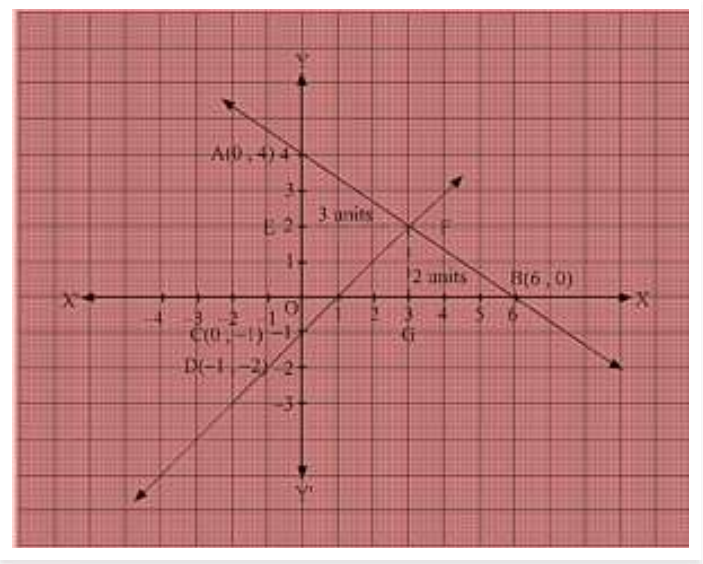
Substituting x in y=x-1,

we get y = -2

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	-1
Y	-1	-2

Plotting D(0,) and E(-1,0) on the graph and by joining the points , we obtain the graph of equation x— y = I .



By the intersection of lines formed by 2x + 3y = 12 and x—y=1 on the graph, triangle ABC is formed on y axis.

Therefore, AC at y axis is the base of triangle ABC having AC = 5 units on y axis.

Draw FE perpendicular from F on y axis. FE parallel to x axis is the height of triangle ABC having FE = 3 units on x axis.

Therefore, Area of triangle ABC, say A is given by A = (Base x Height)/2 =(AC x FE)/2 = (5×3)/2 =>15/2 = 7.5 sq. units

Q 18 : Draw the graphs of the linear equations 4x − 3y + 4 = 0 and 4x + 3y − 20 = 0. Find the area bounded by these lines and x-axis.

A18 :

We are given, 4x − 3y + 4 = 0

We get, $y = \frac{4x+4}{3}$

Now, substituting x = 0 in $y = \frac{4x+4}{3}$, we get

Substituting x = -I in $y = \frac{4x+4}{3}$

we get y =0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

x	0	-1
y	4/3	0

Plotting E(0, 4/3) and A (-1, 0) on the graph and by joining the points, we obtain the graph of equation

4x − 3y + 4 = 0.

We are given, 4x + 3y − 20 = 0

We get,

$y = \frac{20-4x}{3}$

Now, substituting x = 0 in $y = \frac{20-4x}{3}$, we get

y = 7

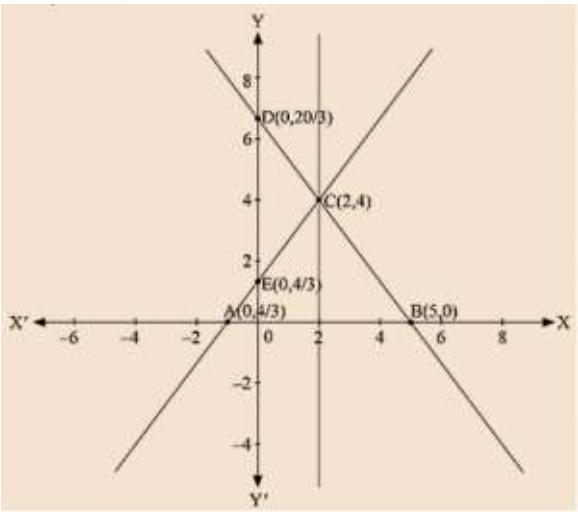
Substituting x = 5 in $y = \frac{20-4x}{3}$, we get

y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	5
Y	20/3	0

Plotting D (0,20/3) and B(5,0) on the graph and by joining the points , we obtain the graph of equation 4x +3y – 20 = 0.



