

Solve the following system of equations graphically:

Q1. $x + y = 3$; $2x + 5y = 12$

Sol:

$$2x + 5y = 12$$

We have,

$$x + y = 3$$

When $y = 0$ we have $x = 3$

When $x = 0$ we have $y = 3$

Thus we have the following table giving points on the line $x + y = 3$

X	0	3
Y	3	0

Now, $2x + 5y = 12$

$$= y = \frac{12 - 2x}{5}$$

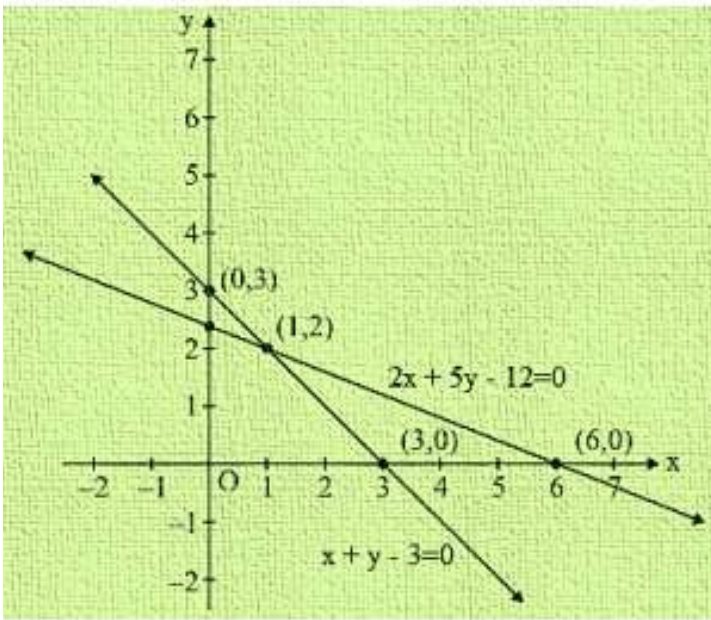
When $x = 1$, we have

$$= y = \frac{12 - 2(1)}{5} = 4$$

Thus we have the following table giving points on the line $2x + 5y = 12$

X	1	-4
Y	2	4

Graph of the equation $x + y = 3$ and $2x + 5y = 12$ is



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

Hence $x = 1$ and $y = 2$

Q2: $x - 2y = 5$, $2x + 3y = 10$

Sol:

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

Now, $x - 2y = 5$

$= x = 5 + 2y$

When $y = 0$ then, $x = 5$

When $y = -2$ then, $x = 1$

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

X	5	-1
Y	0	-2

Now, $2x + 3y = 10 \Rightarrow x = 10 - 3y$

When $y=0$, then $x=5$

When $y=2$, then $x=2$ Thus, we have the following table giving points on the line $2x+3y=10$

X	5	2
Y	0	2

Graph of the equation $x-2y=5$ and $2x+3y=10$

Clearly, two lines intersect at a point P (5,0)

Hence $x=5$ and $y=0$

Q3: $3x+y+1=0$, $2x-3y+8=0$

Sol:

We have, $3x+y+1=0$ and $2x-3y+8=0$

Now $3x+y+1=0$

$= y = -1-3x$

When $x=0$ then, $x=-1$

When $y = -1$ then, $x = 2$

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

X	-1	0
Y	2	-1

Now, $2x - 3y + 8 = 0$

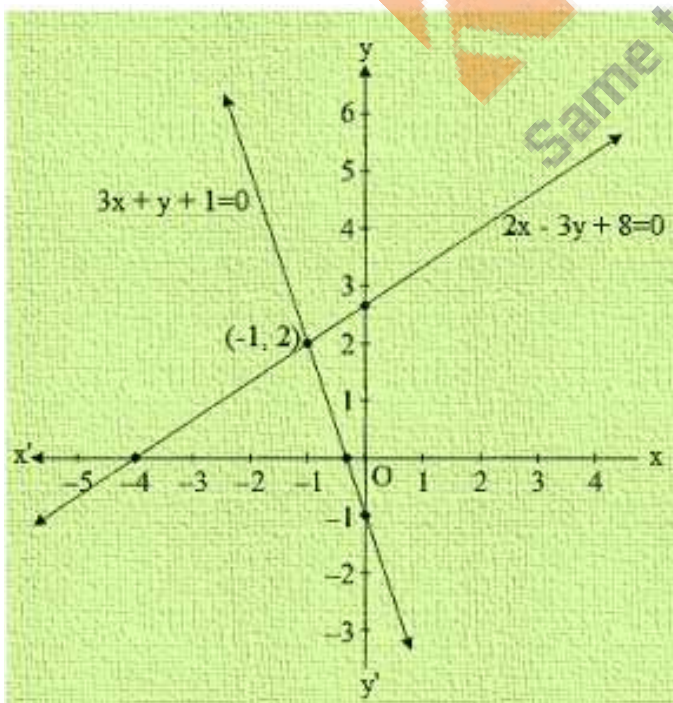
$$x = \frac{3y - 8}{2}$$

When $y = 0$, then $x = -4$

When $y = 2$, then $x = 1$ Thus, we have the following table giving points on the line $2x + 3y = 10$

X	-4	-1
Y	0	-2

Graph of the equation $3x + y + 1 = 0$ and $2x - 3y + 8 = 0$



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

Hence $x = -1$ and $y = 2$

Q4: $2x + y - 3 = 0$, $2x - 3y - 7 = 0$

Sol:

We have, $2x + y - 3 = 0$ and $2x - 3y - 7 = 0$

Now $2x + y - 3 = 0$

$$= y = 3 - 2x$$

When $x = 0$ then, $y = 3$

When $x = 1$ then, $y = 1$

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

X	0	1
Y	3	1

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

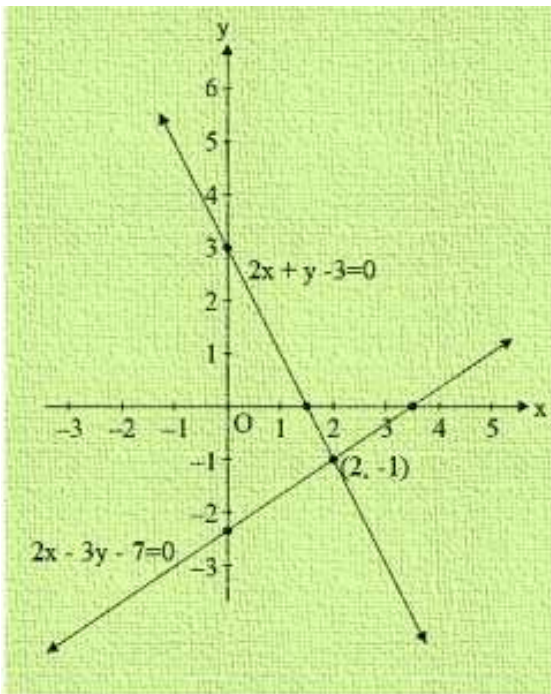
$$= y = \frac{2x - 7}{3}$$

When $x = 0$, then $y = -\frac{7}{3}$

When $x = 5$, then $y = 1$ Thus, we have the following table giving points on the line $2x - 3y - 7 = 0$

X	0	5
Y	$-\frac{7}{3}$	1

Graph of the equation $2x + y - 3 = 0$ and $2x - 3y - 7 = 0$



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

Hence $x = 2$ and $y = -1$

Q5.

$$x+y=6$$

$$x-y=2$$

Soln:

We have, $x+y=6$ and $x-y=2$

Now $x+y=6$

$$= y = 6-x$$

When $x=2$ then, $y = 4$

When $x=3$ then, $y=3$

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

X	2	3
Y	4	3

Now, $x-y=2$

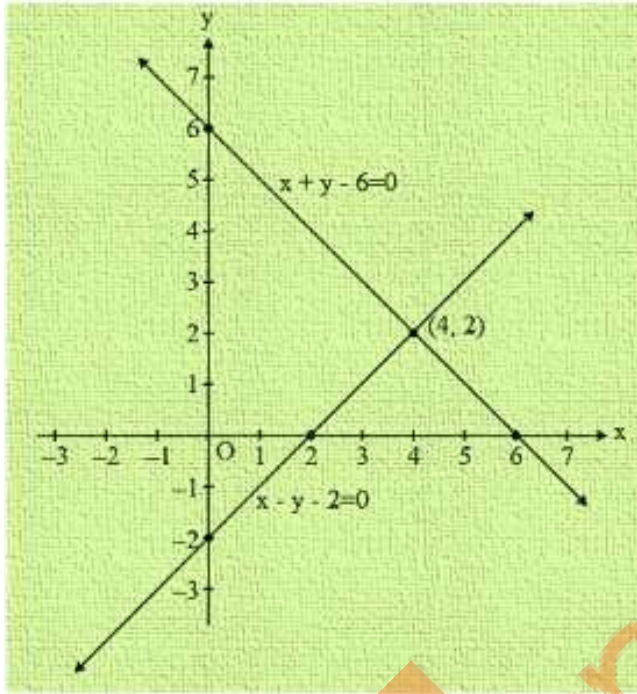
$$=y = x-2$$

When $x=0$, then $y=-2$

When $x=2$, then $y=0$ Thus, we have the following table giving points on the line $2x+3y=10$

X	0	2
Y	2	0

Graph of the equation $x+y=6$ and $x-y=2$



Clearly two lines intersect at a point P (4,2)

Hence $x=4$ and $y=2$

Q6.

$$x-2y=6$$

$$3x-6y=0$$

Soln:

We have, $x-2y=6$ and $3x-6y=0$

$$\text{Now } x-2y=6$$

$$= x=6+2y$$

When $y=-2$ then, $x=2$

When $y=-3$ then, $x=0$

Thus, we have the following table giving points on the line $x-2y=6$

X	2	0
Y	-2	-3

Now , $3x-6y=0$

$$=x=2y$$

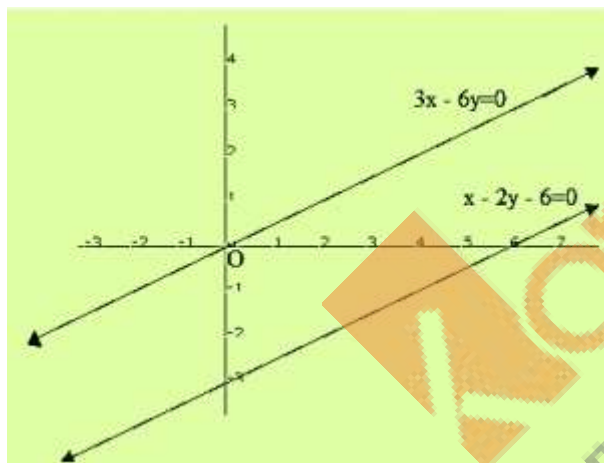
When $y=0$, then $x=0$

When $y=-1$, then $x= 2$

Thus, we have the following table giving points on the line $3x-6y=0$

X	0	2
Y	0	1

Graph of the equation $x-2y=6$ and $3x-6y=0$



Clearly two lines are parallel to each other. So, the two lines have no common point.

