Solution

PAIR OF LINEAR EQUATION IN TWO VARIABLE WS 1

Class 10 - Mathematics

Section A

1. (a) - (iv), (b) - (iii), (c) - (i), (d) - (ii)
2. (a) - (iii), (b) - (ii), (c) - (iv), d - (i)
3. (a) - (iii), (b) - (iv), (c) - (i), (d) - (iii)

Section B

4. $3x - 4y = 7 \; and \; 5x + 2y = 3$

The given system of linear equation is $3x - 4y = 7 \; and \; 5x + 2y = 3$

Now, $3x - 4y = 7$

$y = \frac{3x-7}{4}$

When x = 1 then, y = -1

When x = -3 then y = -4

x	1	-3
y	-1	-4

Now, 5x + 2y = 3

$y = \frac{3-5x}{2}$

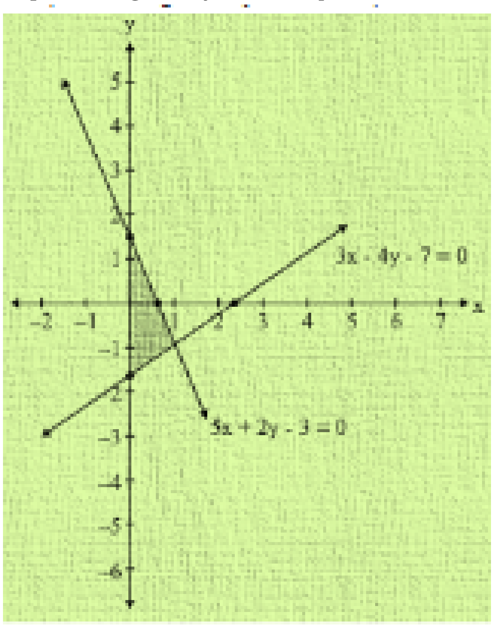
When x = 1 then, y = -1

When x = 3 then y = -6

Thus, we have the following table

x	1	3
y	-1	-6

Graph of the given system of equations are



Clearly the two lines intersect at A(1, -1)

Hence, x = 1 and y = -1 is the solution of the given system of equations.

5. Given equation is $2x + y = 6$

⇒ y = 6 - 2x.......(i)

If, $x = 0, y = 6 - 2(0) = 6$

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

x	0	3
y	6	0

Points	B	A

Given equation is $2x - y + 2 = 0$

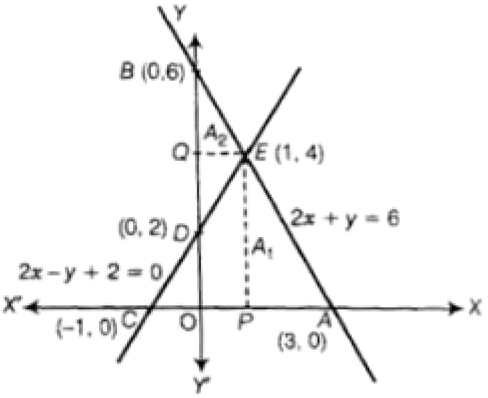
$\Rightarrow y = 2x + 2$ …(ii)

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

$x = -1, y = 2(-1) + 2 = 0$

x	0	-1
y	2	0
Points	D	C

Plotting 2*x* + *y* = 6 and 2*x* - *y* + 2= 0, as shown below, we obtain two lines AB and CD respectively intersecting at point, *E* (1, 4).



Now, A_1 = Area of ACE = $\frac{1}{2} \times AC \times PE$

$= \frac{1}{2} \times 4 \times 4 = 8$

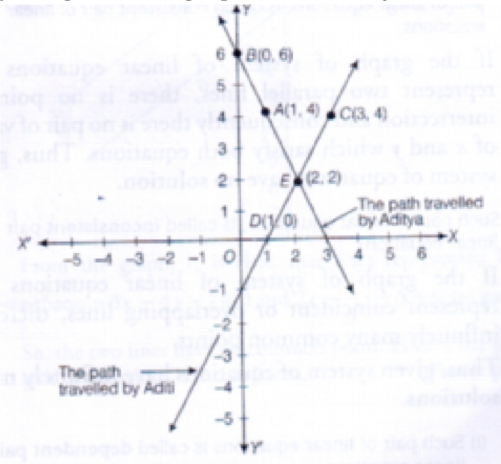
And A_2 = Area of BDE = $\frac{1}{2} \times BD \times QE$

$= \frac{1}{2} \times 4 \times 1 = 2$

$\therefore A_1 : A_2$ = 8:2 = 4: 1

$\therefore$ Ratio of areas of two $\triangle s \quad = \frac{\text{Area } \Delta\text{ACE}}{\text{Area } \Delta\text{BDE}} = \frac{8}{2} = \frac{4}{1} = 4:1$

6. Let the given points be A(1,4) , B(0,6) , C(3,4) and D(1,0).
   On plotting points A and B and joining them, we get the path travelled by Aditya. Similarly, on plotting points C and D and joining them, we get path travelled by Aditi.



   It is clear from the graph that both of them cross each other at point E(2,2).
7. The given equation are
   x + 2y + 7 = 0
   2x + ky + 14 = 0
   The given equations are of the form
   $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$,
   After comparing the given equation with standard equation
   We get, $a_1 = 1$, $b_1 = 2$, $c_1 = 7$ and $a_2 = 2$, $b_2 = k$, $c_2 = 14$
   The given equations will represent coincident lines if they have infinitely many solutions. The condition for which is

$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$
$\Rightarrow \frac{1}{2} = \frac{2}{k} = \frac{7}{14}$
$\Rightarrow$ k = 4

Hence, the given system of equations will represent coincident lines, if k = 4.

8. The solution of pair of linear equations:

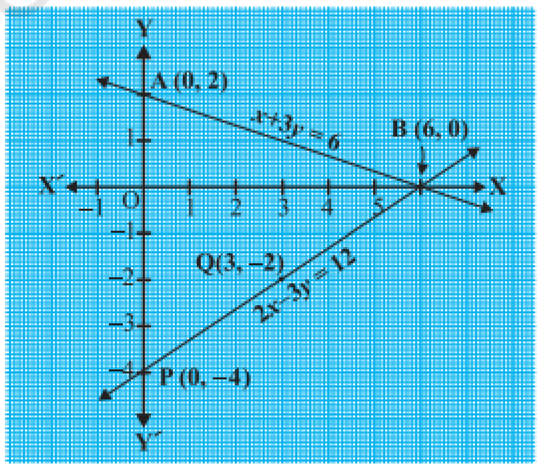
x + 3y = 6 and 2x – 3y = 12

x	0	6
$y = \frac{6-x}{3}$	2	0

and

x	0	3
$y = \frac{2x-12}{3}$	-4	-2

Plot the points A(0, 2), B(6, 0), P(0, – 4) and Q(3, – 2) on graph paper, and join the points to form the lines AB and PQ



We observe that there is a point B (6, 0) common to both the lines AB and PQ. So, the solution of the pair of linear equations is x = 6 and y = 0, i.e., the given pair of equations is consistent.

9. Given, linear equation is 2x + 3y - 8 = 0 ...(i)

Given: 2x + 3y - 8 = 0 ..... (i)

i. For intersecting lines, $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

$\therefore$ Any line intersecting with eq (i) may be taken as 3x + 2y - 9 = 0

or 3x + 2y - 7 = 0

ii. For parallel lines, $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$\therefore$ Any line parallel with eq(i) may be taken as 6x + 9y + 7 = 0

or 2x +3y - 2 = 0

iii. For coincident lines, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\therefore$ Any line coincident with eq (i) may be taken as 4x + 6y - 16 = 0

or 6x + 9y - 24 = 0

10. We have, x - 2y = 5 and 2x + 3y = 10

Now, x- 2y = 5

$\Rightarrow x = 5 + 2y$

Thus, we have the following table giving points on the line x- 2y = 5,

x	5	1
y	0	-2

Also,

2x + 3y = 10

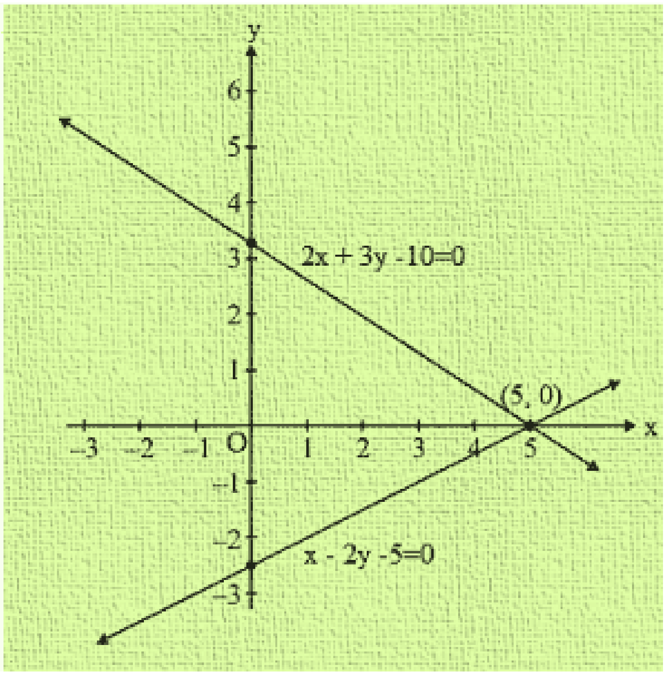
$\Rightarrow x = \frac{10-3y}{2}$

We have the following table giving points on the line 2x + 3y = 10,

x	5	2

y	0	2

Graph of the equations x - 2y = 5 and 2x + 3y = 10 is shown below.



Clearly, two lines intersect at a point P (5,0) on x-axis. Hence x = 5 and y = 0.

11. When y = x

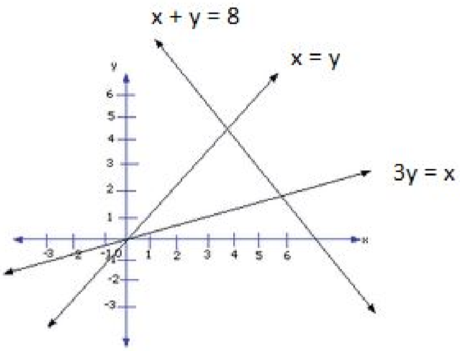
x	1	2
y	1	2

When 3y = x,

x	6	3
y	2	1

when x + y = 8 or y = 8 - x

x	4	5
y	4	3



Clearly, x = y and 3y = x, intersect at (0, 0)

x = y and x + y = 8, intersect at (4, 4)

and x + y = 8 and 3y = x, intersect at (6, 6)

12. For the equation x - y + 2 = 0,

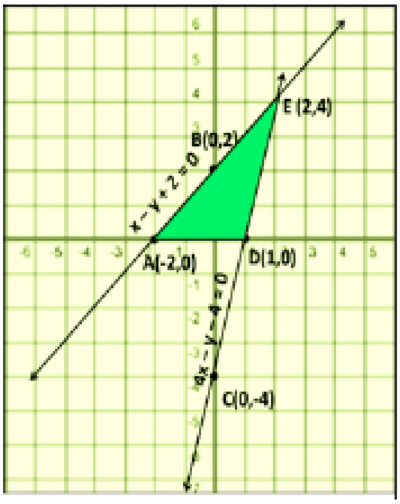
when x = 0, y = 2 and when y = 0, x = -2

Hence, let B = (0, 2) and A = (-2, 0)

For the equation 4x - y - 4 = 0,

when x = 0,y = -4 and when y = 0,x = 1

Hence, let C = (0, -4) and D = (1, 0)



We can see that triangle formed by the two lines and the x-axis is triangle EAD.

The coordinates of the triangle formed is A(-2, 0),D(1, 0) and E(2, 4)

Base = 3 units

height = 4 units

Area of triangle EAD $= \left(\frac{1}{2}\right) \times b \times h = \left(\frac{1}{2}\right) \times 3 \times 4 = 6$ sq. units.

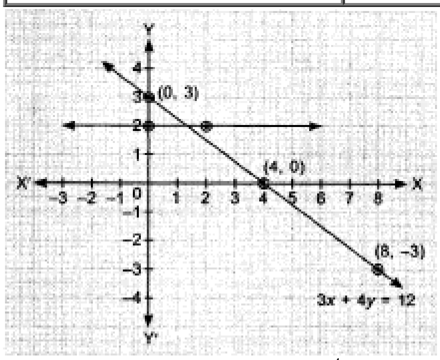
13. Given equations are $3x + 4y = 12$ and $y = 2$

Solution table for $3x + 4y = 12$ is

x	0	4	8
y	3	0	-3

Table for $y = 2$ is

x	0	1	2
y	2	2	2



$\because$ Lines intersect at one point $\left(\frac{4}{3}, 2\right)$

$\Rightarrow$ Pair of linear equations has a unique solution.

14. 3x + y = 2

$\Rightarrow$ y = 2 - 3x

x	0	1	2
y	2	-1	-4

6x + 2y = 4

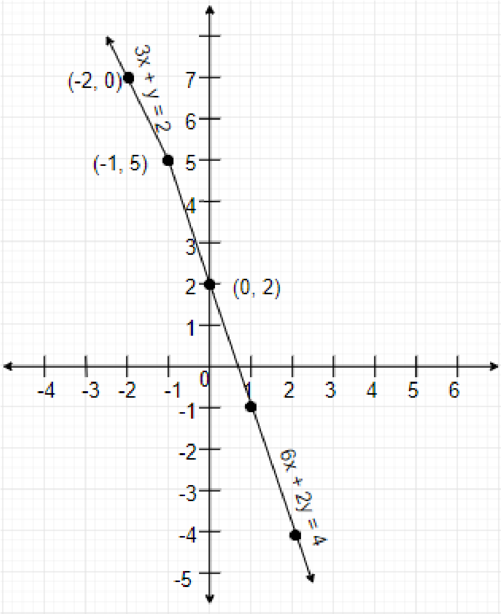
$\Rightarrow y = \frac{4-6x}{2}$

x	-1	0	-2
y	5	2	8

The two lines are coincident (overlapping).

Hence, the pair of equations is dependent.

There are infinite number of solutions i.e., every point on the line is a solution.