By the intersection of lines formed by 4x-3y + 4 = 0 and 4x+ 3y – 20 = 0 on the graph,

Triangle ABC is formed on x axis. Therefore, AB at x axis is the base of triangle ABC having AB = 6 units on x axis.

Draw CF perpendicular from C on x axis.

CF parallel to y axis is the height of triangle ABC having CF = 4 units on y axis.

Therefore, Area of triangle ABC, say A is given by

A = (Base x Height)/2

A =(AB x CF)/2

A = (6 x 4)/2

k= 12 sq. units

Q19 : The path of a train A is given by the equation 3x + 4y -12 = 0 and the path of another train B is given by the equation 6x + 8y – 48 = 0. Represent this situation graphically.

A19:

We are given the path of train A, 3x + 4y – 12 = 0

We get,

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

Now, substituting x = 0 in $y = \frac{12-3x}{4}$, we get

Y=3

Substituting x = 4 in $y = \frac{12-3x}{4}$, we get

y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	4
Y	3	0

Plotting A(4,0) and E(0,3) on the graph and by joining the points , we obtain the graph of equation 3x+4y-12 = 0.

We are given the path of train B,

6x + 8y – 48 = 0

We get, $y = \frac{48-6x}{8}$

Now, substituting x = 0 in $y = \frac{48-6x}{8}$,we get

y=6

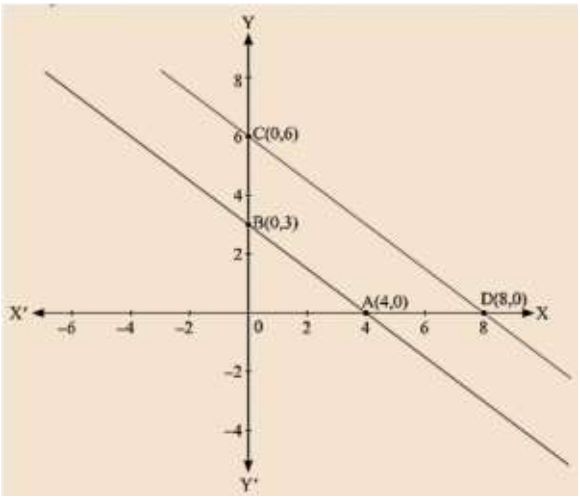
Substituting x = 8 in $y = \frac{48-6x}{8}$, we get

y=0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	8
Y	6	0

Plotting C(0,6) and D(8,0) on the graph and by joining the points , we obtain the graph of equation 6x+8y-48=0



Q 20 : Ravish tells his daughter Aarushi, "Seven years ago, I was seven times as old as you were then. Also, three years from now, I shall be three times as old as you will be". If present ages of Aarushi and Ravish are x and y years respectively, represent this situation algebraically as well as graphically.

A20:

We are given the present age of Ravish as y years and Aarushi as x years.

Age of Ravish seven years ago = y − 7

Age of Aarushi seven years ago = x − 7

It has already been said by Ravish that seven years ago he was seven times old then Aarushi was then

So, y − 7 = 7 (x − 7)

Y − 7 = 7 x − 49

7x − y = − 7 + 49

7x − y − 42 = 0 ——(1)

Age of Ravish three years from now = y + 3

Age of Aarushi three years from now = x+3

It has already been said by Ravish that three years from now he will be three times older then Aarushi will be then So,

Y + 3 = 3 (x + 3)

y + 3 = 3x + 9

3x + 9 − y − 3 = 0

3x − y + 6 = 0 ——(2)

(1) and (2) are the algebraic representation of the given statement.