Hence the given system has no solutions.

Q7.

$$x+y=4$$

$$2x-3y=3$$

Soln:

We have, $x+y=4$ and $2x-3y=3$

Now $x+y=4$

$$= x = 4 - y$$

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 , $2x-3y=3$

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

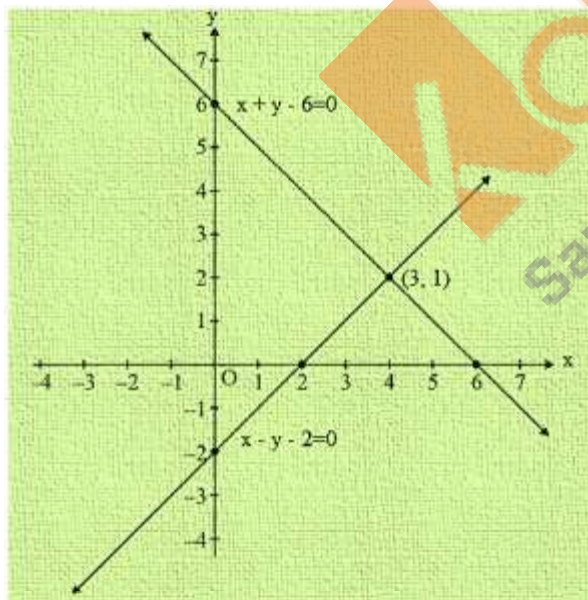
When $y=1$, then $x=3$

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

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



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

Hence $x= 3$ and $y = 1$

Q8.

$$2x+3y=4$$

$$x-y+3=0$$

Soln:

So we have, $2x+3y=4$ and $x-y+3=0$

Now $2x+3y=4$

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

When $y=0$ then, $x=2$

When $y=2$ then, $x=-1$

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

X	-1	2
Y	2	0

Now , $x-y+3=0$

$$=x=y-3$$

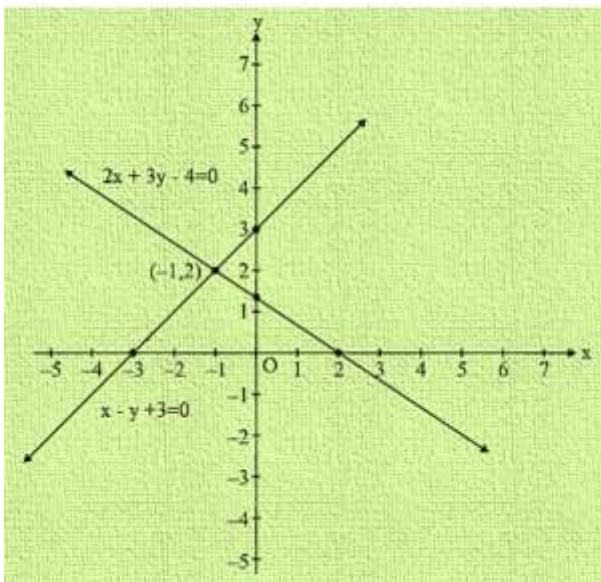
When $y=3$, then $x=0$

When $y=4$, then $x= 1$

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

X	0	1
Y	3	4

Graph of the equation $2x+3y=4$ and $x-y+3=0$



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

Hence $x=-1$ and $y=2$ is the solution of the given system of equations.

Q9.

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

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

Soln:

So we have $2x-3y+13=0$ and $3x-2y+12=0$

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

$$= x = \frac{3y-13}{2}$$

When $y=1$ then, $x=-5$

When $y=3$ then, $x=-2$

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

X	-5	-2
Y	1	3

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

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

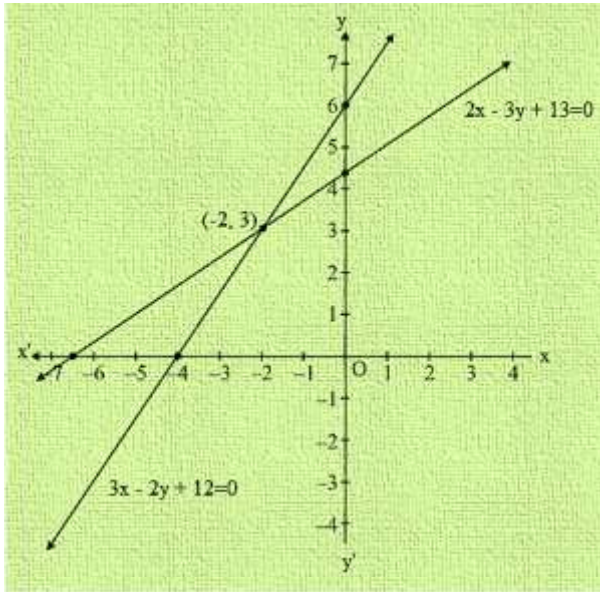
When $y=0$, then $x=-4$

When $y=3$, then $x= -2$

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

X	-4	-2
Y	0	3

Graph of the equation $2x-3y+14=0$ and $3x-2y+12=0$



Clearly two lines intersect at $(-2, 3)$

Hence $x=-2$ and $y=3$ is the solution of the given system of equations.

Q10.

$$2x+3y+5=0$$

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

Soln:

So we have $2x+3y+5=0$ and $3x+2y-12=0$

Now, $2x+3y+5=0$

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

When $y=1$ then, $x=-4$

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

Thus, we have the following table giving points on the line $2x+3y+5=0$

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X	-4	-1
Y	1	-1

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

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

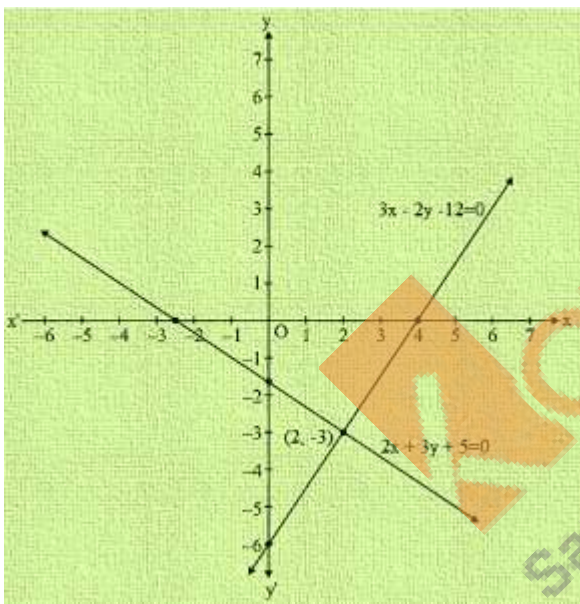
When $y=0$, then $x=4$

When $y=3$, then $x=6$

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

X	4	6
Y	0	3

Graph of the equation $2x+3y+5=0$ and $3x-2y-12=0$



Clearly two lines intersect at $(2, -3)$

Hence $x=2$ and $y=-3$ is the solution of the given system of equations.

Q11.

$$2x+3y=6$$

$$4x+6y=12$$

Soln:

So we have $2x+3y=6$ and $4x+6y=12$

Now, $2x+3y=6$

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

When $y=0$ then, $x=3$

When $y=2$ then, $x=0$

Thus, we have the following table giving points on the line $2x+3y=6$

X	0	3
Y	2	0

Now, $4x+6y=12$

$$x = \frac{12-6y}{4}$$

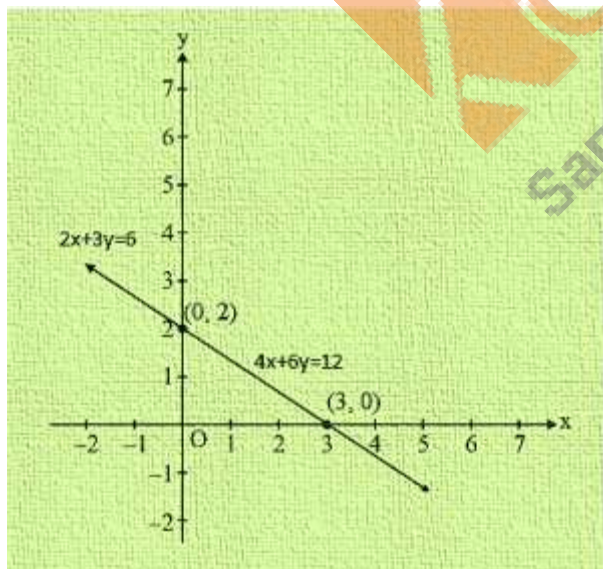
When $y=0$, then $x=3$

When $y=2$, then $x=0$

Thus, we have the following table giving points on the line $4x+6y=12$

X	0	3
Y	2	0

Graph of the equation $2x+3y=6$ and $4x+6y=12$



Thus the graphs of the two equations are coincident.

Hence, the system of equations has infinitely many solutions.

Q12.

$$x-2y=5$$

$$3x-6y=15$$

Soln:

So we have $x-2y=5$ and $3x-6y=15$

$$\text{Now, } x-2y=5$$

$$= x= 2y+5$$

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

$$\text{Now, } 3x-6y=15$$

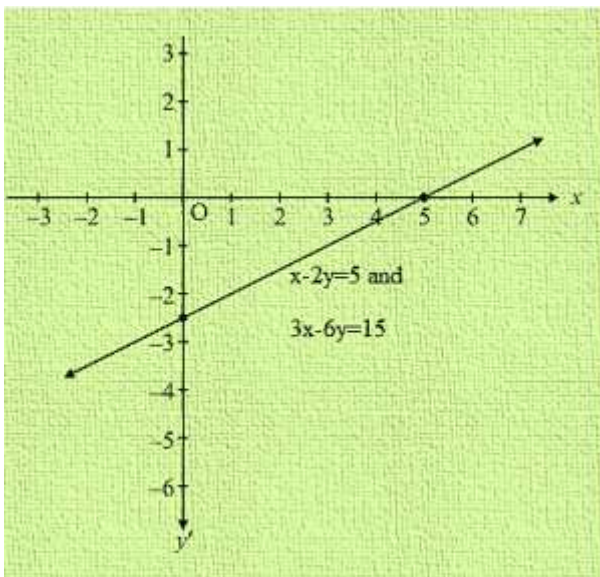
$$=x= 15+6y \frac{15+6y}{3}$$

When $y=-2$, then $x=1$

When $y=-3$, then $x= -1$

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

X	1	-1
Y	-2	-3



Q13.

$$3x+y=8$$

$$6x+2y=16$$

Soln:

So we have $3x+y=8$ and $6x+2y=16$

Now, $x-2y=5$

$$= y= 8-3x$$

When $x=2$ then, $y=2$

When $x=3$ then, $y=-1$

Thus, we have the following table giving points on the line $3x+y=8$

X	2	3
Y	2	-1

Now, $6x+2y=16$

$$=y= 16-6x \times \frac{16-6x}{2}$$

When $x=1$, then $y=5$

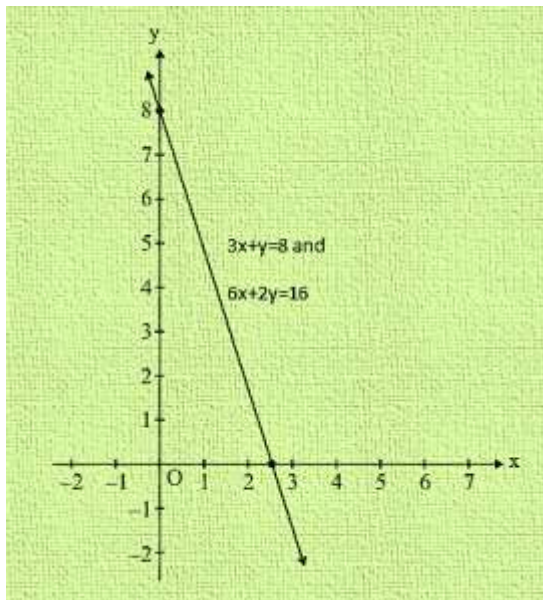
When $x=3$, then $y= -1$

Thus, we have the following table giving points on the line $6x+2y=16$

X	1	3
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Y	5	-1
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Graph of the given equation



Thus, the graphs of the two equations are coincident

Hence, the system of equations has infinitely many solutions.

Q14.

$$X-2y+11=0$$

$$3x+6y+33=0$$

Soln:

So we have $x-2y+11=0$ and $3x+6y+33=0$

Now, $x-2y+11=0$

$$= x= 2y-11$$

When $y=5$ then, $x=-1$

When $y=4$ then, $x=-3$

Thus, we have the following table giving points on the line $x-2y+11=0$

X	-1	-3
Y	5	4

Now, $3x-6y+33=0$

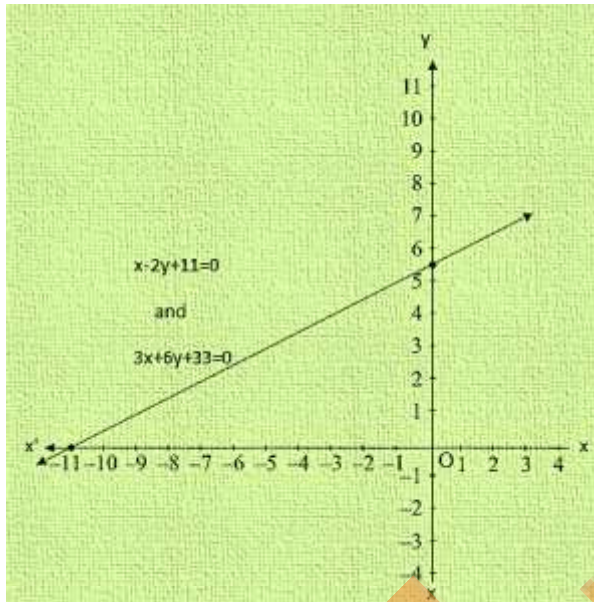
$$=x=6y-33 \frac{6y-33}{3}$$

When $y=6$, then $x=-1$

When $y=5$, then $x= -1$

Thus, we have the following table giving points on the line $3x-6y+33=0$

X	1	-1
Y	6	5



Thus, the graphs of the two equations are coincident

Hence, the system of equations has infinitely many solutions.

Q15.

$$3x-5y=20$$

$$6x-10y=-40$$

Soln:

So we have $3x-5y=20$ and $6x-10y=-40$

Now, $3x-5y=20$

$$=x=5y+20 \frac{5y+20}{3}$$

When $y=-1$ then, $x=5$

When $y=-4$ then, $x=0$

Thus, we have the following table giving points on the line $3x-5y=20$

X	5	0
Y	-1	-4

Now, $6x-10y=-40$

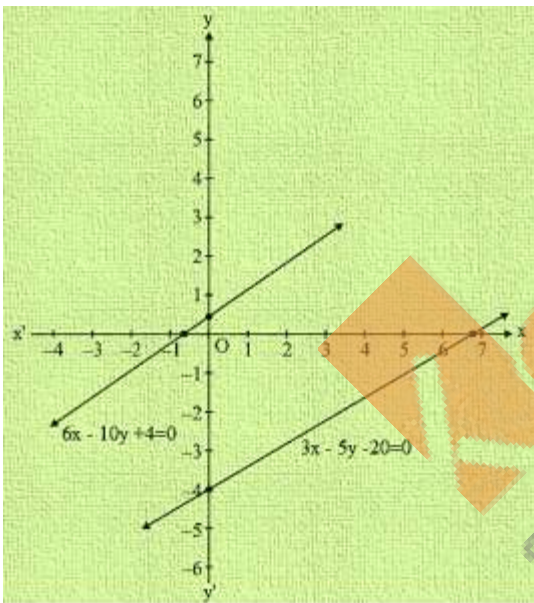
$$=x=6y-406 \frac{6y-40}{6}$$

When $y=4$, then $x=0$

When $y=1$, then $x= -5$

Thus, we have the following table giving points on the line $6x-10y=-40$

X	0	-5
Y	4	1



Clearly, there is no common point between these two lines.

Hence, given systems of equations is inconsistent.

Q16.

$$x-2y = 6$$

$$3x-6y = 0$$

Soln:

So we have $x-2y=6$ and $3x-6y=0$

Now, $x-2y=6$

$=x=6+2y$

When $y=0$ then, $x=6$

When $y=-2$ then, $x=2$

Thus, we have the following table giving points on the line $x-2y=6$

X	6	2
Y	0	-2

Now, $3x-6y=0$

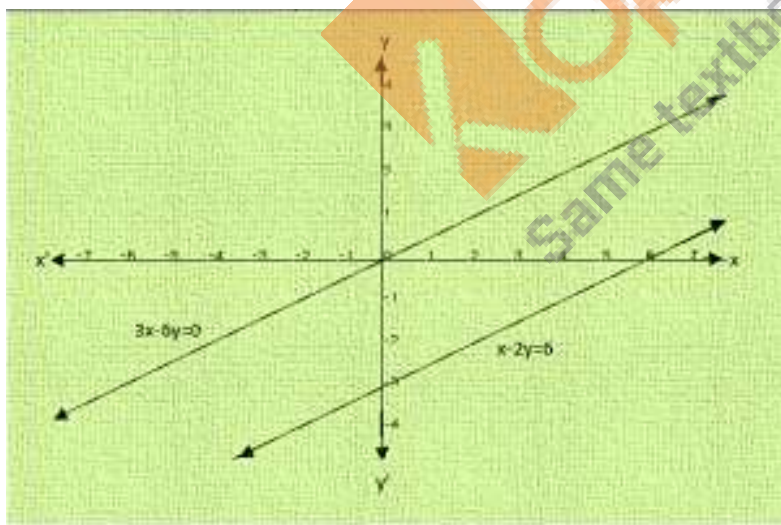
$=x=2y$

When $y=0$, then $x=0$

When $y=1$, then $x=2$

Thus, we have the following table giving points on the line $3x-6y=0$

X	0	2
Y	0	1



We find the lines represented by equations $x-2y=6$ and $3x-6y=0$ are parallel. So, the two lines have no common point.

Hence, the given system of equations is in-consistent.

Q17.

$$2y - x = 9$$

$$6y - 3x = 21$$

Soln:

So we have $2y - x = 9$ and $6y - 3x = 21$

Now, $2y - x = 9$

$$= x = -9 + 2y$$

When $y = 3$ then, $x = -3$

When $y = 4$ then, $x = -1$

Thus, we have the following table giving points on the line $2y - x = 9$

X	-3	-1
Y	3	4

Now, $6y - 3x = 21$

$$= x = 2y - 7$$

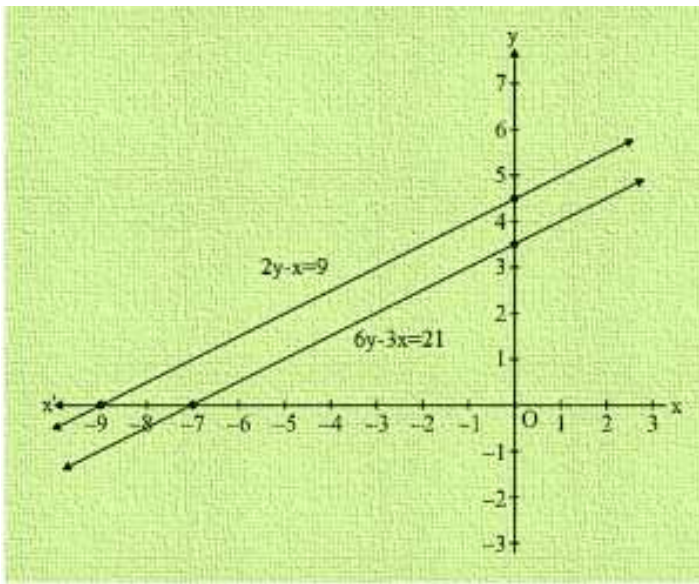
When $y = 2$, then $x = -3$

When $y = 3$, then $x = -1$

Thus, we have the following table giving points on the line $6y - 3x = 21$

X	-3	-1
Y	2	3

Graph of the given equation



We find the lines represented by equations $2y - x = 9$ and $6y - 3x = 21$ are parallel. So, the two lines have no common point.

Hence, the given system of equations is in-consistent.