15. Given, x - 5y = 6 or x = 6 + 5y

x	6	1	-4
y	0	-1	-2

Thus when x = 6, y = 0

when x = 1, y = -1

when x = -4, y = -2

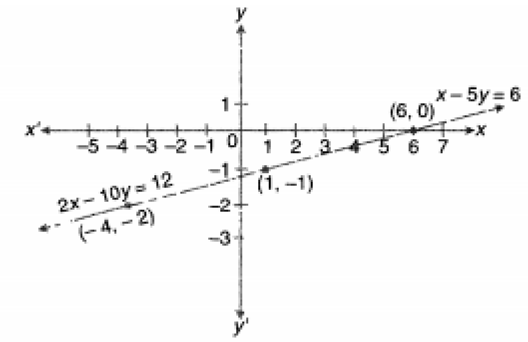
and 2x - 10y = 12 or x = 5y + 6

x	6	1	-4
y	0	-1	-2

when x = 6, y =0

when x = 1, y = -1

when x = -4,y = -2



Since the lines are coincident, so the system of linear equations is consistent with infinite many solutions

16. We have, 2x + 5y = 10

$\Rightarrow$ 2x = 10 - 5y

$\Rightarrow$ x = $\frac{10-5y}{2}$

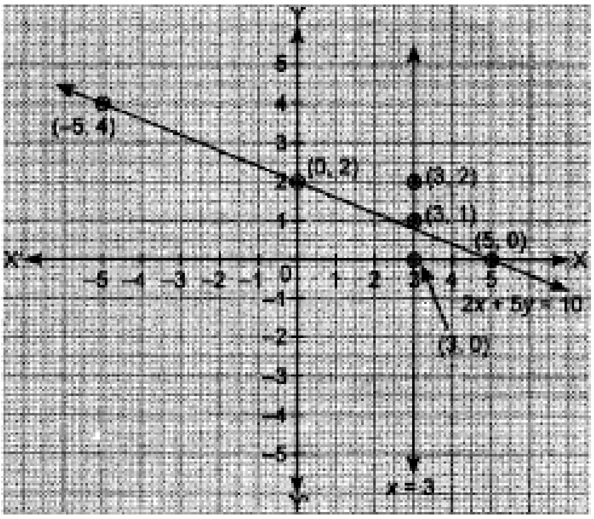
Table for 2x + 5y = 10 is

x	0	5	-5
y	2	0	4

We have, x - 3 = 0

$\Rightarrow$ x = 3

The graph of 2x + 5y = 10 and x - 3 = 0



From graph we find that lines intersect in one point.

∴ System of linear equations has unique solution.

17. 3x + y + 1 = 0

⇒ y = -3x - 1

x	0	1	-1
y	-1	-4	2

Points are (0, -1)(1, -4) and (-1, 2)

2x - 3y + 8 = 0

$\Rightarrow y = \frac{2x+8}{3}$

x	2	-1	-4
y	4	2	0

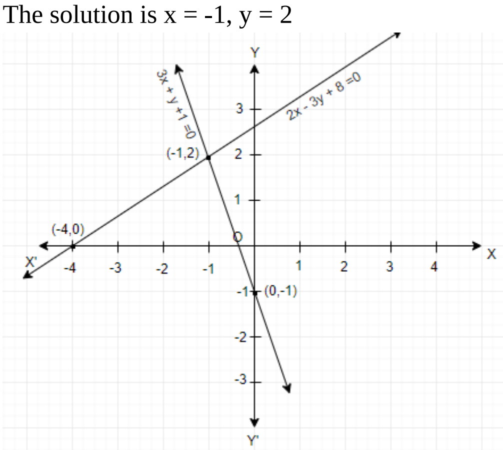
Points are (2, 4), (-1, 2) and (-4, 0)

The required graph is shown below:

The two lines intersect at (-1, 2).

Hence, the pair of equations is consistent.

The solution is x = -1, y = 2



18. Let us denote the number of pants by x and the number of skirts by y.

Then the equations formed are:

y = 2x - 2 ………… (i)

y = 4x - 4………..(ii)

From (i)

When x = 2, then y = 2

When x = 1, then y = 0

x	2	1
y	2	0

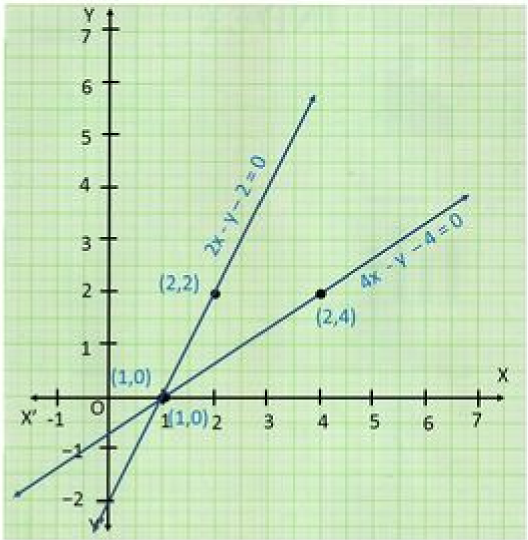
From (ii)

When x = 2, then y = 4

When x = 1, then y = 0

x	2	1
y	4	0

The graphs of two equations of line is shown below.



From the graph, the lines intersect at point (1, 0)

Thus, the value of x = 1 and y = 0

Hence, the number of pants she purchased are 2 and the number of skirts she purchased are 0.

19. x + y = 5 ...(1)

2x + 2y = 10 ...(2)

Here, a_1 = 1, b_1 = 1, c_1 = -5

a_2 = 2, b_2 = 2, c_2 = -10

We see that $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

Hence, the lines represented by the equations (1) and (2) are coincident.

Therefore, equations (1) and (2) have infinitely many common solutions, i.e., the given pair of linear equations is consistent.

Graphical Representation, we draw the graphs of the equations (1) and (2) by finding two solutions for each if the equations.

These two solutions of the equations (1) and (2) are given below in table 1 and table 2 respectively.

For equation (1) x + y = 5 ⇒ y = 5 - x

Table 1 of solutions

x	0	5
y	5	0

For equations (2) x + 2y = 10

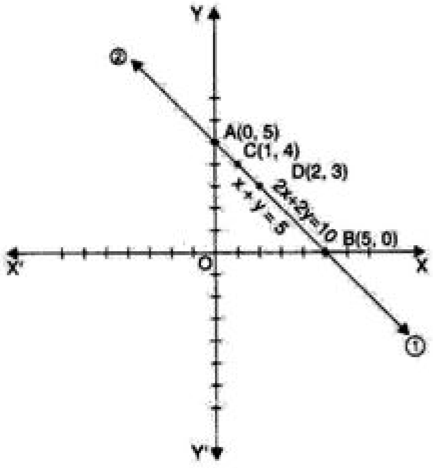
⇒ 2y = 10 - 2x

$\Rightarrow y = \frac{10-2x}{2} \Rightarrow$ y = 5 - x

Table 2 of solutions

x	1	2
y	4	3

We plot the points A(0, 5) and B(5, 0) on a graph paper and join these points to form the line AB representing the equation (1) as shown in the figure, Also, we plot the points C(1, 4) and D (2, 3) on the same graph paper and join these points to form the line CD representing the equation (2) as shown in the same figure.



In the figure we observe that the two lines AB and CD coincide.

20. First, we form a table for all three equations different value of x and y, As:

for, y = x

x	1	2	3
y	1	2	3

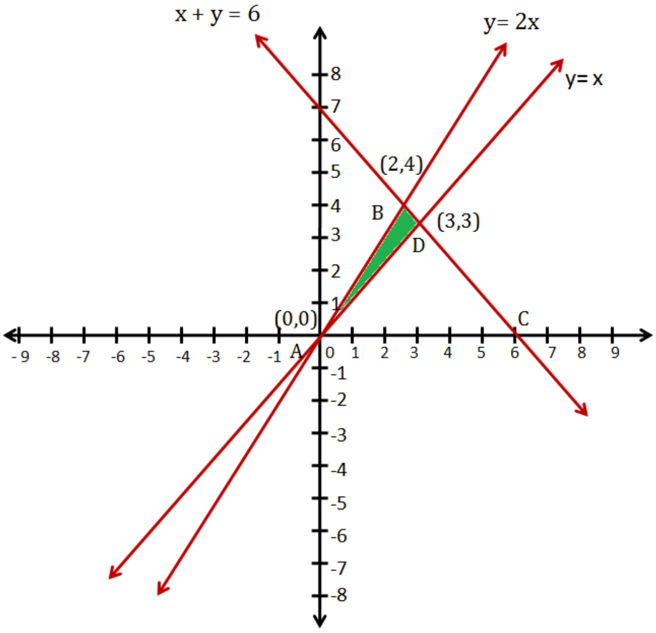
for, x + y = 6

x	6	2	3
y	0	4	3

for, y = 2x

x	1	2	3
y	2	4	6

Now we represent these points on the X-Y plane. As:



The area of the shaded region

$= A(\Delta ABC) - A(\Delta ADC)$

$= \frac{1}{2} \times$ height of $\Delta ABC \times AC + \frac{1}{2} \times$ height of $\Delta ADC \times AC$

$= \frac{1}{2} \times 4 \times 6 + \frac{1}{2} \times 3 \times 6$

= 21 cm^2

21. Let Sangeeta have x socks and y Handkerchiefs. Then the algebraic representation is given by

x + y = 40 ...(1)

and x + 5 = 4(y - 5)

⇒ x + 5 = 4y - 20

⇒ x - 4y = -25 ...(2)

To represent these equations graphically, we find two solutions for each equation, These solutions are given below:

For equation (1) x + y = 40 ⇒ y = 40 - x

Table 1 of solutions

x	20	40
y	20	0

For equation (2) x - 4y = -25

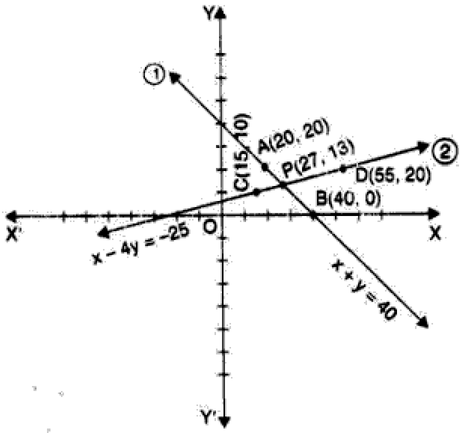
⇒ 4y = x + 25

⇒ $y = \frac{x+25}{4}$

Table 2 of solutions

x	15	55
y	10	20

We plot the points A(20, 20) and B(40, 0) Corresponding to the solutions given in table 1 On a graph paper to get the line AB representing the equation (1) and the points C(15, 10) and D(55, 20) Corresponding to the solution in table 2 on the same graph paper to get the line CD representing the equation (2),



As shown in the figure given above. We observe in figure that the two lines representing the two equations are intersecting at the point P(27, 13).

22. x + 2y = 3 ⇒ $y = \frac{3-x}{2}$

x	1	-1	3
y	1	2	0

Points are (1, 1), (-1, 2) and (3, 0)

2x + 4y = 8 ⇒ $y = \frac{8-2x}{4}$

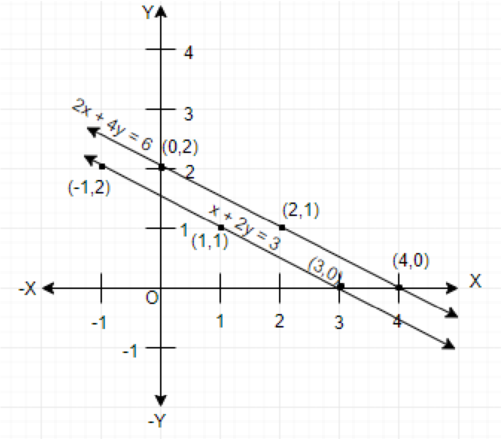
x	0	2	4
y	2	1	0

Points are (0, 2), (2, 1) and (4, 0)

The graph of the two equations represent a pair of parallel lines.

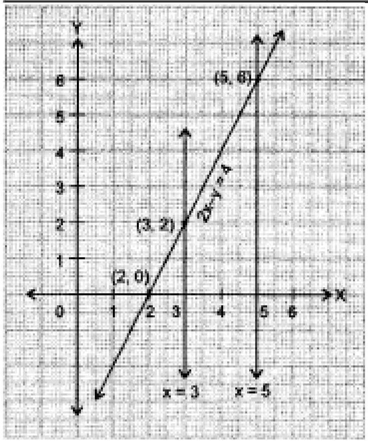
There is no common solution.

Hence, the pair of equations is inconsistent.



23. $2x - y = 4$

x	2	3	5
y	0	2	6



Quadrilateral is like trapezium whose parallel sides are $2\ units\ and\ 6\ units$. Distance between parallel sides is $2\ units.$

So, area of trapezium = $\frac{1}{2}$ $\times$ (sum of parallel sides) $\times$ (Distance between parallel sides)

=$\frac{1}{2}(2+6) \times 2 = 8sq.\,units$

Section C

24. We have to use a single graph paper and draw the graph of the following equations:

2y - x = 8; 5y - x = 14, y - 2x = 1

Also, we have to obtain the vertices of the triangle so obtained.

Graph of $2y - x = 8$:

We have, $2y - x = 8 \Rightarrow x = 2y - 8$

When y = 2, we have

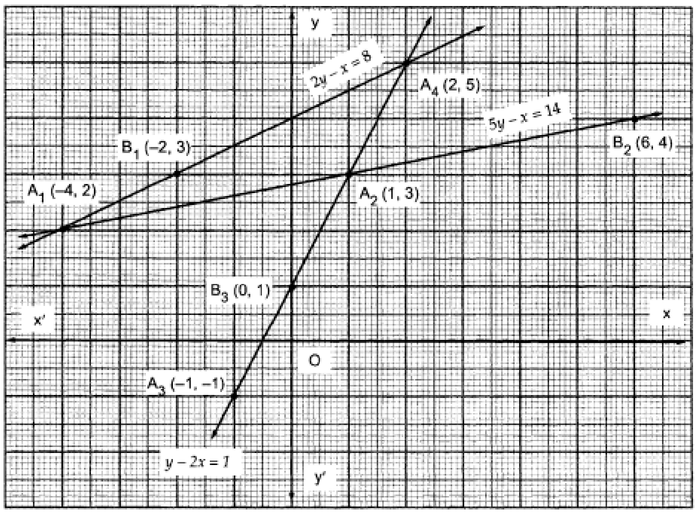
x = 2 $\times$ 2 - 8 = - 4

When y = 3, we have

x = 2 $\times$3 - 8 = 6 - 8 = -2

x	-4	-2
y	2	3

Plot the points $A_1(-4,2)\ and\ B_1(-2,3)$ on the graph paper. Join A_1 and B_1 and extend it on both sides to obtain the graph of $2y - x = 8$ as shown in Fig.



Graph of $5y-x=14$:

We have, $5y-x=14 \Rightarrow x=5y-14$

When y = 3, we have x = 5 $\times$ 3 - 14 = 15 - 14 = 1

When y = 4, we have x = 5 $\times$ 4 - 14 = 20 - 14 = 6

Thus, we have the following table:

x	1	6
y	3	4

Plot the points A_2(1, 3) and B_2(6, 4) on a graph paper. Join A_2 and B_2 and extend it on both sides to obtain the graph of 5y - x = 14 as shown in Fig.