We are given,

7x − y- 42 = 0

We get,

Y = 7x – 42

Now, substituting x = 0 in y = 7x —42,

we get y = -42

Substituting x = 6 in y = 7x – 42,

we get y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	6
Y	-42	0

We are given,

3x – y + 6 =0

We get,

Y = 3x + 6

Now, substituting x=0 in y = 3x + 6,

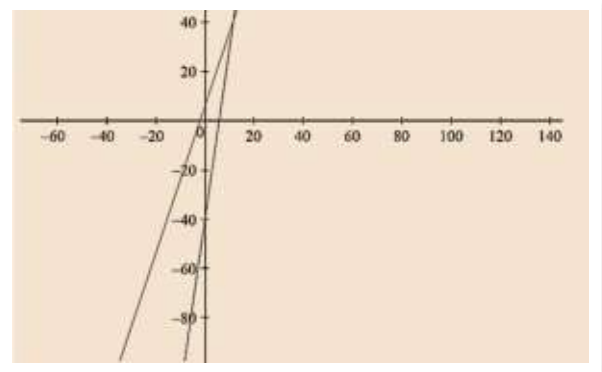
We get y = 6

Substituting x= —2 in y = 3x + 6,

We get y = 0

Thus, we have the following table exhibiting the abscissa and ordinates of points on the line represented by the given equation

X	0	-2
Y	6	0



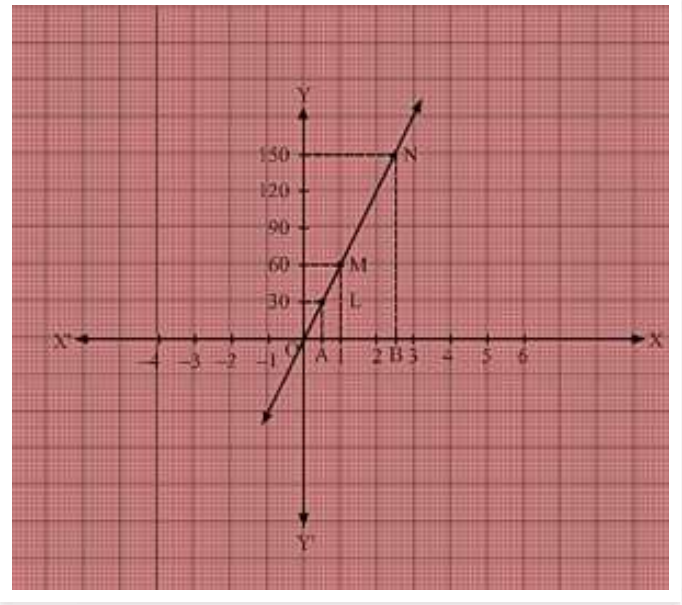
The red -line represents the equation 7x—y-42 =0.

The blue-line represents the equation 3x —y +6 =0.

Q21: Aarushi was driving a car with uniform speed of 60 km/h. Draw distance-time graph From the graph, find the distance travelled by Aarushi in (i) $2\frac{1}{2}$ ***Hours (ii)*** $\frac{1}{2}$ ***Hour***

A21:

Aarushi is driving the car with the uniform speed of 60 km/h. We represent time on X-axis and distance on Y-axis Now, graphically



We are given that the car is travelling with a uniform speed 60 km/hr. This means car travels 60 km distance each hour. Thus the graph we get is of a straight line.

Also, we know when the car is at rest, the distance travelled is 0 km, speed is 0 km/hr and the time is also 0 hr. Thus, the given straight line will pass through O (0 , 0) and M (1 , 60).

Join the points 0 and M and extend the line in both directions.

Now, we draw a dotted line parallel to y-axis from x = 12 that meets the straight line graph at L from which we draw a line parallel to x-axis that crosses y-axis at 30. Thus, in 12hr, distance travelled by the car is 30 km.

Now, we draw a dotted line parallel to y-axis from x = 212 that meets the straight line graph at N from which we draw a line parallel to x-axis that crosses y-axis at 150. Thus, in 212hr, distance travelled by the car is 150 km.