Q18. $3x - 4y - 1 = 0$

$2x - 8y + 5 = 0$ $2x - \frac{8}{3}y + 5 = 0$

Soln:

So we have $3x - 4y - 1 = 0$ and $2x - 8y + 5 = 0$ $2x - \frac{8}{3}y + 5 = 0$

Now, $3x - 4y - 1 = 0$

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

When $y = 2$ then, $x = 3$

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

Thus, we have the following table giving points on the line $3x - 4y - 1 = 0$

X	-1	3
Y	-1	2

Now, $2x - 8y + 5 = 0$ $2x - \frac{8}{3}y + 5 = 0$

$$= x = 8y - 15 \frac{8y - 15}{6}$$

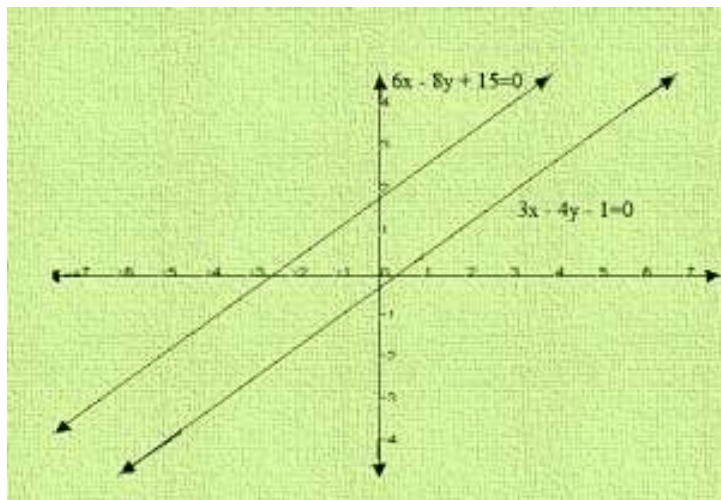
When $y = 0$, then $x = -2.5$

When $y=3$, then $x= 1.5$

Thus, we have the following table giving points on the line $2x - \frac{8}{3}y + 5 = 0$

X	-2.5	1.5
Y	0	3

Graph of the given equation



We find the lines represented by equations $3x - 4y - 1 = 0$ and $2x - \frac{8}{3}y + 5 = 0$

are parallel. So, the two lines have no common point.

Hence, the given system of equations is inconsistent.

Q19. Determine graphically the vertices of the triangle, the equations of whose sides are given below,

(i) $2y - x = 8$, $5y - x = 14$ and $y - 2x = 1$

(ii) $y = x$, $y = 0$ and $3x + 3y = 10$

Soln:

$$2y - x = 8$$

$$5y - x = 14$$

$$y - 2x = 1$$

$$\text{Now, } 2y - x = 8$$

$$x = 2y - 8$$

$$\text{When } y = 2 \text{ then } x = -4$$

When $y=4$ then $x= 0$

Thus, we have the following table giving points on the line $2y-x=8$

X	-4	0
y	2	4

Now, $5y-x=14$

$x=5y-14$

When $y=2$, then $x=1$

When $y=3$, then $x= 1$

Thus, we have the following table giving points on the line $5y-x=14$

X	-4	1
y	2	3

We have,

$y-2x=1$

$x=y-12 \frac{y-1}{2}$

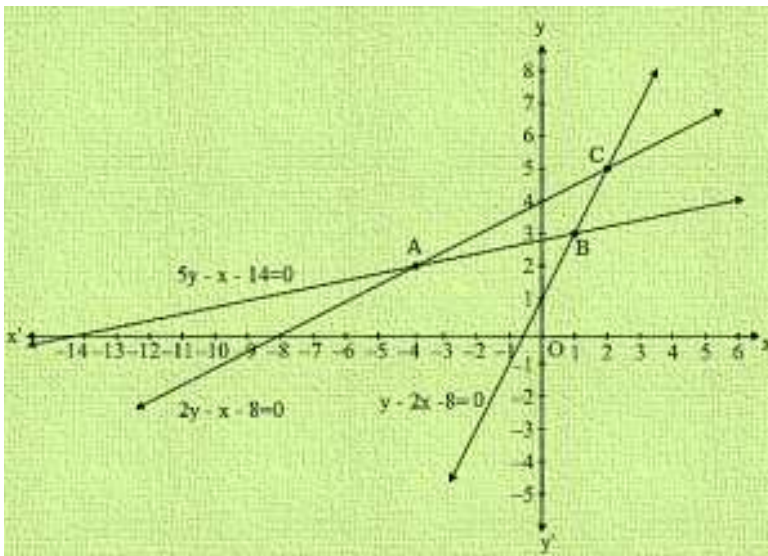
When $y=-1$, then $x=1$

When $y=3$, then $x= 1$

Thus, we have the following table giving points on the line $y-2x=1$

X	-1	1
y	1	3

The graph of the given equation is:



From the graph of the lines represent by the given equation, we observe that the lines taken in pairs intersect at points A(-4,2) B(1,3) and C(2,5)

Hence the vertices of the triangle are A(-4,2) B(1,3) and C(2,5)

The given systems of equations are:

$$y = x$$

$$y = 0$$

$$3x + 3y = 10$$

We have, $y = x$

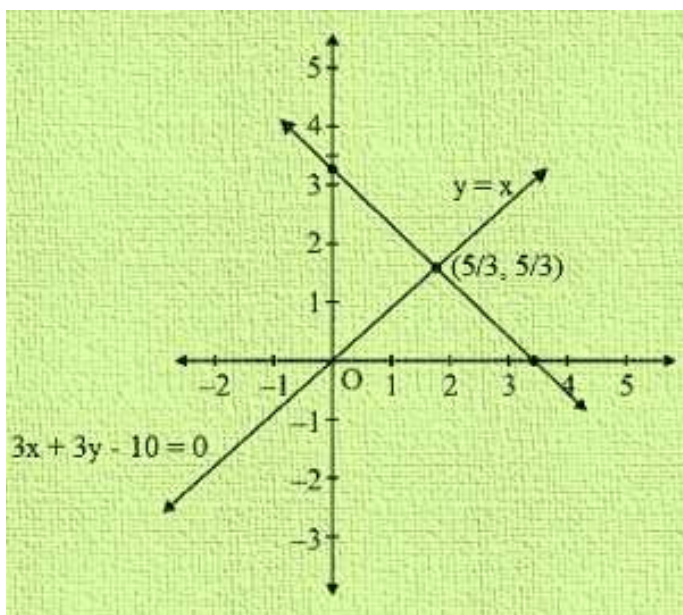
When $x = 1$, then $y = 1$

When $x = -2$, then $y = -2$

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

X	1	-2
y	$7\frac{7}{3}$	$43\frac{4}{3}$

The graph of the given equation is



From the graph of the lines represent by the given equation, we observe that the lines taken in pairs intersect at points A(0,0) B(10/3, 0) and C(5/3, 5/3)

Hence the vertices of the triangle are A(0,0) B(10/3, 0) and C(5/3, 5/3)

Q20. Determine graphically whether the system of equations $x-2y=2$, $4x-2y=5$ is consistent or in-consistent

Soln:

$$x-2y=2$$

$$4x-2y=5$$

$$\text{Now, } x-2y=2$$

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

$$\text{When } y=0 \text{ then, } x=2$$

$$\text{When } y=-1 \text{ then, } x=0$$

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

X	2	0
Y	0	-1

$$\text{Now, } 4x-2y=5$$

$$\Rightarrow x=5+2y$$

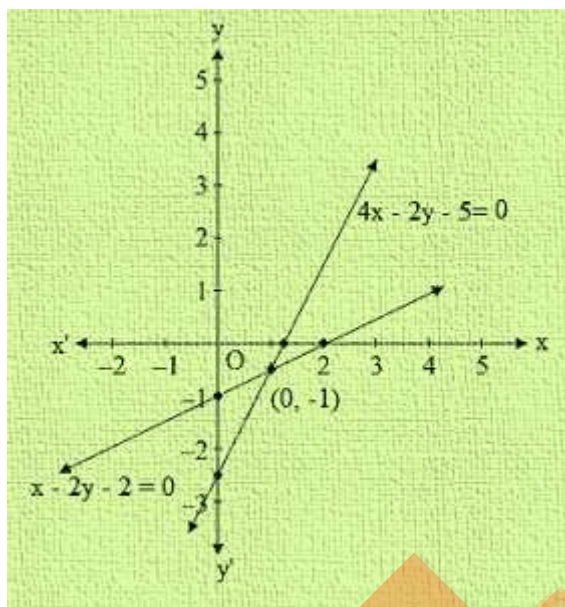
When $y=0$, then $x=54\frac{5}{4}$

When $y=1$, then $x=74\frac{7}{4}$

Thus, we have the following table giving points on the line $4x-2y=5$

X	$54\frac{5}{4}$	$74\frac{7}{4}$
Y	0	1

Graph of the given equation



Clearly, the two lines intersect at $(1,0)$

Hence, the system of equation is consistent.

Q21. Determine by drawing graphs, whether the following system of linear equation has a unique solution or not:

(i) $2x-3y=6$ and $x+y=1$

(ii) $2y=4x-6$ and $2x=y+3$

Soln:

(i) $2x-3y=6$ and $x+y=1$

Now, $2x-3y=6$

$$x=6+3y2\frac{6+3y}{2}$$

When $y=0$ then, $x=3$

When $y=-2$ then, $x=0$

Thus, we have the following table giving points on the line $2x-3y=6$

X	3	0
Y	0	-2

Now, $x+y=1$

$\Rightarrow x=1-y$

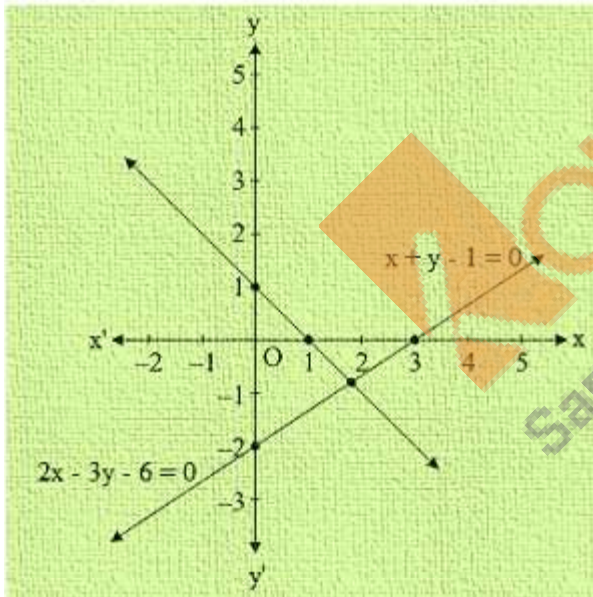
When $y=0$, then $x=1$

When $y=1$, then $x=0$

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

X	0	1
Y	1	0

Graph of the given equations:



(ii) $2y = 4x - 6$

$2x = y + 3$

Now, $2y = 4x - 6$

$$x = 6 + 2y \cdot \frac{6+2y}{4}$$

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

When $y=5$ then, $x=4$

Thus, we have the following table giving points on the line $2y=4x-6$

X	1	4
Y	-1	5

Now, $2x=y+3$

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

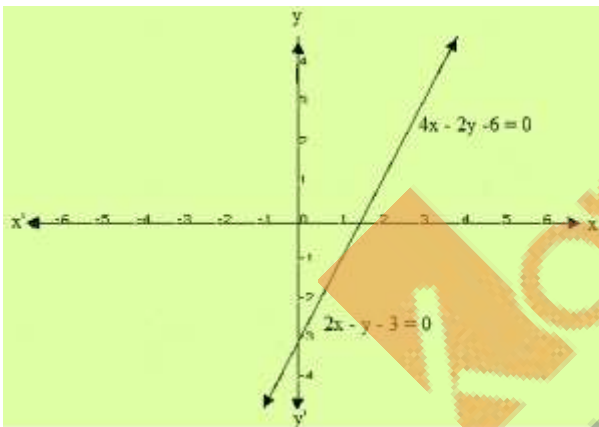
When $y=1$, then $x=2$

When $y=3$, then $x=3$

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

X	2	3
Y	1	3

Graph of the given equations:



We find the graphs of the two equations are consistent.