Graph of $y-2x=1$:

We have, $y-2x=1 \Rightarrow y=2x+1$

When x = -1, we have y = 2 $\times$ -1 + 1 = -2 + 1 = -1

When x = 0, we have y = 2 $\times$ 0 + 1 = 1

x	-1	0
y	-1	1

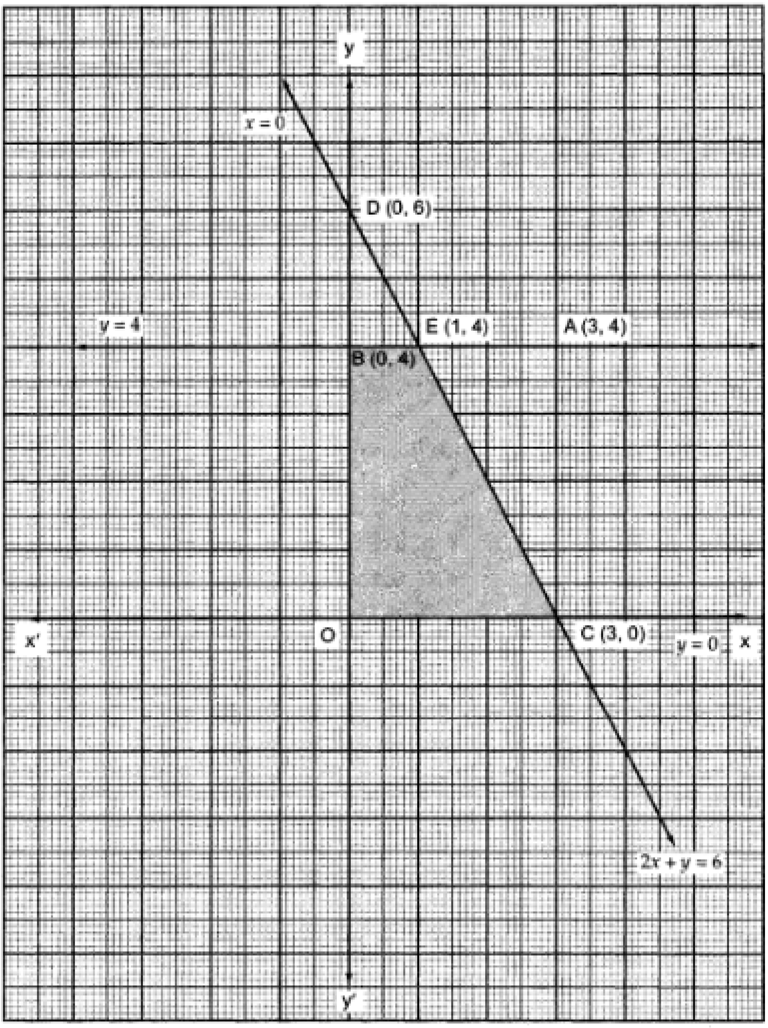
Plot the points A_3(-1 - 1) and B_3 (0,1) on the same graph paper. Join A_3 and B_3 and extend it on both sides to obtain the graph of y - 2x = 1 as shown in Fig.

From the graph of the three equations, we find that the three lines taken in pairs intersect each other at points A_1(- 4,2), A_2(1, 3) and A_4(2, 5).

Hence, the vertices of the required triangle are (-4, 2), (1, 3) and (2,5).

25. x = 0, y = 0, y = 4 and 2x + y = 6

Graph of the equation y = 4:



$2x+y=6$:

We have $2x+y=6$

When y = 0, we get x = 3 and x = 0 gives y = 6.

Thus, we obtain the following table giving coordinates of two points on the line represented by the equation $2x+y=6$.

x	3	0
y	0	6

The coordinates of its vertices are $O(0,0), C(3,0), E(1,4)\ and\ B(0,4)$.

Area of trapezium $\mathrm{OCEB}=\frac{1}{2}(OC+BE)\times OB=\frac{1}{2}(3+1)\times 4=8\mathrm{sq.}\,units$

26. Given System of Equations are,

4x - 3y = 6 .....(1)

7x + 3y = 27 .....(2)

Consider equation (1),

Put x = 0,

-3y = 6 ⇒ y = -2

Put x = 3,

12 - 3y = 6 ⇒ y = 2

Coordinates of the points are (0, -2) and (3, 2).

Consider equation (2),

Put x = 0,

3y = 27 ⇒ y = 9

Put x = 3,

21 + 3y = 27 ⇒ y = 2

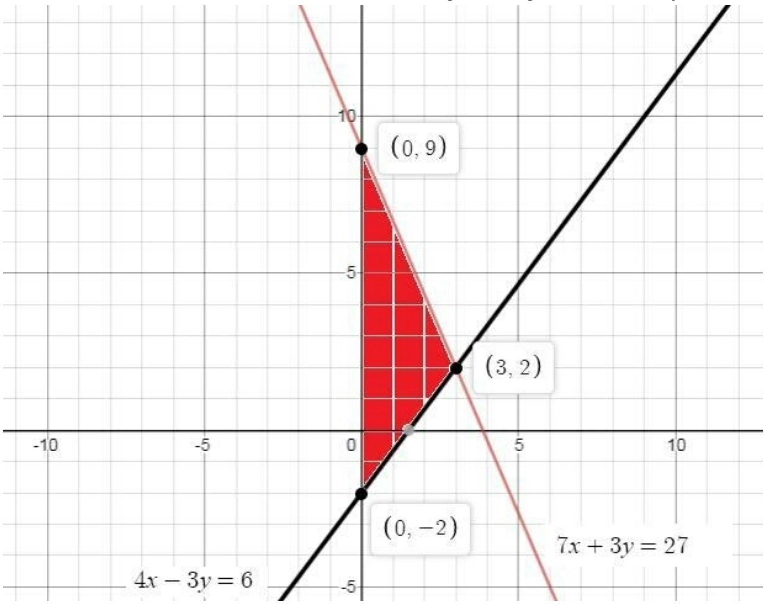
Coordinates of the point are (0, 9) and (3, 2)

Clearly, from the graph, point of the intersection of both lines is (3, 2)

So, the solution to a given lines is x = 3 and y = 2.

The shaded triangle is required one.

The coordinates of the vertices of the triangular region formed by these lines and the y-axis are (3, 2), (0, -2) and (0, 9)



27. We have, $x + y = 4 \; and \; 2x - 3y = 3$

Now $x + y = 4$

$\Rightarrow x = 4 - y$

When y = 0 then, x = 4

When y = 2 then, x = 2

Thus, we have the following table giving points on the line $x + y = 4$

x	4	2
y	0	2

Now, $2x - 3y = 3$

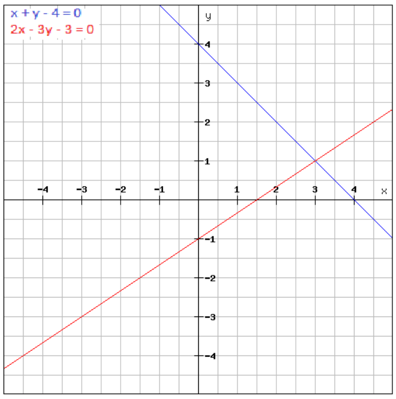
$\Rightarrow x = \frac{3y+3}{2}$

When y = 1, then x = 3

When y = -1, then x = 0

Thus, we have the following table giving points on the line $2x - 3y = 3$

x	3	0
y	1	-1



Clearly, two lines intersect at a point P(3,1)

Hence x = 3 and y = 1

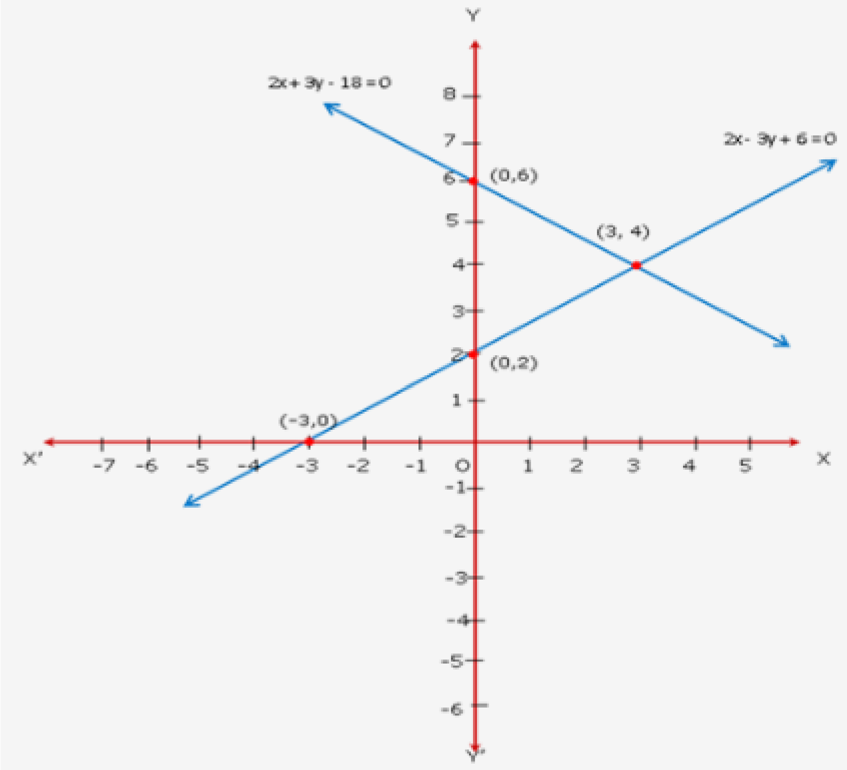
28. $2x - 3y + 6 = 0$

$\Rightarrow y = \frac{2x+6}{3}$

x	-3	0
y	0	2

$2x+3y-18=0$
$\Rightarrow y=\frac{18-2x}{3}$

x	0	3
y	6	4



Thus, the two graph lines intersect at (3, 4)

$\therefore$ x = 3 and y = 4 is the solution of given system of equations

The vertices of the triangle formed by these lines and y - axis are (3, 4), (0, 6) and (0, 2)

So, height of the triangle

= distance from (3, 4) to y-axis

= 3 units

Also base = 4 units

Area of the triangle = $\frac{1}{2}\times$ base $\times$ height

$=\frac{1}{2}\times 4\times 3$

= 6 sq. units

29. It is given that

3x - y = 7 ....(1)

2x + 5y+1 = 0 ....(2)

or, 3x - y - 7 = 0

$a_1=3, b_1=-1, c_1=-7$

$2x+5y+1=0$

$a_2=2, b_2=5, c_2=1$

$\frac{a_1}{a_2}=\frac{3}{2}$

$\frac{b_1}{b_2}=\frac{-1}{5}$

$\frac{3}{2}\neq\frac{-1}{5}$

Thus $\frac{a_1}{a_2}\neq\frac{b_1}{b_2}$

Hence, given pair of linear equations has a unique solution.

From (i) y = 3x - 7

If X = 0, we have y = -7

If X = 2, we have y = -1

If X = 3, we have y = 2

Thus, we have the following table:

x	0	2	3
y	-7	-1	2

and from (ii) 2x + 5y + 1 = 0

or, 5y = -1 - 2x

or, $y = \frac{-1-2x}{5}$

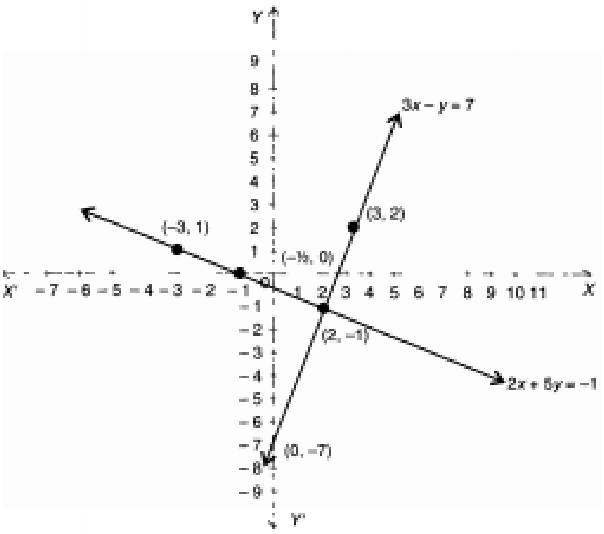
If, X = 2, we have y = -1

If X = -3, we have y = 1

Thus, we have the following table:

x	2	-3
y	-1	1

Plotting these points we get the following graph



Clearly two lines intersect at point(2, -1)

Hence x = 2 and y = - 1

30. 2x + y - 6 = 0 ...(1)

4x - 2y - 4 = 0 ...(2)

Here, $a_1 = 2$, $b_1 = 1$, $c_1 = -6$

$a_2 = 4$, $b_2 = -2$, $c_2 = -4$

We see that $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

Hence, the lines represented by the equations (1) and (2) are intersecting.

Therefore equation (1) and (2) have exactly one (unique) solution i.e., the given pair of linear equation is consistent. Graphical representation. We draw the graphs of the equations (1) and (2) by finding two solutions for each of the equations.

These two solution of the equations (1) and (2) given below in table 1 and 2 respectively.

For equation (1)

2x + y - 6 = 0

$\Rightarrow$ y = -2x + 6

Table 1 of solutions

x	0	3
y	6	0

For equation (2)

4x - 2y - 4 = 0

$\Rightarrow$ 2y = 4x - 4

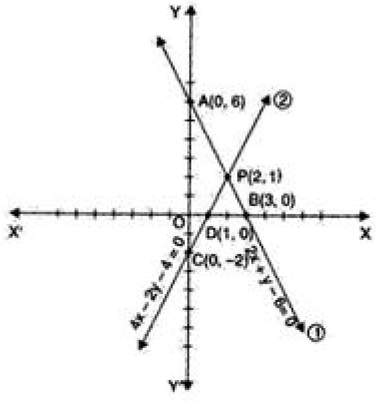
$\Rightarrow y = \frac{4x-4}{2} \Rightarrow$ y = 2x - 2

Table 2 of solutions

x	0	1
y	-2	0

We plots the points A(0, 6) and B(3, 0) on a graph paper and join these points to form the line AB representing the equation (1) as shown in the figure.

Also. we plot the points C(0, -2) and D(1, 0) on the same graph paper and join these points to form the line CD representing the equation (2) as shown in the same figure. In the figure, we observe that the same lines intersect
at the point P(2, 1). So x = 2 and y = 1 is the required unique solution of the pair of linear equations formed.



Verification : substituting x = 2 and y = 1 in (1) and (2) we find that both the equations are satisfied as shown below:

2x + y - 6 = 2(2) + 2 = 6

4x - 2y - 4 = 4(2) - 2(2) - 4 = 0

This verifies the solution.