(i) Distance = Speed x Time Distance travelled in $2\frac{1}{2}$ hours is given by

Distance=60 x $2\frac{1}{2}$

Distance = 60 x 5/2

Distance = 150 Km

(ii) Distance = Speed x Time Distance travelled in $\frac{1}{2}$ hour is given by

Distance=60 x $2\frac{1}{2}$

Distance = 30 km

RD SHARMA

Solutions

Class 9 Maths

Chapter 13

Ex *13.4*

Q1: Give the geometric representations of the following equations

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

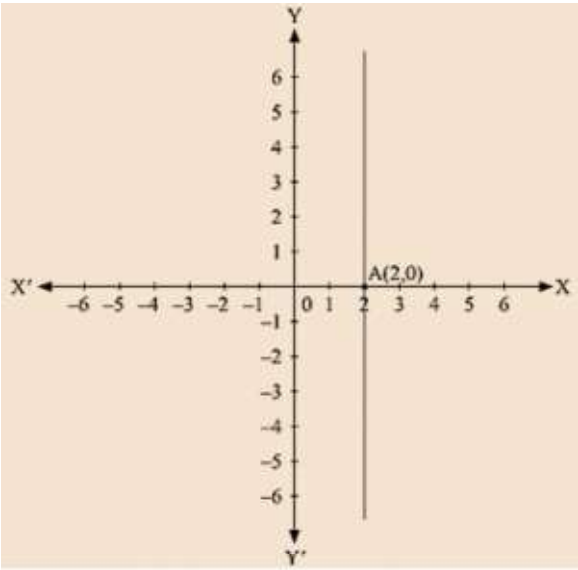
(i) x = 2 (ii) y + 3 = 0 (iii) y = 3 (iv) 2x + 9 = 0 (v) 3x − 5 = 0

Ans :

(i) We are given, x = 2

The representation of the solution on the number line, when given equation is treated as an equation in one variable.

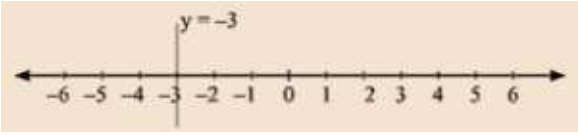
The representation of the solution on the Cartesian plane, it is a line parallel to y axis passing througl-the point (2, 0) is shown below



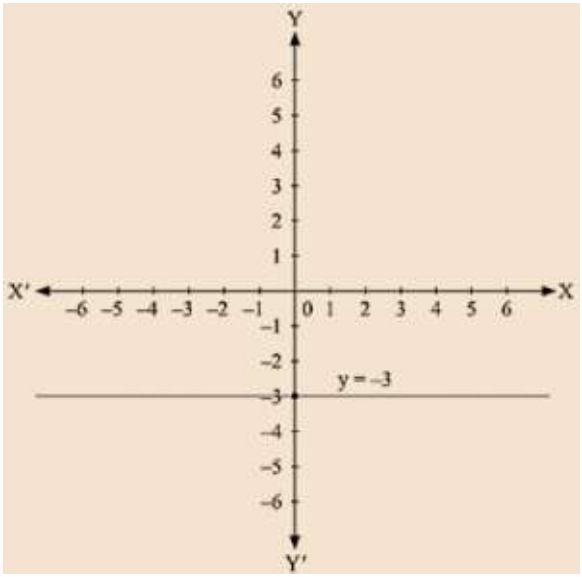
(ii) We are given, y + 3 = 0

We get, Y = -3

The representation of the solution on the number line, when given equation is treated as an equation in one variable.

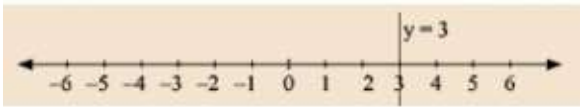


The representation of the solution on the Cartesian plane, it is a line parallel to x axis passing through the point A(0, —3) is shown below

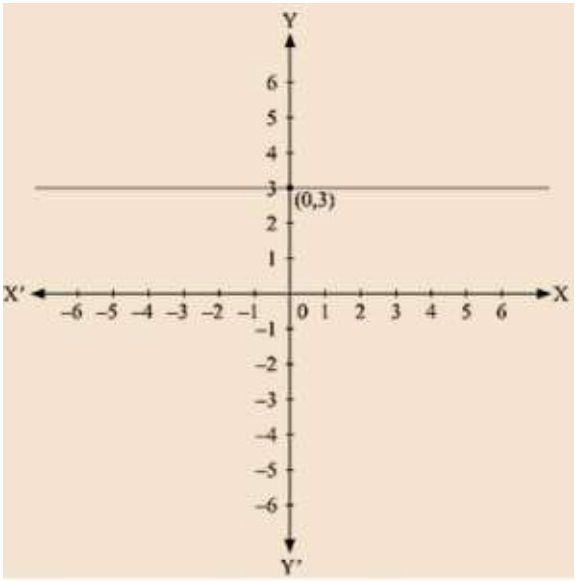


(iii) we are given. y = 3

The representation of the solution on the number line. when given equation is treated as an equation in one variable.