Therefore, the system of equations has infinitely many solutions.

Q22. Solve graphically each of the following system of linear equations. Also, find the coordinates of the points where the lines meet axis of y.

(i) $2x-5y+4=0$ and $2x+y-8=0$

(ii) $3x+2y=12$ and $5x-2y=4$

(ii) $2x+y-11=0$ and $x-y-1=0$

(iv) $X+2y-7=0$ and $2x-y-4=0$

(v) $3x+y-5=0$ and $2x-y-5=0$

(vi) $2x - y - 5 = 0$ and $x - y - 3 = 0$

Soln:

(i) $2x - 5y + 4 = 0$ and $2x + y - 8 = 0$

Now, $2x - 5y + 4 = 0$

$$x = 5y - 42 \frac{5y - 4}{2}$$

When $y = 2$ then, $x = 3$

When $y = 4$ then, $x = 8$

Thus, we have the following table giving points on the line $2x - 5y + 4 = 0$

X	3	8
Y	2	4

Now, $2x + y - 8 = 0$

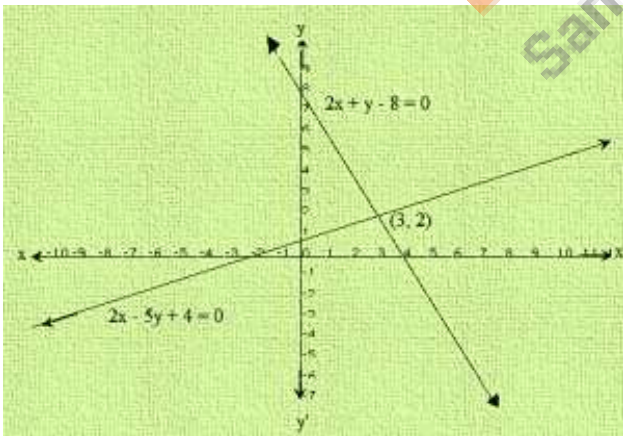
$$x = -y + 82 \frac{-y + 8}{2}$$

When $y = 4$, then $x = 2$

When $y = 2$, then $x = 3$

Thus, we have the following table giving points on the line $2x + y - 8 = 0$

X	3	8
Y	2	4



Clearly, two intersect at $P(3, 2)$

Hence, $x = 3$ and $y = 2$ is the solution of the given system of equations.

We also observe that the lines represented by $2x-5y+4=0$ and $2x+y-8=0$ meet y-axis at $A(0, 4\frac{4}{5})$ and $B(0,8)$ respectively.

(ii) $3x+2y=12$ and $5x-2y=4$

Now, $3x+2y=12$

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

When $y=3$ then, $x=2$

When $y=-3$ then, $x=6$

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

X	2	6
Y	3	-3

Now, $5x-2y=4$

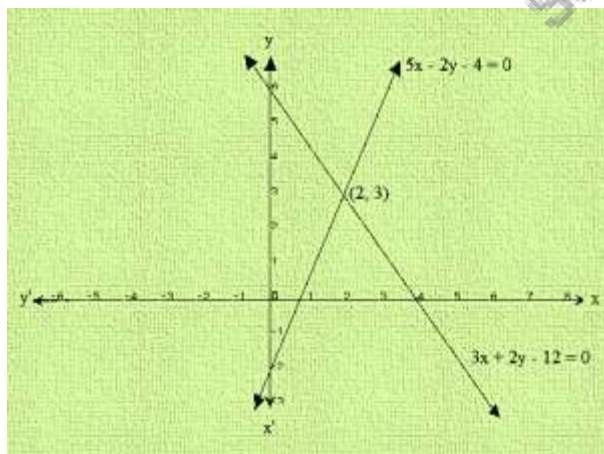
$$x = \frac{4+2y}{5}$$

When $y=3$, then $x=2$

When $y=-7$, then $x=-2$

Thus, we have the following table giving points on the line $5x-2y=4$

X	2	-2
Y	3	-7



Clearly, two intersect at $P(2,3)$

Hence, $x=2$ and $y=3$ is the solution of the given system of equations.

We also observe that the lines represented by $3x+2y=12$ and $5x-2y=4$ meet y-axis at A(0, 6) and B(0,-2) respectively.

(iii) $2x+y-11=0$ and $x-y-1=0$

Now, $2x+y=11$

$$y = 11 - 2x$$

When $y=4$ then, $x=3$

When $y=-5$ then, $x=1$

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

X	4	5
Y	3	1

Now, $x-y=1$

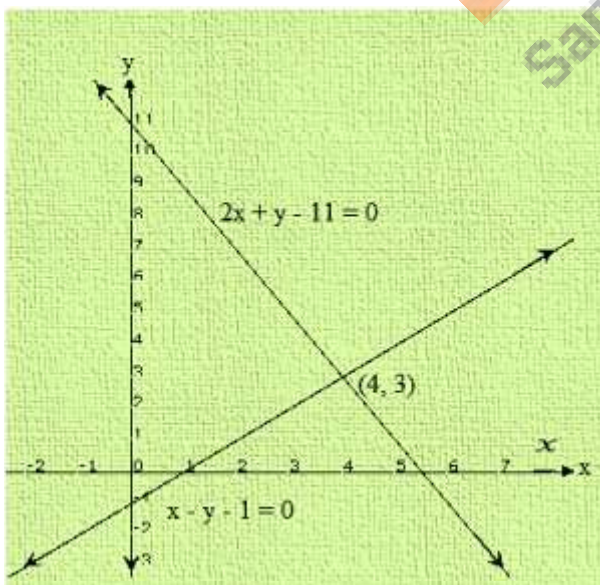
$$y = x - 1$$

When $x=2$, then $y=1$

When $y=3$, then $x=4$

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

X	2	3
Y	1	2



Clearly, two intersect at P (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 $A(0, 11)$ and $B(0,-1)$ respectively.

(iv) $x+2y-7=0$

$2x-y-4=0$

Soln:

Now, $2x-y-4=0$

$X=7-2y$

When $y=1$ then, $x=5$

When $y=-2$ then, $x=3$

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

X	5	3
Y	1	2

Now, $2x-y-4=0$

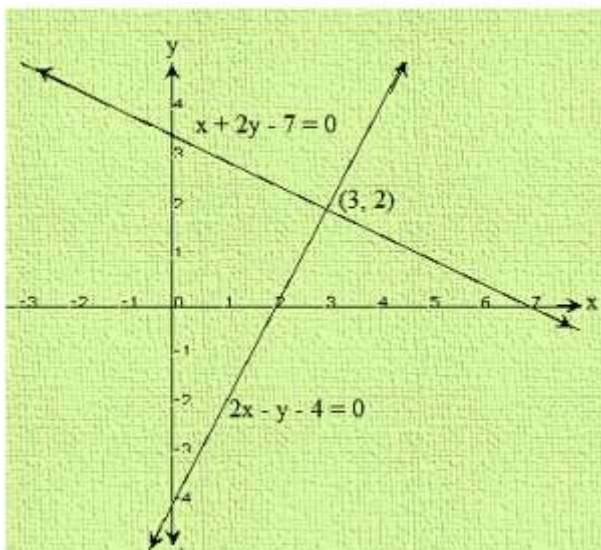
$=y=2x-4$

When $x=2$, then $y=0$

When $y=0$, then $y= -4$

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

X	2	0
Y	0	-4



Clearly, two intersect at P (3,2)

Hence, $x=3$ and $y=2$ is the solution of the given system of equations.

We also observe that the lines meet y-axis at A(0, 3.5) and B(0,-4) respectively.

(v) $3x+y-5=0$ and $2x-y-5=0$

Solution

Now, $3x+y-5=0$

$y=5-3x$

When $x=1$ then, $y=2$

When $x=2$ then, $y=-1$

Thus, we have the following table giving points on the line $3x+y-5=0$

X	1	2
Y	2	-1

Now, $2x-y-5=0$

$y=2x-5$

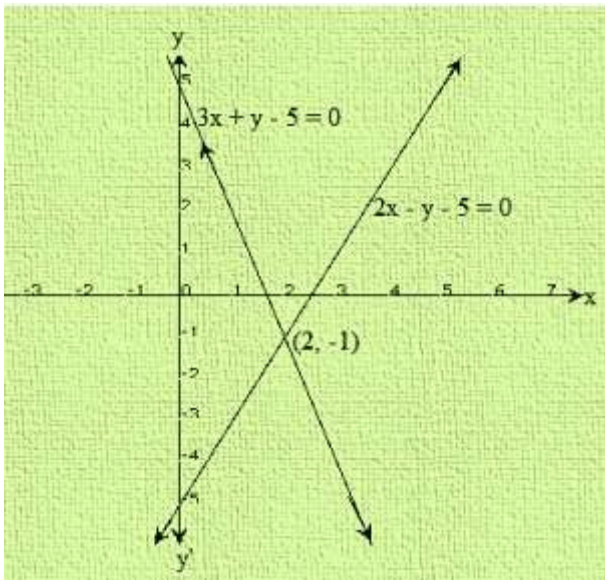
When $x=0$, then $y=-5$

When $x=2$, then $y=-1$

Thus, we have the following table giving points on the line $2x-y-5=0$

X	0	2

Y	-5	-1
---	----	----



Clearly, two intersect at P (2,-1)

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

We also observe that the lines meet y-axis at A(0,5) and B(0,-5) respectively.

(vi) $2x - y - 5 = 0$ and $x - y - 3 = 0$

Now, $2x - y - 5 = 0$

$y = 2x - 5$

When $x = 1$ then, $y = -3$

When $x = 2$ then, $y = -1$

Thus, we have the following table giving points on the line $2x - y - 5 = 0$

X	1	2
Y	-3	-1

Now, $x - y - 3 = 0$

$y = x - 3$

When $x = 3$, then $y = 0$

When $x = 4$, then $y = 1$

Thus, we have the following table giving points on the line $x - y - 3 = 0$

X	3	4
Y	0	1

Y	4	-1
---	---	----

Clearly, two intersect at $P(2, -1)$

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

We also observe that the lines meet y-axis at $A(0, 5)$ and $B(0, -3)$ respectively.

Q23. Solve the following system of linear equations graphically and shade the region between the two lines and x- axis.