31. Given equations,

$2x - y - 2 = 0$

$4x + 3y - 24 = 0$

$y + 4 = 0$

We have, $2x - y - 2 = 0$ or $x = \frac{y+2}{2}$

When y = 0, we have $x = \frac{0+2}{2} = 1$

When x = 0, we have y = -2.

Thus, we obtain the following table giving coordinates of two point on the line represented by the equation $2x - y - 2 = 0$ and its graph is shown below.

x	1	0
y	0	-2

Now we have, $4x + 3y - 24 = 0 \Rightarrow y = \frac{24-4x}{3}$

When y = 0, we have x = 6

When x = 0, we have y = 8

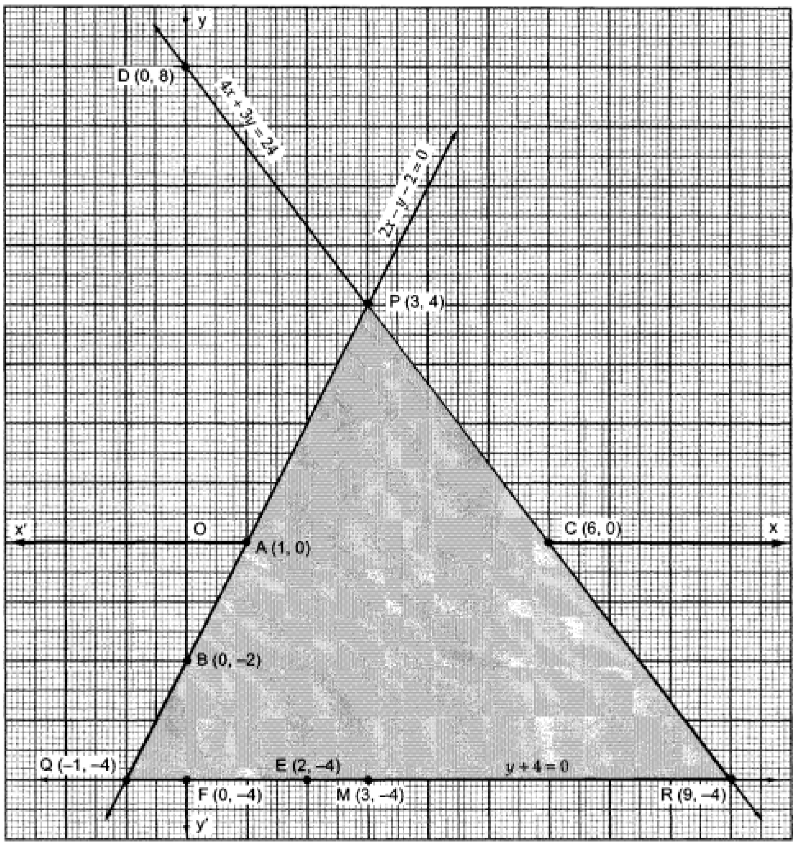
Thus, we obtain the following table giving coordinates of two points on the line represented by the equation $4x + 3y - 24 = 0$ and its graph is shown below.

x	6	0
y	0	8

Also we have $y + 4 = 0$

Clearly, y = - 4 for every value of x.

So, let E(2, -4) and F(0, -4) be two points on the line represented by y + 4 = 0. Plotting these points on the same graph and drawing a line passing through them, we obtain the graph of the line represented by the equation y + 4 = 0 as shown in Figure.



From Fig. we have $\triangle PQR$ having vertices P(3,4), Q(-1,-4) and R(9, -4).

Also, PM = 8 and QR = 10.

$\therefore$ Area of $\triangle PQR = \frac{1}{2}(\text{Base} \times \text{Height})$

$\Rightarrow$ Area of $\triangle PQR = \frac{1}{2}(QR \times PM) = \frac{1}{2}(10 \times 8) sq.\ units$

$\Rightarrow$ Area of $\triangle PQR = 40 \text{sq.}\ units.$

32. We can rewrite the equations as:

4x – y = 4 and 3x + 2y = 14

For equation, 4x – y = - 2

First, take x = 0 and find the value of y.

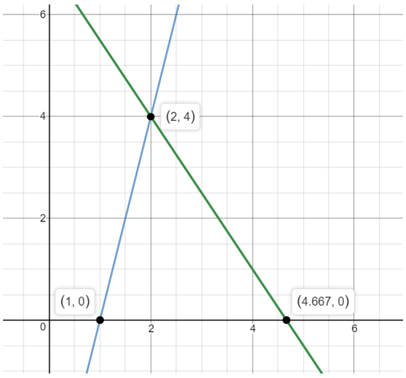
Then, take y = 0 and find the value of x.

x	0	1
y	-4	0

Now similarly solve for equation, 3x + 2y = 14

x	0	$\frac{14}{3}$
y	7	0

Plot the values in a graph and find the intersecting point for the solution.



Hence, the solution so obtained from the graph is (2,4), which is the intersecting point of the two lines.

The vertices of the formed triangle by these lines and the y - axis in the graph are A(2, 4), B(7, 0) and C(0, - 4).

Clearly, from the graph we can identify base and height of the triangle.

Now, we know

Area of Triangle = $\frac{1}{2}$ $\times$ base $\times$ height

Thus, Area(ΔABC) = $\frac{1}{2}$ $\times$ 11 $\times$ 4 [$\because$ Base = OB + OC = 7 + 4 = 11 units and height = 4 units]

Area($\triangle$ABC) = 22 sq. units

33. Given equations, $2x+y-3=0 \; and \; 2x-3y-7=0$

Now $2x+y-3=0$

$\Rightarrow y=3-2x$

When x = 0 then, y = 3

When x = 1 then, y = 1

Thus, we have the following table giving points on the line $2x+y-3=0$ and the graph is shown below.

x	0	1
y	3	1

Now, $2x-3y-7=0$

$\Rightarrow y=\frac{2x-7}{3}$

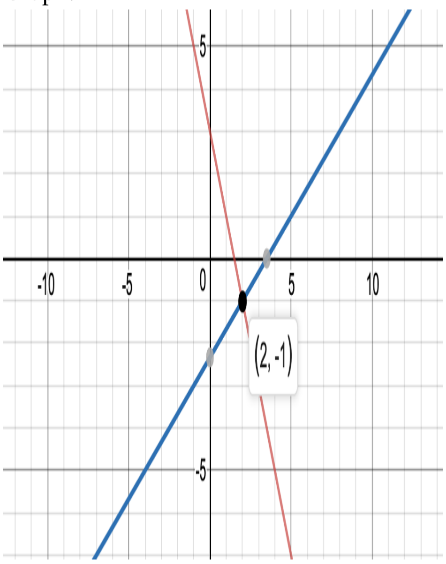
When x = 2, then y = -1

When x = 5, then y = 1

Thus, we have the following table giving points on the line $2x-3y-7=0$ and the graph is shown below.

x	2	5
y	-1	1

Graph:



Clearly two lines intersect at a point P (2, -1)

Hence x = 2 and y = -1

34. Given equations, 2x - 3y +13= 0 and 3x - 2y + 12 = 0.

Now, $2x-3y+13=0$

$\Rightarrow y=\frac{13+2x}{3}$

When x=1 then, y=5

When x=4 then, y=7

Thus, we have the following table giving points on the line 2x - 3y +13= 0.

x	1	4
y	5	7

Now, $3x-2y+12=0$

$\Rightarrow y=\frac{12+3x}{2}$

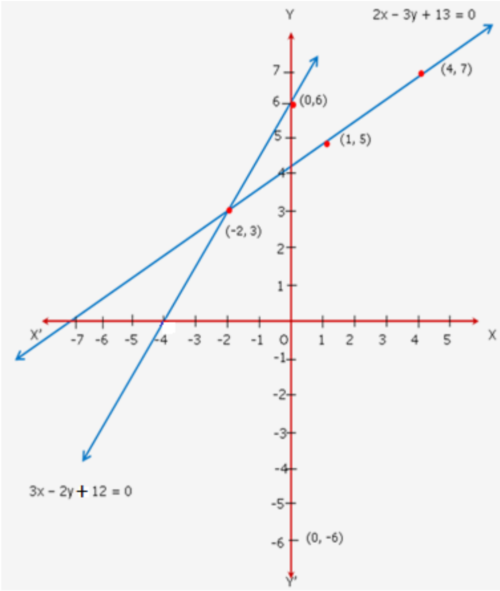
When x=0 then, y=6

When x=-2 then, y=3

Thus, we have the following table giving points on the line 3x - 2y + 12 = 0.

x	0	-2
y	6	3

Graph:



Since, the two graphs intersect at $(-2, 3)$.

Hence, $x = -2 \; and \; y = 3$.

35. Let the number of rides Akhila had on Giant wheel be x and number of times Akhila played Hoopla be y.

Given, number of times she played Hoopla is half the number of rides she had on the Giant Wheel.

$\Rightarrow y = \frac{x}{2}$

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

For above equation, we have following table

x	0	2
$y = \frac{x}{2}$	0	1

Given, each ride on giant wheel costs Rs 3, and a game of Hoopla costs Rs 4 and she spent total Rs 20 in the fair.

⇒ 3x + 4y = 20

⇒ 3x + 4y - 20 = 0 ...(ii)

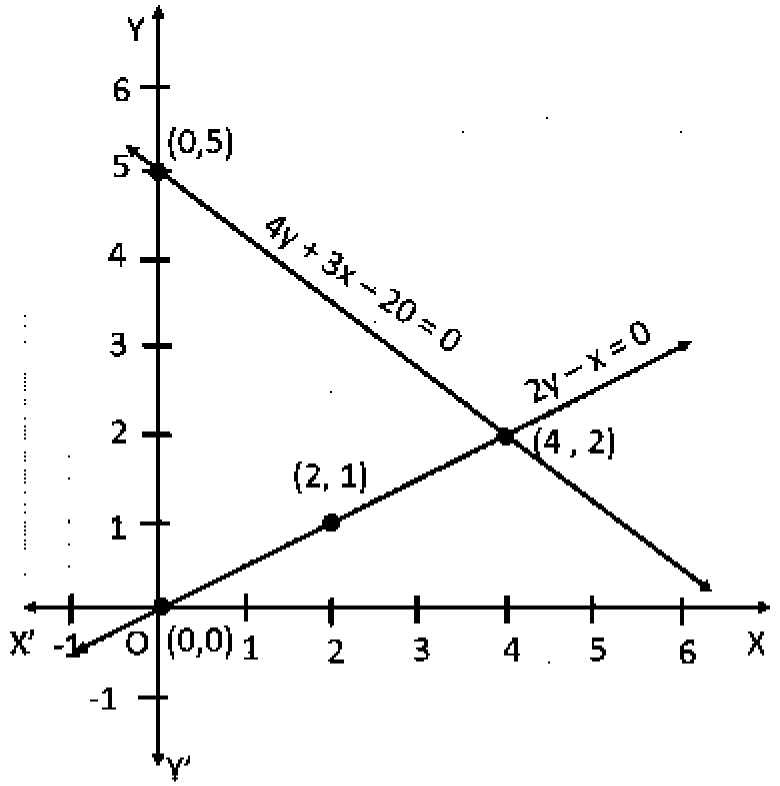
$\Rightarrow y = \frac{20-3x}{4}$

x	0	4
$y = \frac{20-3x}{4}$	5	2

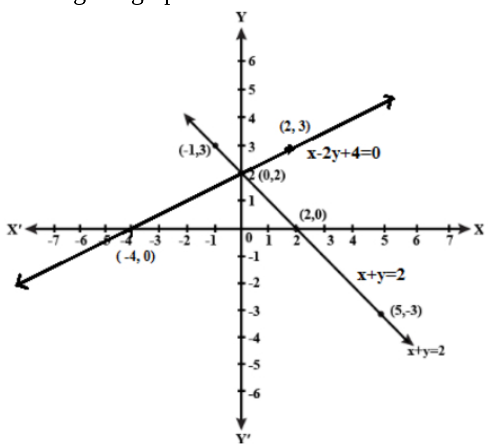
Thus, algebraically the equations are represented as:

2y - x = 0 and 3x + 4y - 20 = 0

Graphically they are represented as:



36. Plotting the graph of each line.



Solution is x = 0 and y = 2

37. We can rewrite the equations as:

2x - 5y = - 4 and 2x + y = 8

For equation, 2x - 5y = - 4

First, take x = 0 and find the value of y.

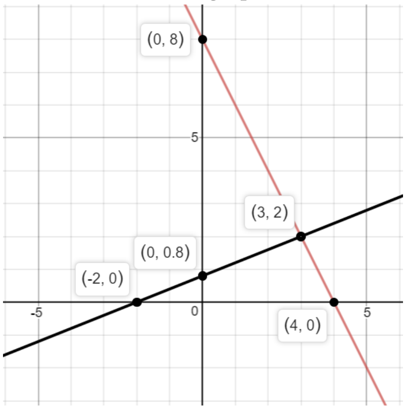
Then, take y = 0 and find the value of x.

x	0	-2
y	$\frac{4}{5}$	0

Now similarly solve for equation, 2x + y = 8

x	0	4
y	8	0

Plot the values in a graph and find the intersecting point for the solution.



Hence, the solution so obtained from the graph is (3,2), which is the intersecting point of the two lines.

The vertices of the formed triangle by these lines and the y - axis in the graph are A(3, 2), B(0, 8) and C(0, 0.8).

Clearly, from the graph we can identify base and height of the triangle.

Now, we know

Area of Triangle = $\frac{1}{2} \times$ base $\times$ height

Thus, Area($\triangle$ABC) = $\frac{1}{2} \times 7.2 \times 3$ [$\because$ Base = OB - OC = 8 - 0.8 = 7.2 units and height = 3 units]

Area($\triangle$ABC) = 10.8 sq. units

38. There are two sections X-A and X-B,

Let amount contributed by Section X-A be Rs.x

and Let amounts contributed by X-B Rs. y

x + y = 1,500 ...(i)

y - x = 100 ....(ii)

From (i) y = 1500 - x

x	0	700	1,500
y	1,500	800	0

From (ii) y= x + 100

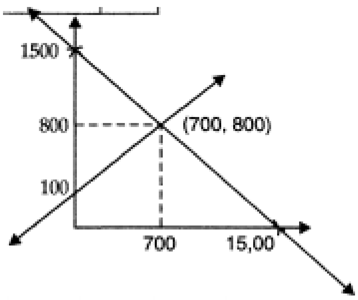
Point of intersection = (700,800)

Hence X-A contributes = Rs 700 and section X-B contributes Rs 800.

x	0	700
y	100	800

Point of intersection = (700,800)

Hence X-A contributes = Rs 700 and section X-B contributes Rs 800.