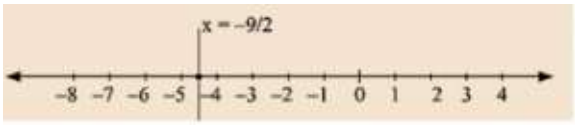


The representation of the solution on the Cartesian plane, it is a line parallel to x axis passing through the point (0, 3) is shown below

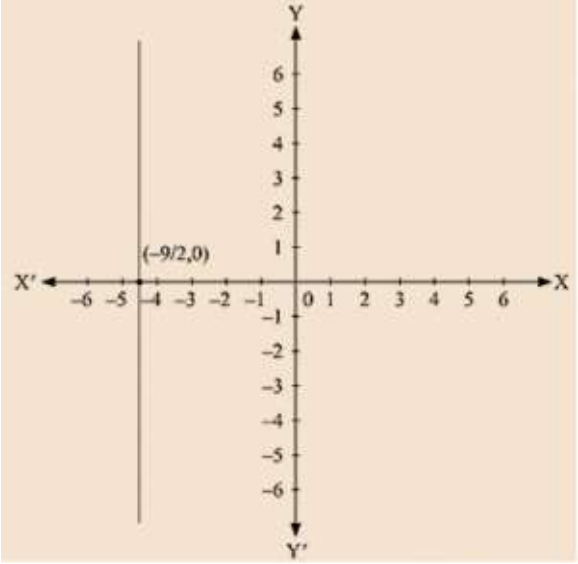


(iv) We are given, 2x +9 = 0

We get, 2x = -9 The representation of the solution on the number line, when given equation is treated as an equation in one variable.

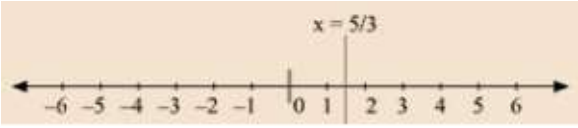


The representation of the solution on the Cartesian plane, it is a line parallel to y axis passing through the point (-9/2,0) is shown below

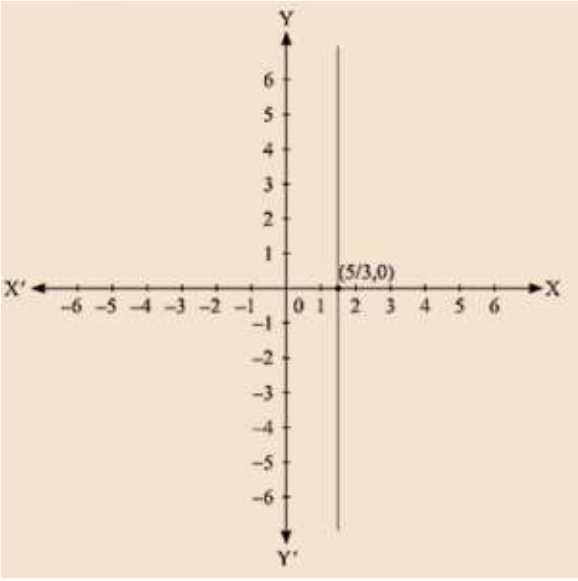


(v) We are given, 3x —5 = 0

We get, 5 x = 3 The representation of the solution on the number line, when given equation is treated as an equation in one variable.



The representation of the solution on the Cartesian plane, it is a line parallel to y axis passing througl-the point (5,0) is shown below



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

(i) one variable (ii) two variables

Ans:

We are given,

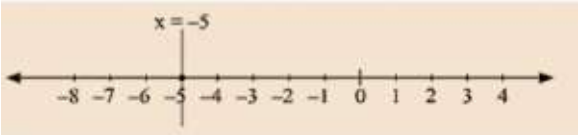
2x +13 = 0

We get,

2x = -13

x = -13/2

The representation of the solution on the number line, when given equation is treated as an equation in one variable.