(i) $2x+3y=12$ and $x-y=1$

(ii) $3x+2y-4=0$ and $2x-3y-7=0$

(iii) $3x+2y-11=0$ and $2x-3y+10=0$

Soln:

(i) $2x+3y=12$ and $x-y=1$

The system of the given equation is $y=x$, $3y=x$ and $y+x=8$

Now, $2x+3y=12$

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

When $y=2$, then $x=3$

When $y=4$, then $x=0$

Thus, we have the following table:

X	0	3
---	---	---

Y	4	2
---	---	---

We have,

$$x - y = 1$$

$$x = y + 1$$

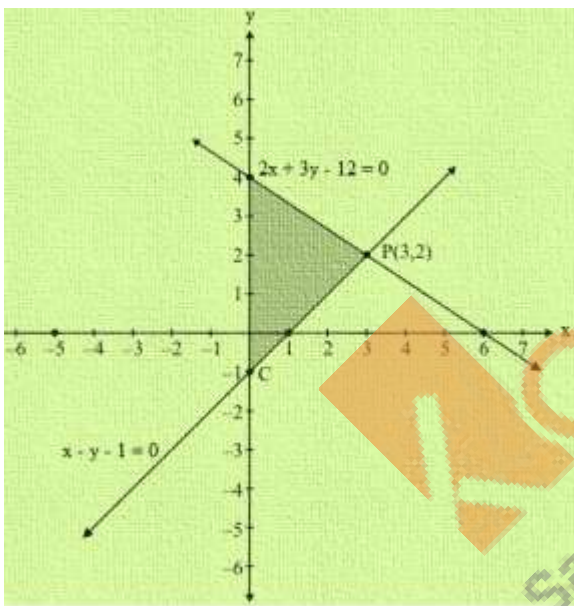
When $y = 0$, then $x = 1$

When $y = 1$, then $x = 2$

Thus, we have the following table:

X	1	2
Y	0	1

Graph of the given system is:



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

Hence $x = 3$ and $y = 2$ is the solution of the given system of equations.

(ii) $3x + 2y - 4 = 0$ and $2x - 3y - 7 = 0$

The system of the given equation is $3x + 2y - 4 = 0$ and $2x - 3y - 7 = 0$

Now, $3x + 2y - 4 = 0$

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

When $y = 5$, then $x = -2$

When $y = 8$, then $x = -4$

Thus, we have the following table:

X	-2	-4
Y	5	8

We have,

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

$$x = 3y + 7 \frac{3y + 7}{2}$$

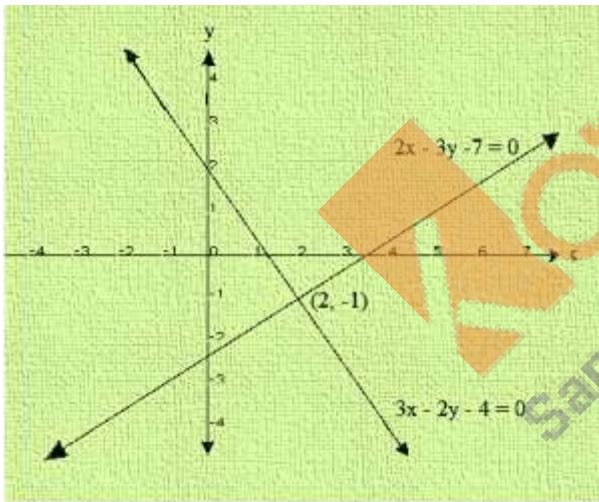
When $y = 1$, then $x = 5$

When $y = -1$, then $x = 2$

Thus, we have the following table:

X	5	2
Y	1	-1

Graph of the given system is:



Clearly the two lines intersect at $P(2, -1)$

Hence $x = 2$ and $y = -1$ is the solution of the given system of equations.

(iii) $3x + 2y - 11 = 0$ and $2x - 3y + 10 = 0$

Now, $3x + 2y - 11 = 0$

$$x = 11 - 2y \frac{11 - 2y}{3}$$

When $y = 1$, then $x = -3$

When $y = 4$, then $x = 1$

Thus, we have the following table:

X	3	1
Y	1	4

We have,

$$2x - 3y + 10 = 0$$

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

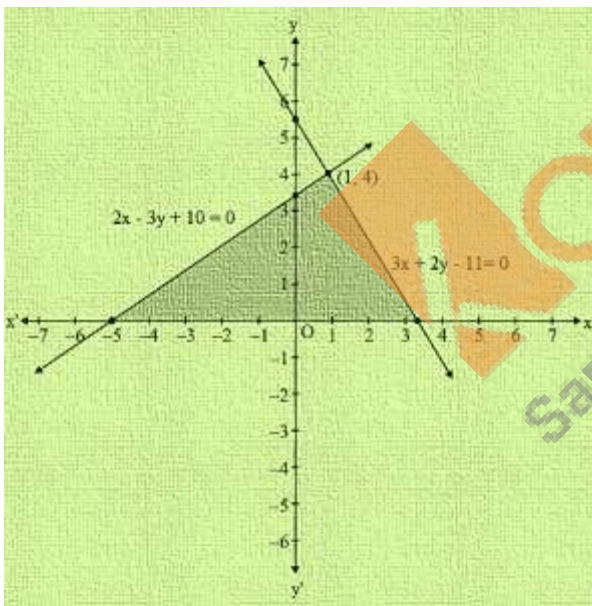
When $y=0$, then $x=-5$

When $y=2$, then $x=-2$

Thus, we have the following table:

X	-5	-2
Y	0	2

Graph of the given system is:



Clearly the two lines intersect at $P(1,4)$

Hence $x=1$ and $y=4$ is the solution of the given system of equations.

Q24. Draw the graphs of the following equations on the same graph paper:

$$2x + 3y = 12 \text{ and } x - y = 1$$

Soln:

$$\text{Now, } 2x + 3y = 12$$

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

When $y=0$, then $x=6$

When $y=2$, then $x=3$

Thus, we have the following table:

X	6	3
Y	0	2

We have,

$$x - y = 1$$

$$x = 1 + y$$

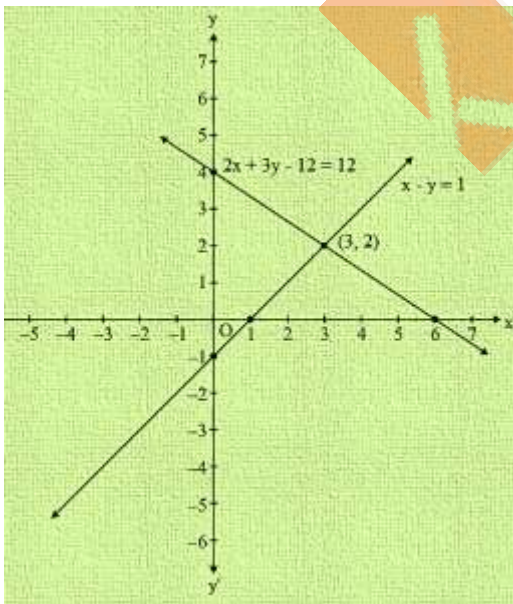
When $y=0$, then $x=1$

When $y=-1$, then $x=0$

Thus, we have the following table:

X	1	0
Y	0	-1

Graph of the given system is:



Clearly the two lines intersect at $A(3,2)$

We also observe that the lines meet y-axis $B(0,-1)$ and $C(0,4)$

Hence the vertices of the required triangle are $A(3,2)$, $B(0,-1)$ and $C(0,4)$.

Q25. Draw the graphs of $x-y+1=0$ and $3x+2y-12=0$. Determine the coordinates of the vertices of the triangle formed by these lines and x-axis and shade the triangular area. Calculate the area bounded by these lines and x- axis.

Soln:

The given system of equations is:

$$x-y+1=0 \text{ and } 3x+2y-12=0$$

$$\text{Now, } x-y+1=0$$

$$x = y-1$$

$$\text{When } y=3, \text{ then } x=2$$

$$\text{When } y=-1, \text{ then } x=-2$$

Thus, we have the following table:

X	2	-2
Y	3	-1

We have,

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

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

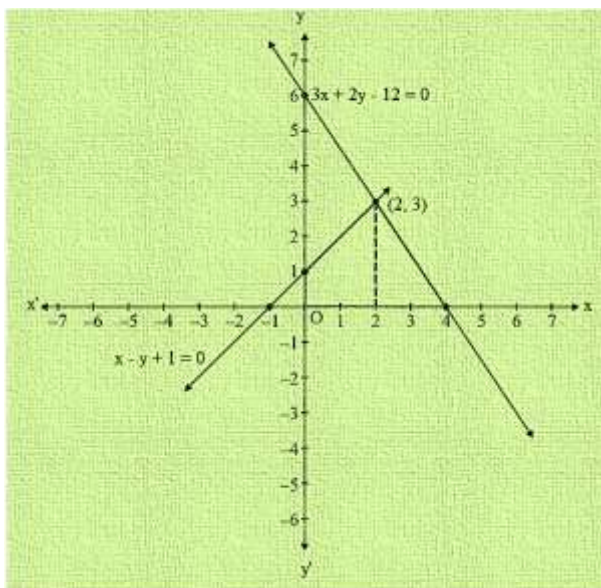
$$\text{When } y=6, \text{ then } x=0$$

$$\text{When } y=3, \text{ then } x=2$$

Thus, we have the following table:

X	0	2
Y	6	3

Graph of the given system is:



Clearly, the two lines intersect at A(2,3)

We also observe that the lines meet x-axis B(-1,0) and C(4,0)

Thus $x=2$ and $y=3$ 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 (2,3)

AD= 3 and $BC=4-(-1)=4+1=5$

Q26. Solve graphically the system of linear equation:

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

Find the area bounded by these lines and x-axis.

Soln:

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

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

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

When $y=0$, then $x=-1$

When $y=4$, then $x=2$

Thus, we have the following table:

X	2	-1
Y	4	0

We have,

$$4x + 3y - 2 = 0$$

$$x = 20 - 3y$$

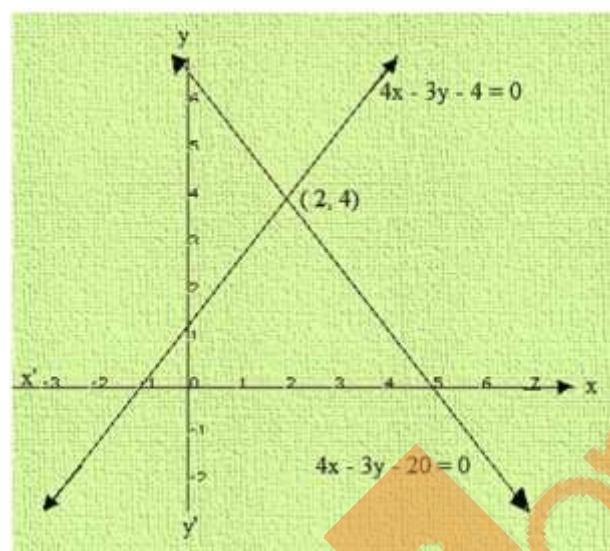
When $y=0$, then $x=5$

When $y=4$, then $x=2$

Thus, we have the following table:

X	5	2
Y		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,

$AD = y\text{-coordinate point } A(2,4)$

$AD = 3$ and $BC = 5 - (-1) = 4 + 1 = 6$

Area of the shaded region = $\frac{1}{2} \times \text{base} \times \text{altitude}$

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

$= 12 \text{ sq. units}$

Q27. Solve the following system of linear equations graphically:

$$3x + y - 11 = 0 \text{ and } x - y - 1 = 0$$

Shade the region bounded by these lines and y- axis. Also find the area of the region bounded by these lines and y-axis.