39. Given equations, $x - 2y = 5$ *and* $3x - 6y = 15$

Now, $x - 2y = 5$

$\Rightarrow x = 2y + 5$

When y = - 1 then, x = 3

When y = 0 then, x = 5

Thus, we have the following table giving points on the line $x - 2y = 5$

x	3	5
y	-1	0

Now, $3x - 6y = 15$

$\Rightarrow x = \frac{15+6y}{3}$

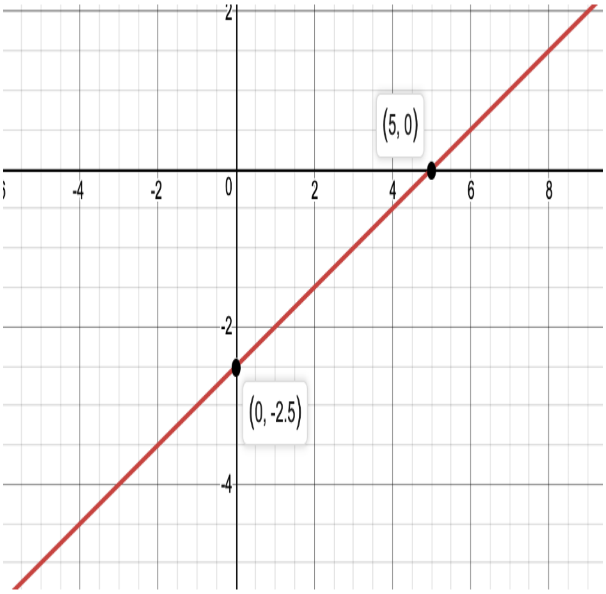
When y = 0, then x = 5

When y = -1, then x = 3

Thus, we have the following table giving points on the line $3x - 6y = 15$

x	5	3
y	0	-1

Graph:



Since the two lines are coincident, the given equations have infinitely many solutions.

40. The given system of equation is $4x - 3y + 4 = 0$ and $4x + 3y - 20 = 0$

Now, $4x - 3y + 4 = 0$

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

Solution table for $4x - 3y + 4 = 0$

x	2	-1
y	4	0

We have,

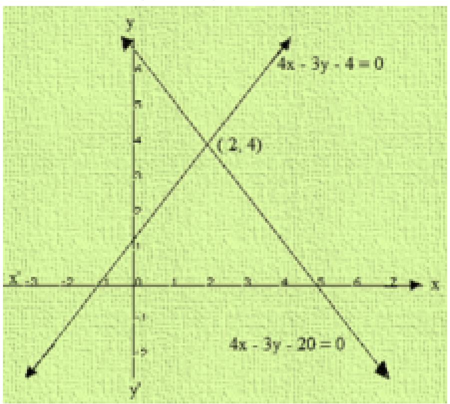
$4x + 3y - 20 = 0$

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

Solution table for $4x + 3y - 20 = 0$

x	5	2
y	0	4

Graph of the given system is:



Clearly, the two lines intersect at A(2, 4)

We also observe that the lines meet x - axis B(-1, 0) and C(5, 0)

Thus x = 2 and y = 4 is the solution of the given system of equations.
AD is drawn perpendicular A on x - axis. Clearly we have,
AD = y - coordinate point A(2, 4)
AD = 3 and BC = 5 - (-1) = 4 + 1 = 6
Area of the shaded region = $\frac{1}{2}$ × base × altitude
$= \frac{1}{2} \times 6 \times 4$
= 12 sq. units

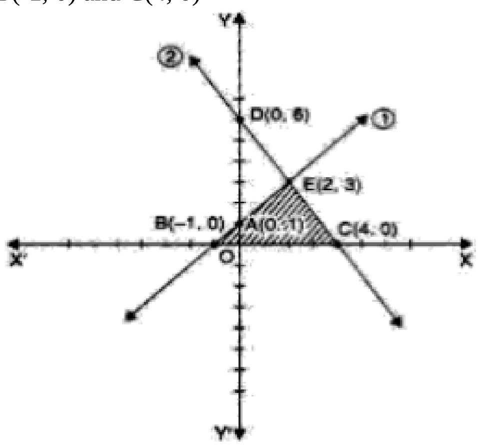
41. The given equations are
x - y + 1 = 0 ...(1)
3x + 2y - 12 = 0 ...(2)
Let us draw the graphs of equations (1) and (2) by finding two solutions for each of these equations. These two solutions of these equations (1) and (2) are given below in table 1 and table 2 respectively.
For equation (1) x - y + 1 = 0
$\Rightarrow$ y = x + 1
Table 1 of solutions

x	0	-1
y	1	0

For equation (2) 3x + 2y - 12 = 0 $\Rightarrow y = \frac{12-3x}{2}$
Table 2 of solutions

x	4	0
y	0	6

We plot the points A(0, 1) and B(-1, 0) on a graph paper and join these points to form the line AB representing the equation (1) as shown in the figure. Also, we plot the points C(4, 0) and D(0, 6) on the same graph paper and join these points to form the line CD representing the equation (2) and shown in the same figure.
In the figure, we observe that the coordinates of the vertices of the triangle formed by these given lines and the x-axis are E(2, 3), B(-1, 0) and C(4, 0)



The triangular region EBC has been shaded and the area of triangular region EBC = $\frac{1}{2}(5)(3) = \frac{15}{2}$

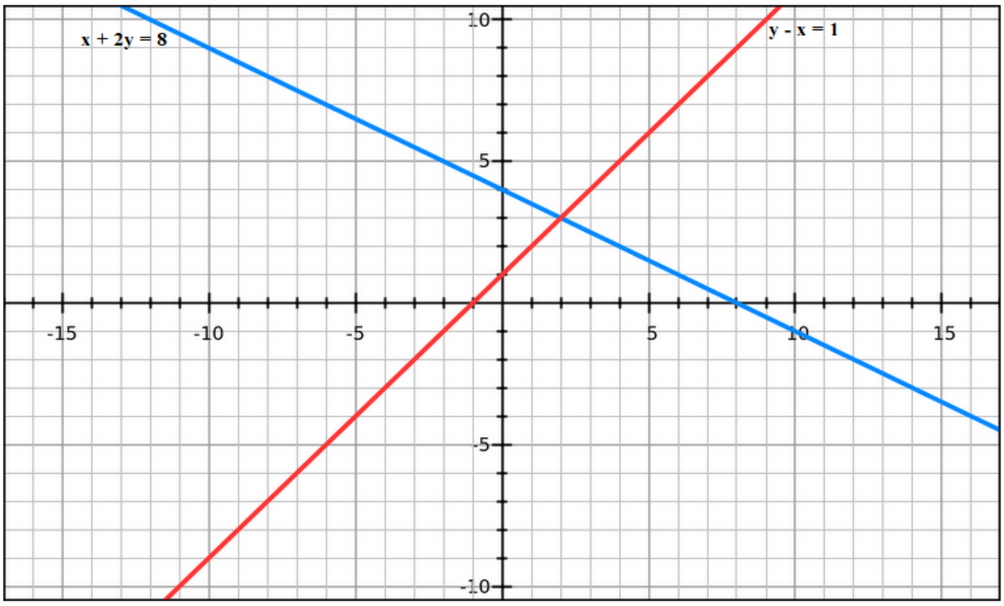
42. Given equations are
x + 2y = 8...(i)
We have,

x	8	6
y	0	1

and y - x = 1...(ii)

x	0	1
y	1	2

Therefore the graph is shown:



So, the coordinates where the lines meet the y-axis are (0,1) and (0,4).

43. Given equations are : x - y + 1 = 0 ...(i)

3x + 2 y - 12 = 0 ..(ii)

solving (i)

x - y + 1 = 0

y = x + 1

Let x = 0,

⇒ y = 0 + 1 = 1

So, x = 0, y = 1 is a solution

Let x = 1

⇒ y = 1 + 1 = 2

so, x = 1, y = 2 is a solution

x	0	1
y	1	2

Solving (ii)

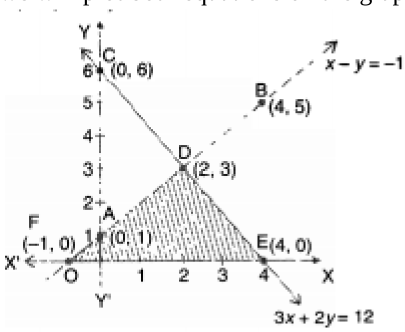
3x + 2y - 12 = 0

2y = 12 - 3x

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

x	0	2
y	6	3

we will plot both equations on the graph



Therefore, the traingle formed by the lines and x - axis is $\triangle ODE$ Where D(2,3), O(-1,0) and E(4,0).

44. Given system of equations are:

$x - y = 1$

$2x + y = 8$

Graph of the equation $x - y = 1$:

We have,

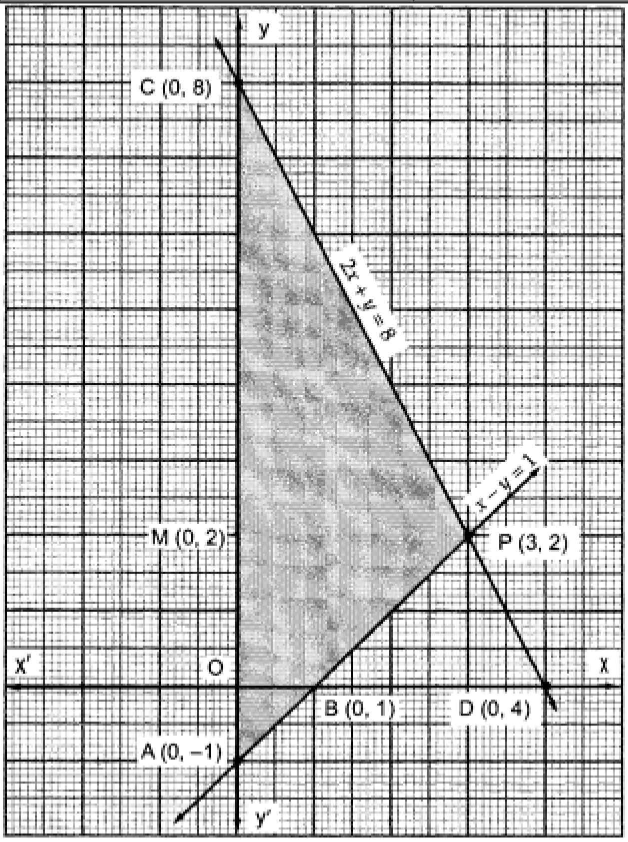
x - y = 1 ⇒ y = x - 1 and x = y + 1

Putting x = 0, we get y = -1

Putting y = 0, we get x = 1

Thus, we have the following table for the points on the line $x - y = 1$:

x	0	1
y	-1	0



Graph of the equation $2x + y = 8$:

We have,

2x + y = 8 ⇒ y = 8 - 2x and $x = \frac{8-y}{2}$

Putting x = 0, we get y = 8

Putting y = 0, we get x = 4

Thus, we have the following table giving two points on the line represented by the equation 2x + y = 8.

x	0	4
y	8	0

Clearly, the two lines intersect at P (3,2). The area enclosed by the lines represented by the given equations and the y-axis is shaded in Fig.

Now, Required area= Area of the shaded region

⇒ Required area = Area of ΔPAC

$\Rightarrow \quad \text{Required area } = \frac{1}{2}(\text{ Base } \times \text{ Height })$

$\Rightarrow \quad \text{Required area } = \frac{1}{2}(AC \times PM)$

$\Rightarrow \quad \text{Required area } = \frac{1}{2}(9 \times 3) \text{ sq.units}$ [∵ PM = x-coordinate of P = 3]

= 13.5 sq. units.

45. Given system of equations are:

$2x + y = 6$ ...(i)

$2x - y + 2 = 0$ ...(ii)

Graph of the equation $2x + y = 6$:

We have,

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

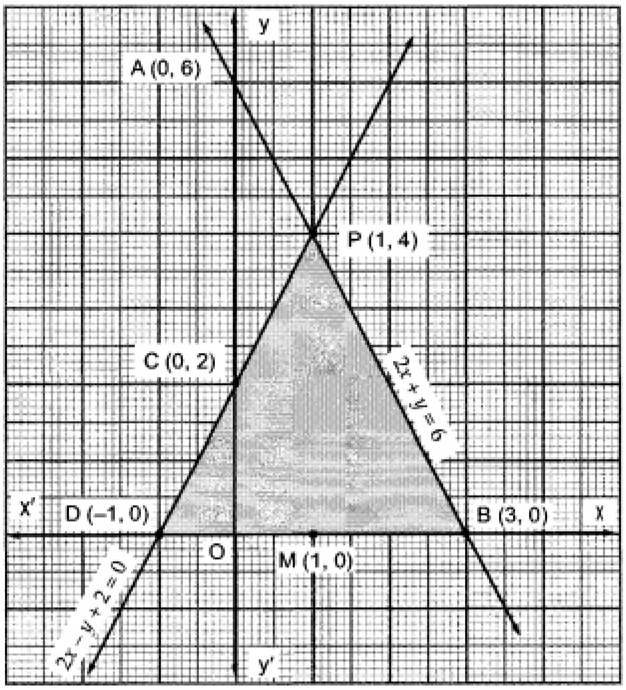
When x = 0, we have y = 6 - 2(0) = 6

When x =3, we have y = 6 - 2(3) = 6 - 6 = 0

Thus, we have the following table giving two points on the line represented by the equation $2x + y = 6$

x	0	3
y	6	0

Graph of the equation $2x - y + 2 = 0$:



We have,

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

When x = 0, we have y = 2(0) + 2 = 2

When x = -1, we have y = 2(-1) + 2 = 2 - 2 = 0

Thus, we have the following table giving two points on the line representing the given equation

x	0	-1
y	2	0

Thus, x = 1, y = 4 is the solution of the given system of equations. Draw PM perpendicular from P on x-axis

Clearly, we have

PM = y-coordinate of point P(1, 4)

$\Rightarrow$ PM=4

and, DB = 4

$\therefore$ Area of the shaded region =Area of $\triangle$PBD

$\Rightarrow$ Area of the shaded region $= \frac{1}{2}(\text{ Base } \times \text{ Height })$

$\Rightarrow$ Area of the shaded region $= \frac{1}{2}(DB \times PM)$

$\Rightarrow$ Area of the shaded region $= \left(\frac{1}{2} \times 4 \times 4\right)$ sq. units $= 8 sq. units.$

46. Let the dimensions (i.e., length and width) of the garden be x and y m respectively.

Then, x = y + 4 and $\frac{1}{2}$(2x + 2y) = 36

$\Rightarrow$ x - y = 4 ...(1)

x + y = 36 ...(2)

Let us draw the graphs of equations (1) and (2) by finding two solutions for each of the equations. These two solution of the equations (1) and (2) are given below in table 1 and table 2 respectively.