The representation of the solution on the Cartesian plane, it is a line parallel to y axis passing through the point (-13/2 , 0) is shown below.

Q3:. Solve the equation 3x + 2 = x − 8, and represent the solution on

(i) the number line (ii) the Cartesian plane.

Ans : We are given,

3x + 2 = x – 8

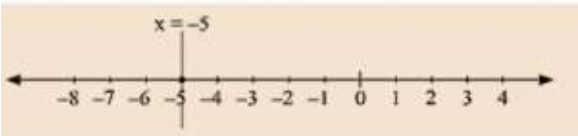
we get,

3x – x = -8 – 2

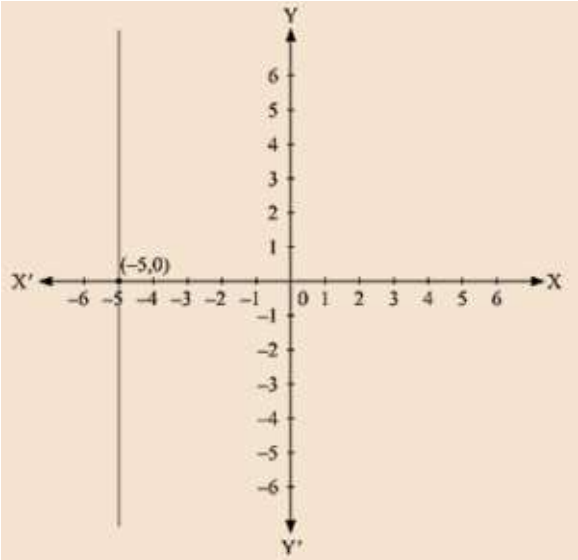
2x = -10

x = -5

The representation of the solution on the number line, when given equation is treated as an equation in one variable.



The representation Of the solution on the Cartesian plane, it is a line parallel to y axis passing through the point (-5, 0) is shown below



Q 4: Write the equation of the line that is parallel to x-axis and passing through the points

(i) (0,3) (ii) (0, – 4) (iii) (2,-5) (iv) (3,4)

Ans:

(i) We are given the co-ordinates of the Cartesian plane at (0,3).

For the equation of the line parallel to x axis, we assume the equation as a one variable equation independent of x containing y equal to 3.

We get the equation as y = 3

(ii) We are given the co-ordinates of the Cartesian plane at (0,-4).

For the equation of the line parallel to x axis, we assume the equation as a one variable equation Independent of x containing y equal to -4.

We get the equation as y = -4

(iii) We are given the co-ordinates of the Cartesian plane at (2,-5).

For the equation of the line parallel to x axis, we assume the equation as a one variable equation independent of x containing y equal to -5.

We get the equation as y = -5

(iv) We are given the co-ordinates of the Cartesian plane at (3,4).

For the equation of the line parallel to x axis, we assume the equation as a one variable equation independent of x containing y equal to 4.

We get the equation as

y = 4

Q 5 : Write the equation of the line that is parallel to y-axis and passing through the Points

(i) (4,0) (ii) (-2,0) (iii) (3,5) (iv) (- 4, – 3)

Ans:

(i) We are given the coordinates of the Cartesian plane at (4,0)-

For the equation of the line parallel to y axis ,we assume the equation as a one variable equation independent of y containing x equal to 4

We get the equation as y = 3

(ii) We are given the coordinates of the Cartesian plane at (-2,0) –

For the equation of the line parallel to y axis, we assume the equation as a one variable equation independent of y containing x equal to -2

We get the equation as y = -4

(iii) We are given the coordinates of the Cartesian plane at (3,5)-

For the equation of the line parallel to y axis, we assume the equation as a one variable equation independent of y containing x equal to 3

We get the equation as y = -5

(iv) We are given the coordinates of the Cartesian plane at (-4,-3)-

For the equation of the line parallel to y axis, we assume the equation as a one variable equation independent of y containing x equal to -4

We get the equation as y = 4