Soln:

The given system of equations is $3x+y-11=0$ and $x-y-1=0$

Now, $3x+y-11=0$

$$y=11-3x$$

When $x=0$, then $y=11$

When $x=3$, then $y=2$

Thus, we have the following table:

X	0	3
Y	11	2

We have

$$x-y-1=0$$

$$y=x-1$$

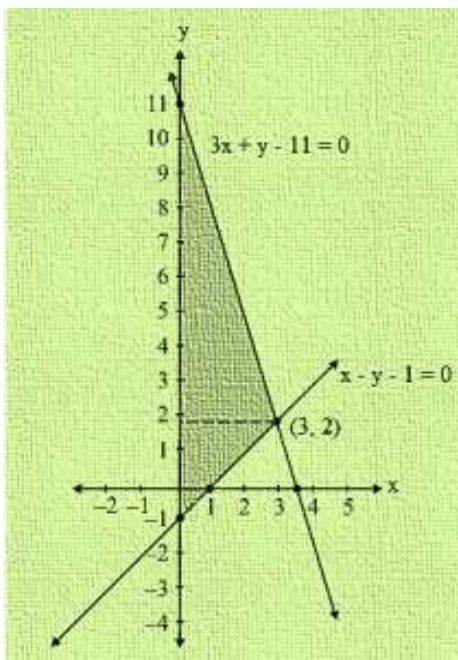
When $x=0$, then $y=-1$

When $x=3$, then $y=2$

Thus, we have the following table:

X	0	3
Y	-1	2

Graph of the given system is:



Clearly, the two lines intersect at A (3,2)

We also observe that the lines meet y-axis B(0,11) and C(0,-1)

Thus $x=3$ and $y=2$ 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=11-(-1) =11+1 = 12

Area of the shaded region = $\frac{1}{2} \times \text{base} \times \text{altitude}$

$$= \frac{1}{2} \times 12 \times 3$$

$$= 18 \text{ sq. units}$$

Q29. Draw the graph of the following equation:

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

$$2x+3y-18=0$$

$$y-2=0$$

Soln:

$$\text{Now, } 2x-3y+6=0$$

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

When $y=0$, then $x=-3$

When $y=2$, then $x=0$

Thus, we have the following table:

X	-3	0
Y	0	2

We have

$$2x+3y-18=0$$

$$X= 18-3y \quad \frac{18-3y}{2}$$

When $y=2$, then $x=6$

When $y=6$, then $x=0$

Thus, we have the following table:

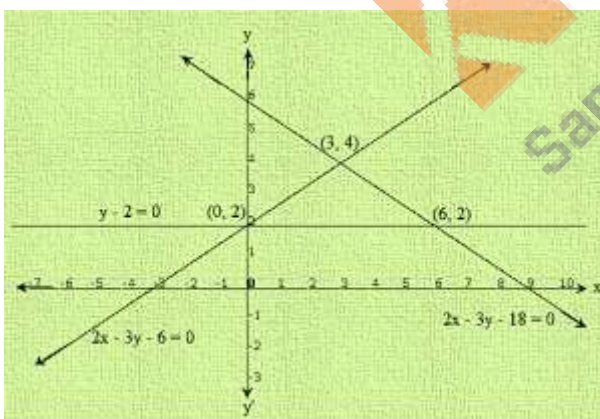
X	6	0
Y	2	6

We have

$$y-2=0$$

$$y=-2$$

Graph of the given system of equations:



From the graph of three equations, we find that the three lines taken in pairs intersect each other at points $A(3,4)$, $B(0,2)$ and $C(6,2)$

Hence, the vertices of the required triangle are $(3,4)$, $(0,2)$ and $(6,2)$

From the graph, we have

$$AD=4-2=2$$

$$BC=6-0=6$$

$$\text{Area of the shaded region} = \frac{1}{2} \times \text{base} \times \text{altitude} \times \frac{1}{2} \times \text{base} \times \text{altitude}$$

$$= \frac{1}{2} \times 6 \times 2 \times \frac{1}{2} \times 6 \times 2$$

$$= 6 \text{ sq. units}$$

Q30. Solve the following system of equations graphically:

$$2x-3y+6=0 \text{ and } 2x+3y-18=0$$

Also, find the area of the region bounded by these lines and y-axis.

Soln:

The given system of equations:

$$2x-3y+6=0 \text{ and } 2x+3y-18=0$$

$$\text{Now, } 2x-3y+6=0$$

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

$$\text{When } x=0, \text{ then } y=2$$

$$\text{When } x=-3, \text{ then } y=0$$

Thus, we have the following table:

X	0	-3
Y	2	6

We have

$$2x+3y-18=0$$

$$X = \frac{18-3y}{2}$$

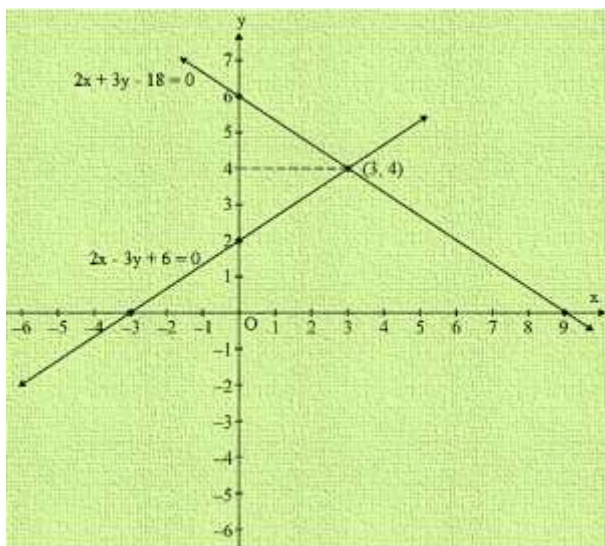
$$\text{When } y=2, \text{ then } x=6$$

$$\text{When } y=6, \text{ then } x=0$$

Thus, we have the following table:

X	6	0
Y	2	6

Graph of the given system of equations:



Clearly, the two lines intersect at A(3,4) .Hence $x=3$ and $y=4$ is the solution of the given system of equations.

From the graph, we have

$$AD = x\text{-coordinate point } A(3,4) = 3$$

$$BC = 6 - 2 = 4$$

$$\text{Area of the shaded region} = \frac{1}{2} \times \text{base} \times \text{altitude}$$

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

$$= 6 \text{ sq. units}$$

Q31. Solve the following system of linear equation graphically;

$$4x - 5y - 20 = 0 \text{ and } 3x + 5y - 15 = 0$$

Soln:

$$\text{Now, } 4x - 5y - 20 = 0$$

$$x = \frac{5y + 20}{4}$$

$$\text{When } y=0, \text{ then } x=5$$

$$\text{When } y=-4, \text{ then } x=0$$

Thus, we have the following table:

X	5	0
Y	0	-4

We have

$$3x+5y-15=0$$

$$x= 5y+205 \frac{5y+20}{5}$$

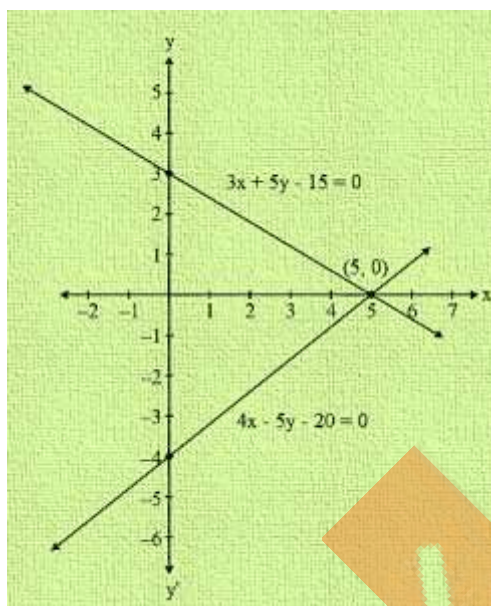
When $y=0$, then $x=5$

When $y=-4$, then $x=0$

Thus, we have the following table:

X	5	0
Y	0	3

Graph of the given system of equations:



Clearly, the two lines intersect at $A(5,0)$. Hence $x=5$, $y=0$ is the solution of the given system of equations.

The lines meet y-axis at $B(0,-4)$ and $C(0,3)$ respectively.

The vertices of the triangle are $(5,0)$, $(0,-4)$ and $(0,3)$

Q32: Draw the graphs of the equations $5x-y=5$ and $3x-y=3$. Determine the coordinates of the vertices of the triangle formed by these lines and y-axis. Calculate the area of the triangle formed.

Soln:

$$5x-y=5$$

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

Three solutions of this equation can be written as follows:

X	0	1	2

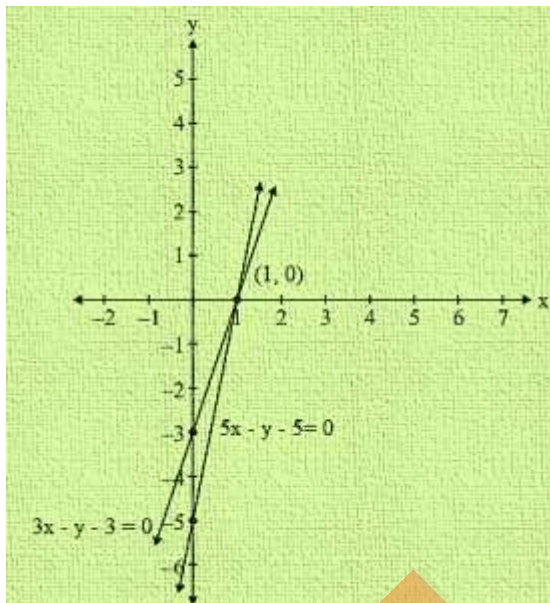
y	-5	0	5
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$$3x - y = 3$$

$$Y = 3x - 3$$

X	0	1	2
y	-3	0	3

The graphical representation of the two lines will be as follows:



It can be observed that the required triangle is ABC

The coordinates of its vertices A (1,0) B(0,-3) and C(0,-5)

Q33. Form the pair of linear equations in the following problems, and find their solution graphically:

(i) 10 students of class X took part in mathematics quiz. If the number of girls is 4 more than the number of boys. Find the number of boys and girls who took part in the quiz.