For equation (1)

x - y = 4

$\Rightarrow$ y = x - 4

Table 1 of solutions

x	4	2

y	0	-2

For equation (2) x + y = 36

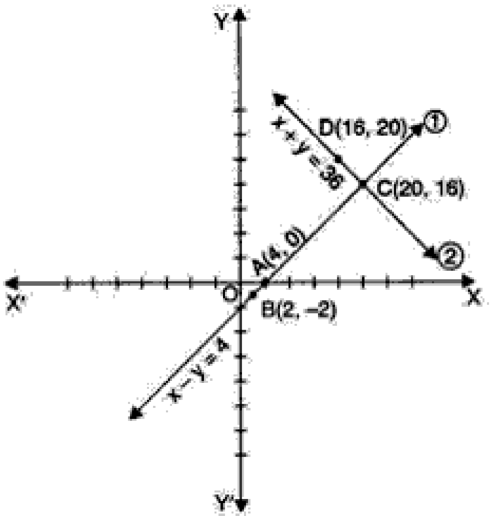
⇒ y = 36 - x

Table 2 of solutions

x	20	16
y	16	20

We plot the points A(4, 0) and B(2, -2) on a graph paper and join these points to form the line AB representing. The equation (1) as shown in the figure.

Also, we plot the points C(20, 16) and D(16, 20) on the same graph paper and join these points to form the line CD representing the equation (2) as shown in the same figure.



In the figure, we observe that the two lines intersect at the point C(20, 16) So x = 20, y = 16 is the required solution of the pair of linear equations formed. i.e., the dimensions of the garden are 20 m and 16 m.

Verification : substituting x = 20 and y = 16 in (1) and (2), we find that both the equations are satisfied as shown below:

20 - 16 = 4

20 + 16 = 36

This verifies the solution.

47. Let, the numerator and the denominator of the fraction be x and y respectively. Then the algebraical representation is given by the following equations:

$\frac{x+1}{y} = \frac{1}{2}$

⇒ 2(x + 1) = y

⇒ 2(x + 1) = y

⇒ 2x - y = -2 ...(1)

and $\frac{x}{y-1} = \frac{1}{3} \Rightarrow$ 3x = y - 1

⇒ 3x - y = -1 ...(2)

To represent these equation graphically, we find two solutions for each equation. These solution are given below:

For equation (1) 2x - y = -2

Table 1 of solutions

x	0	-1
y	2	0

For equation (2),

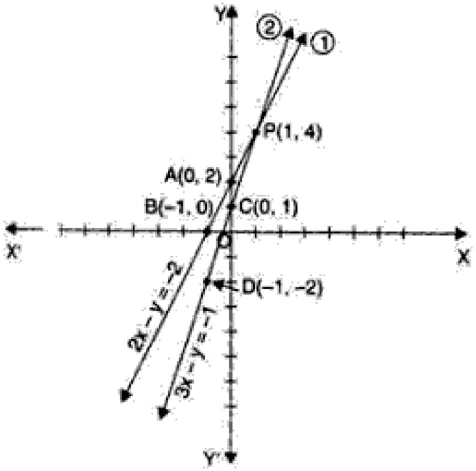
3x - y = -1

⇒ y = 3x + 1

Table 2 of solutions

x	0	-1
y	1	-2

We plot the points A(0, 2) and B(-1, 0) corresponding to the solutions in table 1 on a Graph paper to get the line AB representing. The equation (1) and the points C(0, 1) and D(-1, 2) corresponding to the solutions in Table 2 on the same graph paper to get the line CD representing the equation (2) as shown in the figure given below



We observe in the figure that the two lines representing the two equations are intersecting at the point P(1, 4).

48. We can rewrite the equations as:

x - 2y = - 2 and 2x + y = 6

For equation, x - 2y = - 2

First, take x = 0 and find the value of y.

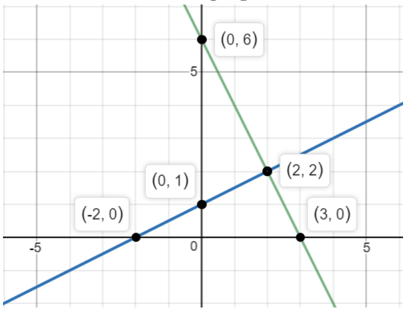
Then, take y = 0 and find the value of x.

x	0	-2
y	1	0

Now similarly solve for equation, 2x + y = 6

x	0	3
y	6	0

Plot the values in a graph and find the intersecting point for the solution.



Hence, the solution so obtained from the graph is (2, 2), which is the intersecting point of the two lines.

The vertices of the formed triangle by these lines and the x - axis in the graph are A(2, 2), B(-2, 0) and C(3, 0).

Clearly, from the graph we can identify base and height of the triangle.

Now, we know

Area of Triangle = $\frac{1}{2}$ $\times$ base $\times$ height

Thus, Area($\triangle$ABC) = $\frac{1}{2}$ $\times$ 5 $\times$ 2 [$\because$ Base = BO + OC = 2 + 3 = 5 units and height = 2 units]

Area($\triangle$ABC) = 2 sq. units

49. Let the present age of Sagar be x years and the age of Tiru be y year.

5 years ago, Sagar's age = $(x - 5)$years and Tiru's age =$(y - 5)$years

According to given condition,

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

$\Rightarrow x - 5 = 2y - 10 \Rightarrow x - 2y + 5 = 0$

After 10 yr, Sagar's age = $(x + 10)$yrs and Tiru's age =$(y + 10)$yrs

According to the given question,

$x + 10 = (y + 10) + 10$

$\Rightarrow x + 10 = y + 20 \Rightarrow x - y - 10 = 0$

Thus, we get following pair of linear equations

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

$\Rightarrow x - y - 10 = 0$ ...(ii)

Now, Let us draw the graphs of Eqs.(i) and (ii) , by finding atleast two solutions of each of the above equations. The solutions of equations are given in the following tables.

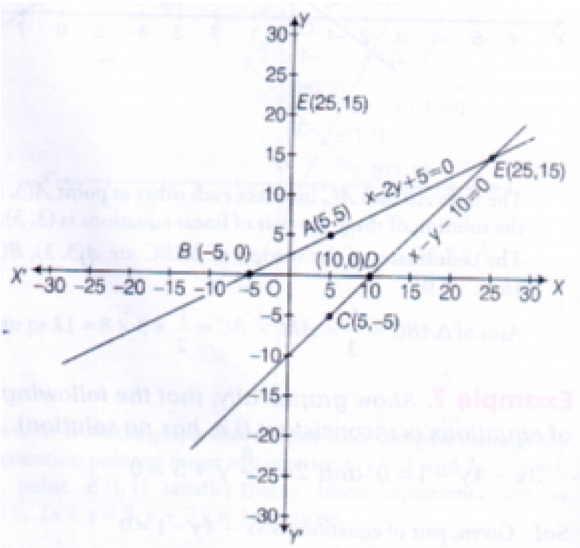
Table for $x - 2y + 5 = 0$

x	5	-5
$y = \frac{x+5}{2}$	5	0
Points	A(5,5)	B(-5,0)

Table for $x - y - 10 = 0$

x	5	10
y = x - 10	-5	0
Points	C(-5,5)	D(10,0)

Plot the points A(5,5) and B(-5,0) on a graph paper and join them to get the line AB. Similarly, plot the points C(-5,5) and D(10,0) on the same graph paper and join them to get line CD.



It is clear from the graph that, lines AB and CD intersect each other at point E(25,15).

So, $x = 25$ and $y = 15$ is the required solution.

Hence, Sagar's present age = 25 yr and Tiru's present age = 15 yr

50. Given equations are: 2x + 3 y = 12 and 3y = 12 - 2x

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

If x = 0, we have y = 4

If x = 6,we have y = 0

If x = 3 , we have y = 2

The solution table is as follows:

x	0	6	3
y	4	0	2

x - y = 1

or, y = x - 1

If x = 0, we have y = -1

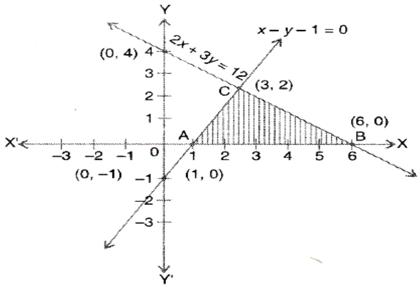
If x = 1, we have y = 0

If x = 3, we have y = 2

The solution table is as follows:

x	0	1	3
y	-1	0	2

Plotting the above points and drawing the lines joining them, we get the following graph.



The two lines intersect each other at point (3, 2).

Hence, x = 3 and y = 2.

$\triangle ABC$ is the region between the two lines represented by the given equations and the X-axis.

51. Graph for the equation:

$x+y=3$

$\Rightarrow 3-x=y$

or, $y=3-x$

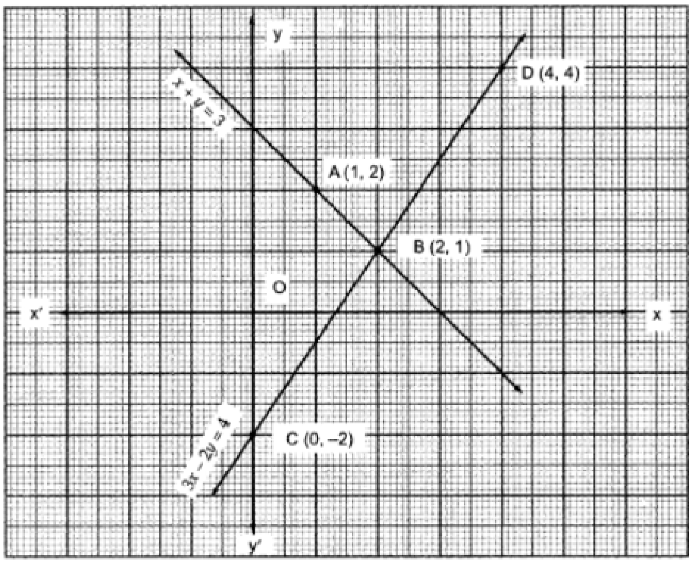
When x=1, we have

y=3 -1 =2

When x=2, we have

y=3 - 2=1

x	1	2
y	2	1



Plotting the points $A(1,2)$ *and* $B(2,1)$ and drawing a line joining them, we get the graph of the equation $x+y=3$ as shown in Fig.

Graph of the equation $3x-2y=4$:

We have,

$3x-2y=4 \Rightarrow 2y=3x-4 \Rightarrow y=\frac{3x-4}{2}$

When, x=0, we have

$y=\frac{3\times 0-4}{2}=-2$

When x=4, we have

$y=\frac{3\times 4-4}{2}=\frac{12-4}{2}=4$

x	0	4
y	-2	4

Plotting the point C (0, -2) and D (4, 4) on the same graph paper and drawing a line joining them, we obtain the graph of the equation 3x - 2y = 4.

The two lines intersect at point P(2,1).

Hence, x = 2, y = 1 is the solution of the given system.

52. x + 2y = 5......(1)

or, 2y = 5 - x

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

When x = 1, we have y = 2

When x =3, we have y = 1

When x = 5, we have y = 0

Thus, we have the following table given points on the line x + 2y = 5

x	1	3	5
y	2	1	0

2x -3y = - 4.......(2)

-3y = - 4 - 2x

or -3y = -(4 + 2x)

or, $y = \frac{2x+4}{3}$

When x = 1, we have y = 2

When x = 4, we have y = 4

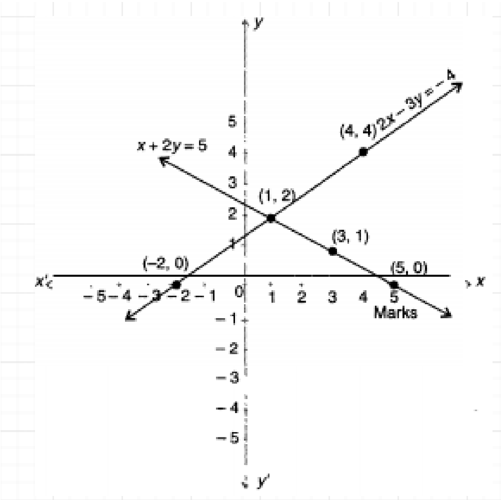
When x = -2, we have y = 0

Thus we have the following table giving points on the line 2x - 3y = -4

x	1	4	-2
y	2	4	0

Graph of the given equations x+ 2y = 5 and 2x - 3y = - 4 is as given below:

Lines meet x-axis at (5,0) and (- 2 0) respectively.



53. **Formulation**: Let the number of girls be x and the number of boys be y.

It is given that total ten students took part in the quiz.

∴ Number of girls+ Number of boys = 10

i.e. x + y =10

It is also given that the number of girls is 4 more than the number of boys.

∴ Number of girls= Number of boys + 4

i.e. x = y+4

or, x-y = 4

Thus, the algebraic representation of the given situation is

x + y=10 ....(i)

x - y =4 ....(ii)

Add (i) and (ii) we get

x + y + x - y = 10 + 4

2x = 14

x = 7

Put x = 7 in (i)

x + y = 10

7 + y = 10

y = 10 -7

y = 3

So, value of x = 7 and y = 3

Graphical Representation: Now putting y = 0 in x + y = 10, we get

x = 10. Similarly, by putting x = 0 in x + y = 10, we get y = 10.

Thus, two solution of equation (i) are:

x	10	0
y	0	10

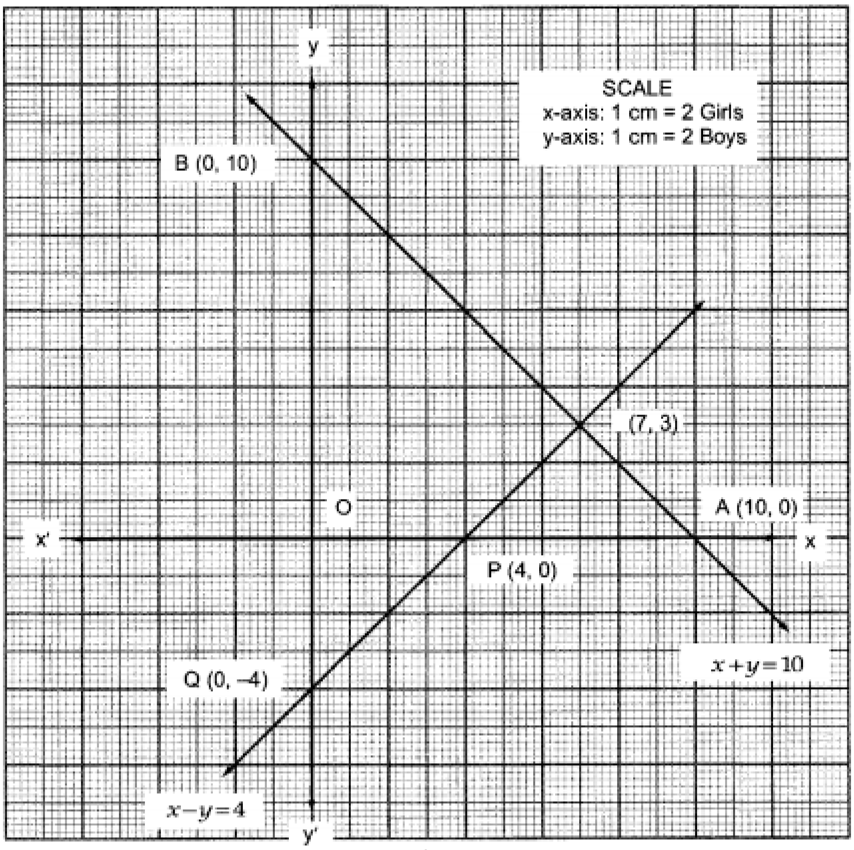
Similarly, two solutions of equation (ii) are:

putting y = 0 in x - y = 4, we get

x = 4. Similarly, by putting x = 0 in x + y = 10, we get y = -4.

x	4	0
y	0	-4

Now, we plot the points A (10, 0), B (0, 10), P (4, 0) and Q (0, -4) corresponding to these solutions on the graph paper and draw the lines AB and PQ representing the equations x + y = 10 and x - y - 4 as shown in Fig.