(ii) 5 pencils and 7 pens together cost Rs.50, whereas 7 pencils and 5 pens together cost Rs.46.

Find the cost of one pencil and one pen.

(iii) Champa went to a sale to purchase some pants and skirts. When her friends asked her how many of each kind she had bought, she answered, "the number of skirts is two less than twice the number of pants purchased". Also, "the number of skirts is four less than four times the number of pants purchased." Help her friends to find how many pants and skirts Champa bought.

Soln:

(i) Let the number of girls and boys in the class be x and y respectively.

According to the Q.,

$x+y=10$ and $x-y=4$ are the given equations

Now, $x+y=10$

$x=10-y$

Three solutions of this equation can be written as follows:

X	4	5	6
Y	6	5	4

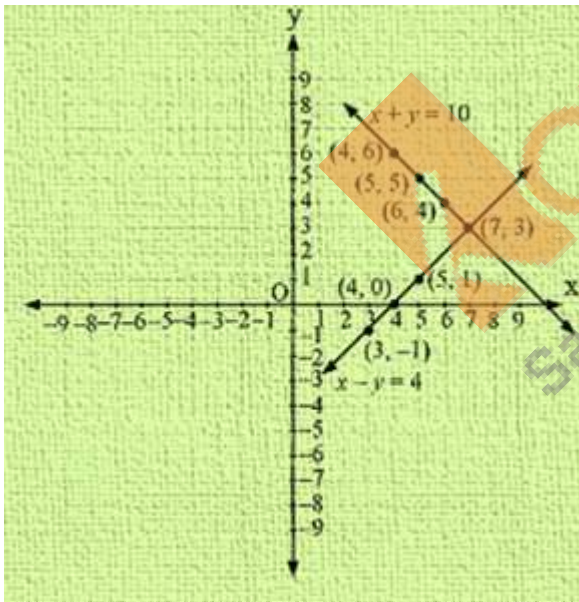
$x-y=4$

$x=4+y$

Three solutions of this equation can be written as follows:

X	5	4	3
Y	1	0	-1

The graphical representation is as follows:



From the graph, it can be observed that the two lines intersect each other at point (7,3).

So $x=7$ and $y=3$

The number of girls and boys in the class are 7 and 3 respectively.

(ii) Let the cost of one pencil and one pen Rs. x and Rs. y respectively.

According to the Q., we have,

$$5x+7y=50$$

$$7x+5y=50$$

$$\text{Now, } 5x+7y=50$$

$$x = 50 - 7y \quad \frac{50-7y}{5}$$

Three solutions of this equation can be written as follows:

X	3	10	-4
y	5	0	10

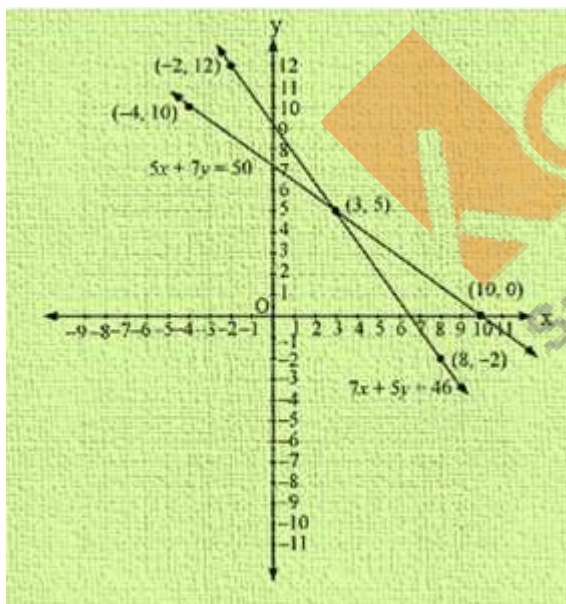
$$7x+5y=46$$

$$x = 46 - 5y \quad \frac{46-5y}{7}$$

Three solutions of this equation can be written as follows:

X	8	3	-2
y	-2	5	12

The graphical representation is as follows:



From the graph it can be observed that the two lines intersect each other at the point (3,5)

So $x = 3$ and $y = 5$

Therefore the cost of the pencil and the pen are 3 and 5 respectively.

(iii) Let us denote the number of pants by x and the number of skirts by y . Then the equations formed are :

$$y = 2x^2 \dots\dots\dots (i)$$

$$y = 4x^2 \dots\dots\dots (ii)$$

let us draw the graphs of the equations (i) and (ii) by finding the two solutions for each of the equations.

X	2	0
$y - 2x^2$	2	-2

X	0	1
$y - 4x^2$	-4	0



The lines intersect at point (1,0)

The value of $x=1$ and $y=0$

Q34. Solve the following system of equations graphically:

Shade the region between the lines and y-axis

(i) $3x - 4y = 7$ and $5x + 2y = 3$

(ii) $4x - y = 4$ and $3x + 2y = 14$

Soln:

(i) $3x - 4y = 7$ and $5x + 2y = 3$

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

Now, $3x - 4y = 7$

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

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

When $x=-3$ then $y=-4$

Thus, we have the following table

X	1	-3
Y	-1	-4

Now, $5x+2y=3$

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

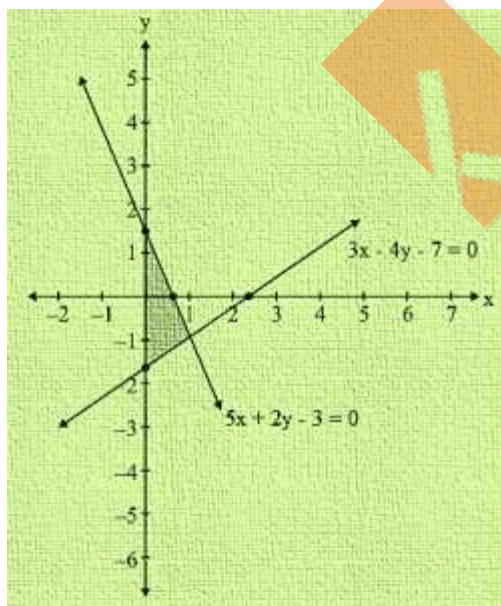
When $x=1$ then, $y=-1$

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.

(ii) $4x-y=4$ and $3x+2y=14$

The given system of linear equation is $4x-y=4$ and $3x+2y=14$

Now, $4x-y=4$

$$y = 4x - 4$$

When $x=0$ then, $y=-4$

When $x=-1$ then $y=-8$

Thus, we have the following table

X	0	-1
y	-4	-8

Now, $3x+2y=14$

$$y = 14 - 3x \quad \frac{14-3x}{2}$$

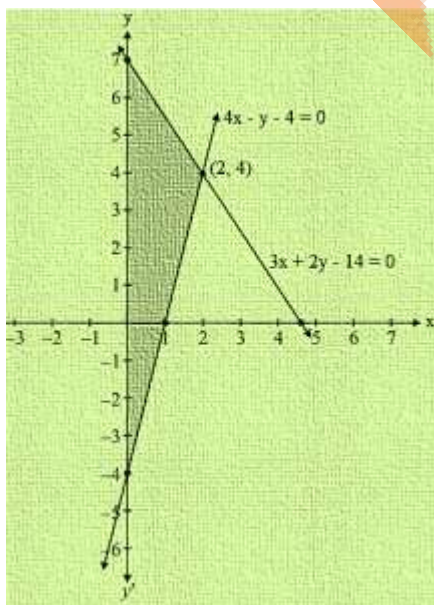
When $x=0$ then, $y=7$

When $x=4$ then $y=1$

Thus, we have the following table

X	0	4
Y	7	1

Graph of the given system of equations are:



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

Hence $x=2$ and $y=4$ is the solution of the given system of equations.

Q35. Represent the following pair of equations graphically and write the coordinates of points where the lines intersect y-axis

$$x+3y=6 \text{ and } 2x-3y=12$$

Soln:

The given systems of equations are:

$$x+3y=6 \text{ and } 2x-3y=12$$

$$\text{Now, } x+3y=6$$

$$y= 6-x \div 3$$

$$\text{When } x=0 \text{ then, } y=2$$

$$\text{When } x=3 \text{ then } y=1$$

Thus, we have the following table

X	0	3
Y	2	1

$$\text{Now, } 2x-3y=12$$

$$y= 2x-12 \div 3$$

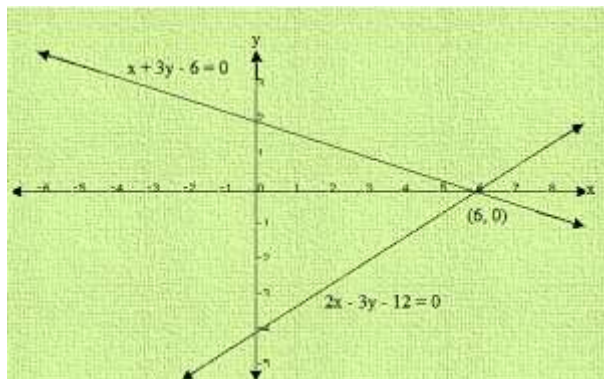
$$\text{When } x=0 \text{ then, } y=-4$$

$$\text{When } x=6 \text{ then } y=0$$

Thus, we have the following table

X	0	6
Y	-4	0

Graph of the given system of equations are :



Clearly the two lines meet y-axis at B(0,2) and C(0,-4) respectively.

Hence the required coordinates are (0,2) and (0,-4)

Q36. Given the linear equation $2x+3y-8=0$, write another in two variables such that the geometrical representation of the pair so formed is (i) intersecting lines (ii) parallel lines (iii) coincident lines

Soln:

(i) For the two lines $a_1x+b_1x+c_1=0$ and $a_2x+b_2x+c_2=0$ to be intersecting. We must have

$$a_1a_2 \neq b_1b_2 \quad \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

So the other linear equation can be $5x+6y-16=0$

$$a_1a_2 \frac{a_1}{a_2} = 25 \frac{2}{5}$$

$$b_1b_2 \frac{b_1}{b_2} = 36 \frac{3}{6} = 12 \frac{1}{2}$$

$$c_1c_2 \frac{c_1}{c_2} = -8-16 \frac{-8}{-16} = 12 \frac{1}{2}$$

(ii) For the two lines $a_1x+b_1x+c_1=0$ and $a_2x+b_2x+c_2=0$ to be parallel we must have

$$a_1a_2 \frac{a_1}{a_2} = b_1b_2 \frac{b_1}{b_2} \neq c_1c_2 \frac{c_1}{c_2}$$

So, the other linear equation can be $6x+9y+24=0$

$$a_1a_2 \frac{a_1}{a_2} = 26 \frac{2}{6} = 13 \frac{1}{3}$$

$$b_1b_2 \frac{b_1}{b_2} = 39 \frac{3}{9} = 13 \frac{1}{3}$$