We observe that the two lines representing the two equations are intersecting at the point (7, 3).

54. The given system of linear equation is

3x - 5y =20............(1)

6x - 10y = -40...........(2)

We can write these equations as

3x - 5y - 20 = 0..........(3)

6x - 10y = -40................(4)

Here, a_1 = 3, b_1 = -5, c_1= -20;

a_2 = 6, b_2= -10, c_2= 40

We see that $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

Hence, the lines representing the given pair of linear equations are parallel.

Therefore, equation(1) and (2) have a common solution, i.e, the given pair of linear equations is inconsistent.

55. We can rewrite the equations as:

x - y = - 3 and 2x + 3y = 4

For equation, x - y = - 3

First, take x = 0 and find the value of y.

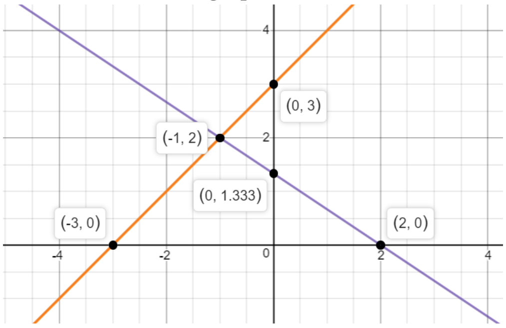
Then, take y = 0 and find the value of x.

x	0	-3
y	3	0

Now similarly solve for equation, 2x + 3y = 4

x	0	2
y	$\frac{4}{3}$	0

Plot the values in a graph and find the intersecting point for the solution.



Hence, the solution so obtained from the graph is (-1, 2), which is the intersecting point of the two lines.

Clearly, from the graph we can identify base and height of the triangle.

Now, we know

Area of Triangle = $\frac{1}{2}$ $\times$ base $\times$ height

Thus, Area(△ABC) = $\frac{1}{2} \times 5 \times 2$

[∵ Base = BO + OC = 3 + 2 = 5 units and height = 2 units]

Area(△ABC) = 5 sq. units

56. Given system of equations are:

$2x - y - 4 = 0$

$x + y + 1 = 0$

Graph of the equation $2x - y - 4 = 0$:

We have,

$2x - y - 4 = 0$

$\Rightarrow y = 2x - 4$

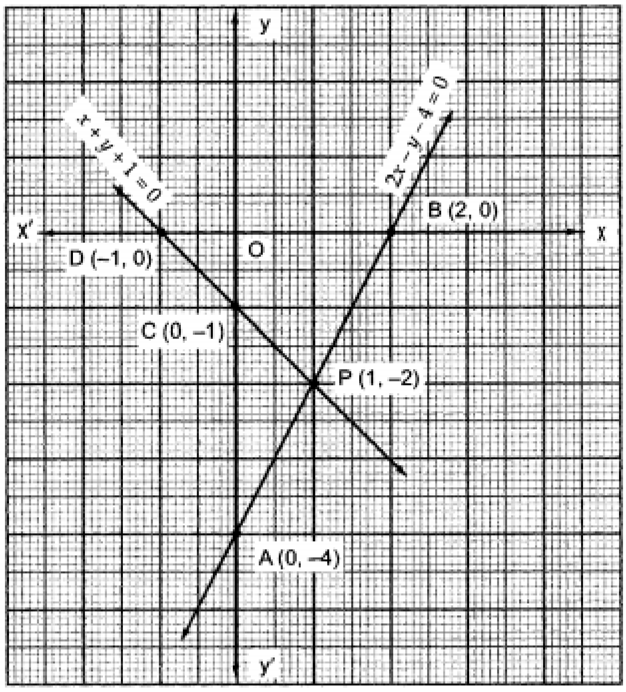
When x = 0, we have $y = 2(0) - 4 = -4$

When x = 2, we have $y = 2(2) - 4 = 4 - 4 = 0$

Thus, we have the following table giving points on the line $2x - y - 4 = 0$.

x	0	2
y	-4	0

Plotting the points $A(0, -4)\ and\ B(2, 0)$ on the graph paper on a suitable scale and drawing a line passing through these two points we obtain the graph of the line given by the equation $2x - y - 4 = 0$ as shown in Fig.



Graph of the equation x + y + 1 = 0:

We have,

x + y + 1 = 0 => y = -x - 1 and x = -y - 1.

When x = 0, we have y = -1

When x = -1, we have y = 0

Thus we have the following table giving points on the line x + y + 1 = 0

x	0	-1
y	-1	0

Plotting the points $C(0,-1)\ and\ D(-1,0)$ on the same graph paper and drawing a line passing through them, we obtain the graph of the line represented by the equation $x+y+1=0$ as shown in Fig.

Clearly, the two lines intersect at P (1,-2). Hence, $x=1, y=-2$ is the solution of the given system of equations.

From Fig, we observe that the lines represented by the equations $2x-y-4=0\ and\ x+y+1=0$ meet y-axis at A (0 ,-4) and C(0,-1) respectively.

57. It is given that

2x - y = 1

or, y = 2x - 1

If x = 0, we have y = -1

If x = 1, we have y = 1

If x = 3, we have y = 5

For y = 2x - 1

x	0	1	3
y	- 1	1	5

In second equation x + 2y = 13

or, 2y = 13 - x

or, $y=\frac{13-x}{2}$

If, x = 1, we have y = 6

If x = 3, we have y = 5

If x = 5, we have y = 4

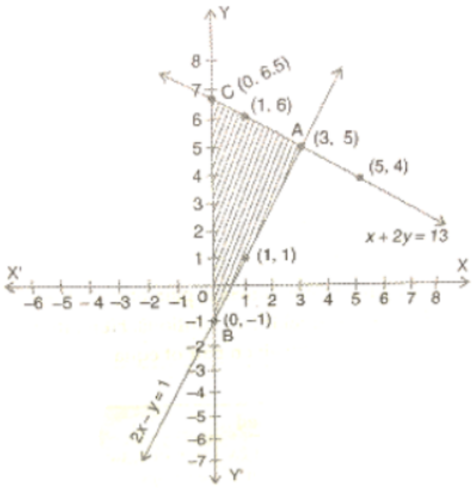
x	1	3	5
y	6	5	4

Plotting the above points and drawing the lines joining them, we get the graph of above equations.

Two obtained lines intersect at point A (3, 5)

Hence, x = 3 and y = 5

ABC is the triangular shaded region formed by the obtained lines with the Y-axis.



58. 2x + 3y = 12

2x = 12 - 3y

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

When x = 0 we have, y = 4

when x = 6 we have, y = 0

when x = 3 we have, y = 2

Thus, we have the following table

x	0	6	3
y	4	0	2

x - y = 1

or, y = x - 1

When x = 0, we have y = -1

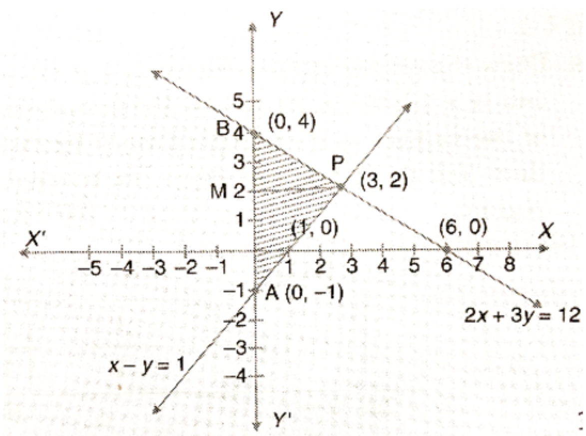
When x = 1, we have y = 0

When x = 3, we have y = 2

Thus, we have the following table

x	0	1	3
y	-1	0	2

Plotting the above points and drawing lines joining them. Graph of the given system of equations :



Clearly, the two lines intersect at point P(3,2).

Hence, x = 3 and y = 2

we also observe that the lines represented by the equations 2x + 3y = 12 and x - y = -1 meet y - axis at A(0,1) and B(0,4)

Area of shaded triangle region = Area of $\triangle PAB$

$= \frac{1}{2} \times$ base $\times$ height

$= \frac{1}{2} \times AB \times PM$

$= \frac{1}{2} \times 5 \times 3$

= 7.5 square unit.

59. x - y = 1

or, y = x - 1

When x = 2, we have y = 1

When x = 3, we have y = 2

When x= -1, we have y = -2

x	2	3	- 1
y	1	2	-2

2x + y = 8

or y = 8 - 2x

When x = 2, we have y = 4

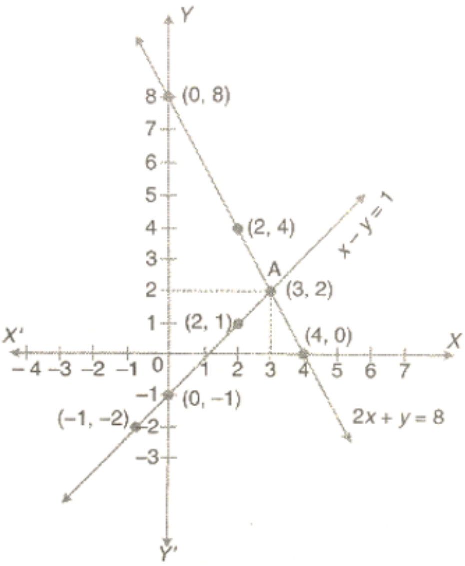
When x = 4, we have y = 0

When x = 0 , we have y = 8

x	2	4	0
y	4	0	8

Plotting the above points and drawing a line joining them, we get the graphical representation

Therefore, required graph is shown below:



The two lines intersect at point A (3, 2).

∴ Solution of given equations is x = 3, y = 2.

Again, x - y = 1 intersects y-axis at (0, -1) and 2x + y = 8 intersects y-axis at (0,8).

60. We have, $2x + y - 11 = 0 \; and \; x - y - 1 = 0$

Now, $2x + y = 11$

$\Rightarrow y = 11 - 2x$

When $y = 4 \Rightarrow x = 3$

When $y = -5 \Rightarrow x = 1$

Thus, we have the following table giving points on the line $2x + y = 11$

x	4	5
y	3	1

Now, $x - y = 1$

$\Rightarrow y = x - 1$

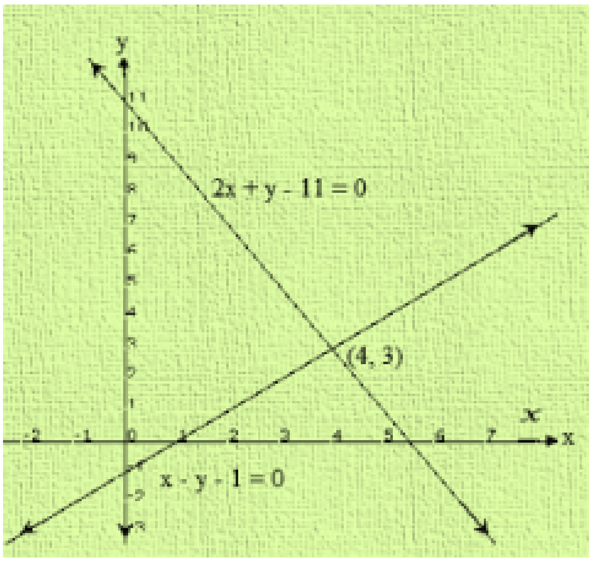
When $x = 2 \Rightarrow y = 1$

When $x = 3 \Rightarrow y = 2$

Thus, we have the following table giving points on the line $x - y = 1$

x	2	3
y	1	2

The graph of the given linear equations is:



Clearly, two intersect at (4, 3)

Hence, x = 4 and y = 3 is the solution of the given system of equations.

We also observe that the lines represented by 2x + y = 11 and x - y = 1 meet y - axis at (0, 11) and (0, - 1) respectively.

61. Graph of $3x - y = 2$:

We have, $3x - y = 2 \Rightarrow y = 3x - 2$

When x = 2, we have

y = 3 × 2 - 2 = 4

When x = 1, we have

y = 3 × 1 - 2 = 1

x	2	1
y	4	1

Plotting the points $A(2, 4)\ and\ B(1, 1)$ on the graph paper and drawing a line passing through A and B, we obtain the graph of $3x - y = 2$ as shown in Fig.

Graph of $9x - 3y = 6$:

We have, $9x - 3y = 6$

$\Rightarrow \quad y = 9x - 6$

$\Rightarrow \quad y = \frac{9x-6}{3}$

When, x = 0, We have

$y = \frac{9 \times 0 - 6}{3} = -2$

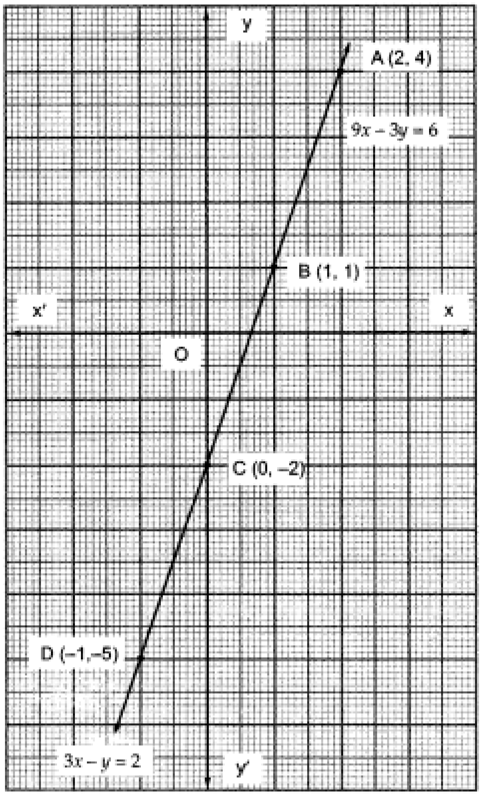
When x = -1, we have

$y = \frac{9 \times -1 - 6}{3} = -5$

x	0	-1
y	-2	-5

Plotting the points $C(0, -2) and D(-1, -5)$ on the graph paper and drawing a line passing through these two points on the same graph paper we obtain the graph of

$9x - 3y = 6$. We find the C and D both lie on the graph of $3x - y = 2$. Thus, the graphs of the two equations are coincident. Hence, the system of equations has infinitely many solutions.



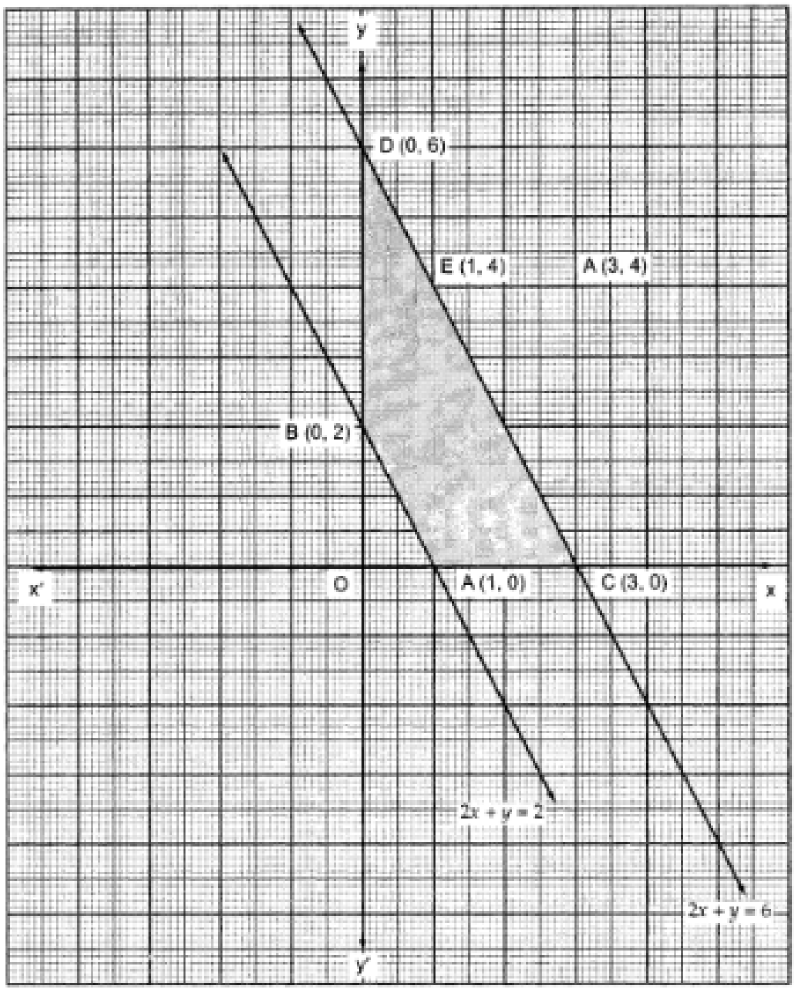
62. The given equations are $2x + y = 2 \; and \; 2x + y = 6$.
We have, $2x + y = 2$
When y = 0, we have x = 1
When x = 0, we have y = 2
Thus, we obtain the following table giving coordinates of two points on the line represented by the equation $2x + y = 2$ and the graph is shown in Figure below.

x	1	0
y	0	2

We have, $2x + y = 6$
When y = 0, we get x = 3
When x = 0, we get y = 6
Thus, we obtain the following table giving coordinates of two points on the line represented by the equation $2x + y = 6$ and the graph is shown in the Figure below.

x	3	0
y	0	6

Graph:



Clearly, lines AB and CD form trapezium ACDB having vertices A(1, 0), C(3, 0), D(0, 6), B(0, 2).

Now,

Area of trapezium ACDB = Area of $\triangle$OCD - Area of $\triangle$OAB

$= \frac{1}{2}(OC \times OD) - \frac{1}{2}(OA \times OB)$

$= \frac{1}{2}(3 \times 6) - \frac{1}{2}(1 \times 2)$

$= \frac{1}{2}$ (18 - 2)

$= \frac{1}{2}$ (16)

= 8 sq. units.

63. The given system of equations is

$2x + 3y = 8$

$x - 2y = -3$

Now,

$2x + 3y = 8$

$\Rightarrow 2x = 8 - 3y$

$\Rightarrow x = \frac{8-3y}{2}$

When $y = 2$, we have

$x = \frac{8-3\times2}{2} = 1$

When y = 4, we have

$x = \frac{8-3\times4}{2} = -2$

x	1	-2
y	2	4

We have,

$x - 2y = -3$

$\Rightarrow x = 2y - 3$

When y = 0, we have

x = 2 × 0 - 3 = -3

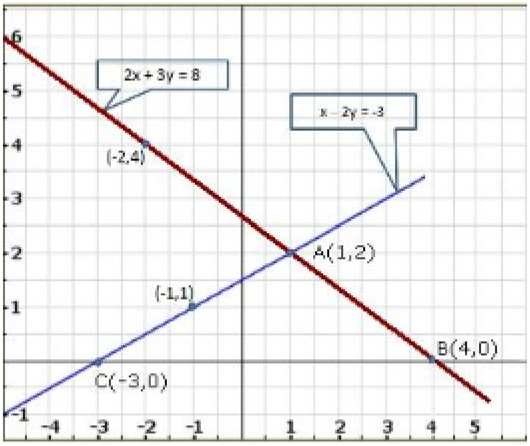
When y = 1, we have

x = 2 × 1 - 3 = -1

Thus, we have the following table;

x	-3	-1
y	0	1

Graph of the given system of equations:



Clearly, the lines intersect at A(1, 2).

Hence, x = 1, y= 2 is the solution of the given system of equations.

We also observe that the lines represented by the equations 2x + 3y = 8 and x - 2y = -3 meet x-axis at B(4, 0) and C(-3, 0) respectively.

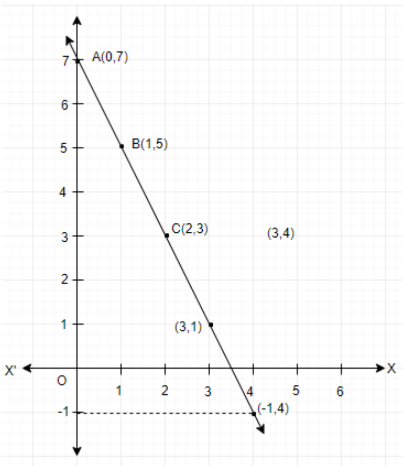
64. 2x + y = 7

⇒ y = 7 - 2x

x	0	1	2
y	7	5	3

(Steps)

i. Given equation.
ii. Write y in term s of x.
iii. Complete the table.
iv. Plot the points A(0, 7), B(1, 5) and C(2, 3) on the graph paper.
v. Join the points.
vi. Draw a horizontal line at y = -1. It intersects the line at x = 4.



vii. Draw a vertical line at x = -1.

In intersects the line AC at y = 9.

i. The point (3, 4) does not lie on the graph of the equation
ii. The point (3, 1) lies on the graph.

Hence, x = 3, y = 1 is a solution of the equation.

iii. When y = -1, x = 4
iv. When x = -1, y = 9.

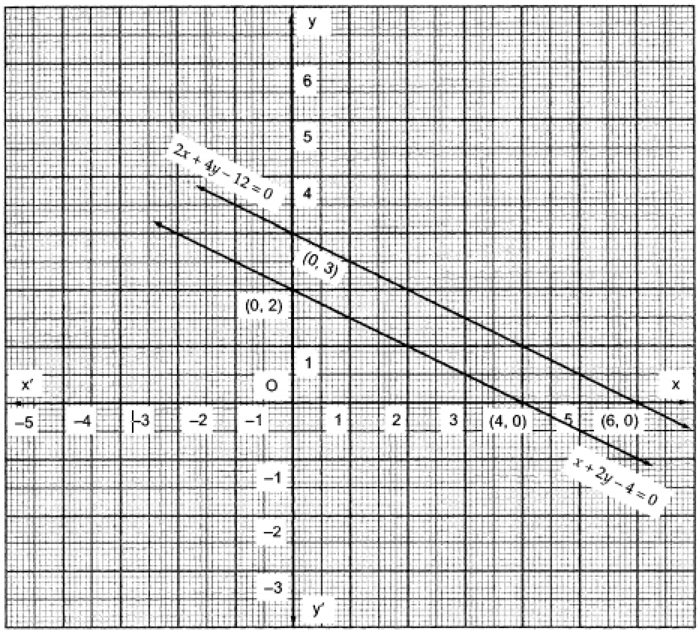
65. We have,
$x + 2y - 4 = 0$ .....(i)
Putting $y = 0$, we get
$x + 0 - 4 = 0$
$\Rightarrow x = 4$
Putting x = 0, we get
$0 + 2y - 4 = 0$
$\Rightarrow y = 2$
Thus, two solutions of equation $x + 2y - 4 = 0$ are:

x	4	0
y	0	2

We have,
$2x + 4y - 12 = 0$ .....(ii)
Putting $x = 0$, we get
$0 + 4y - 12 = 0$
$\Rightarrow y = 3$
Putting $y = 0$, we get
$2x + 0 - 12 = 0$
$\Rightarrow$ x = 6
Thus, two solutions of equation $2x + 4y - 12 = 0$ are:

x	0	6
y	3	0

Now, we plot the points A (4, 0) and B (0, 2) and draw a line passing through these two points to get the graph of the line of equation (i).
We also plot the points P (0, 3) and Q (6, 0) and draw a line passing through these two points to get the graph of the line of equation (ii).



We observe that the lines are parallel and they do not intersect anywhere.

66. The given system of linear equation is
2x - y - 5 = 0 ... (1)
x - y - 3 = 0 ...(2)
let us draw the graphs of equations (1) and (2) by finding two solutions for each of the equations. These two solutions of the equations (1) and (2) are given below in table 1 and table 2 respectively.

For equation (1) 2x - y - 5 = 0 ⇒ y = 2x - 5

Table 1 of solutions

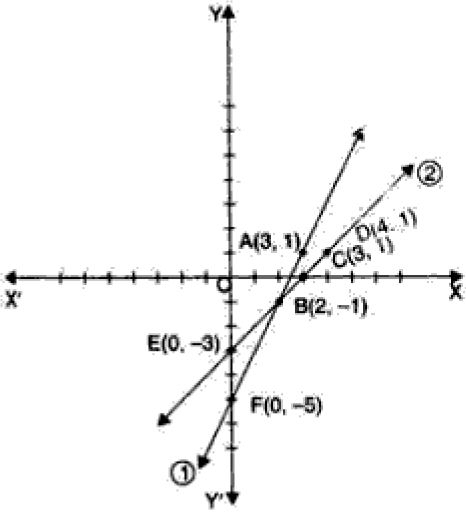
x	3	2
y	1	-1

For equation (2) x - y - 3 = 0 ⇒ y = x - 3

Table 2 of solutions

x	0	4
y	-3	1

We plot the points A(3, 1) and B(2, -1) on a graph paper and join these points to form the line AB representing the equation (1) as shown in the figure. Also, we plot the points C(0, -3) and D(4, 1) on the same graph paper and join these points to form the line CD representing the equation (2) as shown in the same figure.



In the figure, we observe that the two lines intersect at the point B (2, -1).

So, x = 2 and y = -7 is the required solution of the given pair of linear equations.

Also, we observe that the line (1) and (2) meet the y-axis in the points E(0, -3) and F(0, -5) respectively.

67. Graph of the equation $x + 3y = 6$:

We have, $x + 3y = 6 \Rightarrow x = 6 - 3y$

When y = 1, we have x = 6 - 3 =3

When y = 2, we have x = 6 - 6 = 0

Thus, we have the following table:

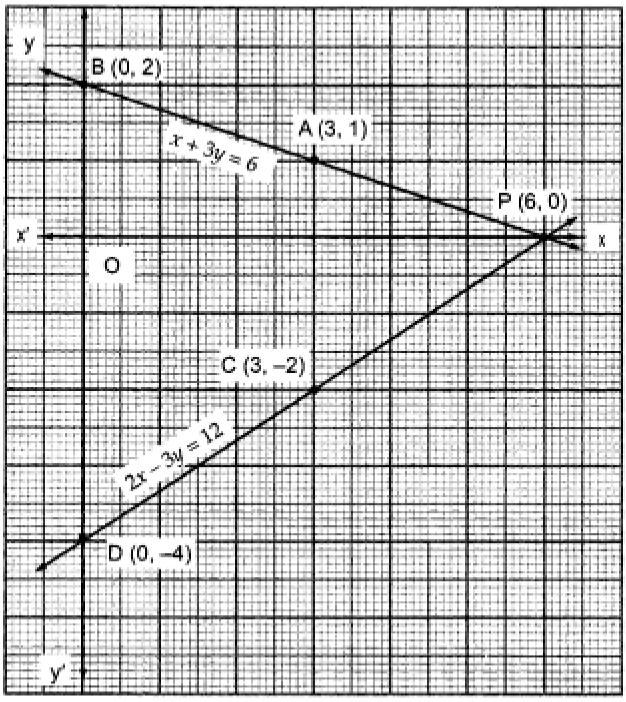
x	3	0
y	1	2

Plotting the points $A(3,1)\ and\ B(0,2)$ and drawing a line joining them, we get the graph of the equation x + 3y = 6 as shown in Fig.

Graph of the equation $2x - 3y = 12$:

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

When x=3, we have $y = \frac{2\times3-12}{3} = -2$



When x=0, we have $y=\frac{0-12}{3}=-4$

x	3	0
y	-2	-4

Plotting the points $C(3,-2)\ and\ D(0,-4)$ on the same graph paper and drawing a line joining them, we obtain the graph of the equation $2x-3y=12$ as shown in Fig.

Clearly, two lines intersect at P(6, 0).

Hence, $x=6, y=0$ is the solution of the given system of equations.

Putting x = 6, y = 0 in $a=4x+3y$, we get

a = (4 × 6) + (3 × 0) = 24

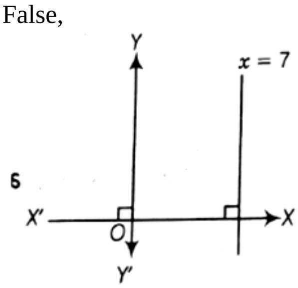
Section D

68. State True or False:

(i) **(b)** False

Explanation:

False,



From the figure, the line x = 7 is parallel to the y-axis and not the x-axis.

(ii) **(b)** False

Explanation: False

(iii) **(b)** False

Explanation: False

(iv) **(b)** False

Explanation: False

(v) **(a)** True

Explanation: True

(vi) **(a)** True

Explanation: True

(vii) **(a)** True

Explanation: True

(viii) **(a)** True

Explanation: True