

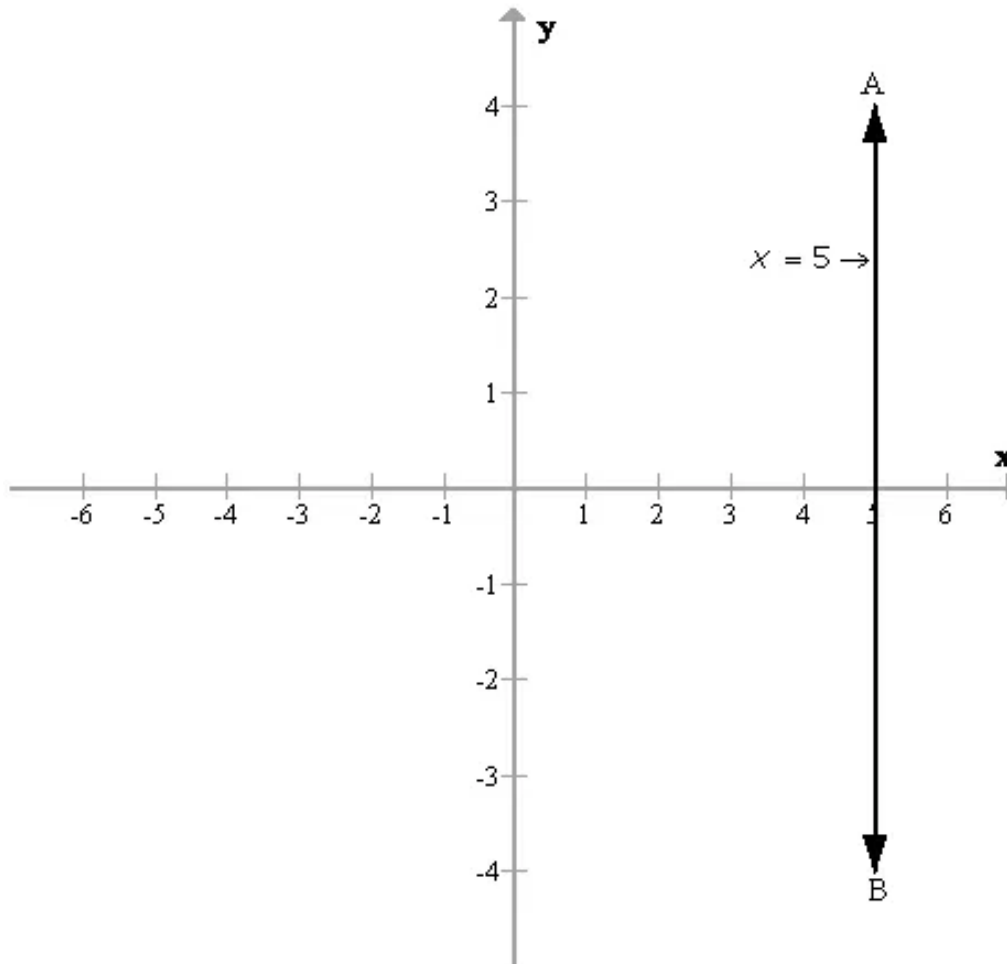
Chapter 27. Graphical Solution (Solution of Simultaneous Linear Equations, Graphically)

Exercise 27(A)

Solution 1:

(i)

The graph $x = 5$ in the following figure is a straight line AB which is parallel to y axis at a distance of 5 units from it.

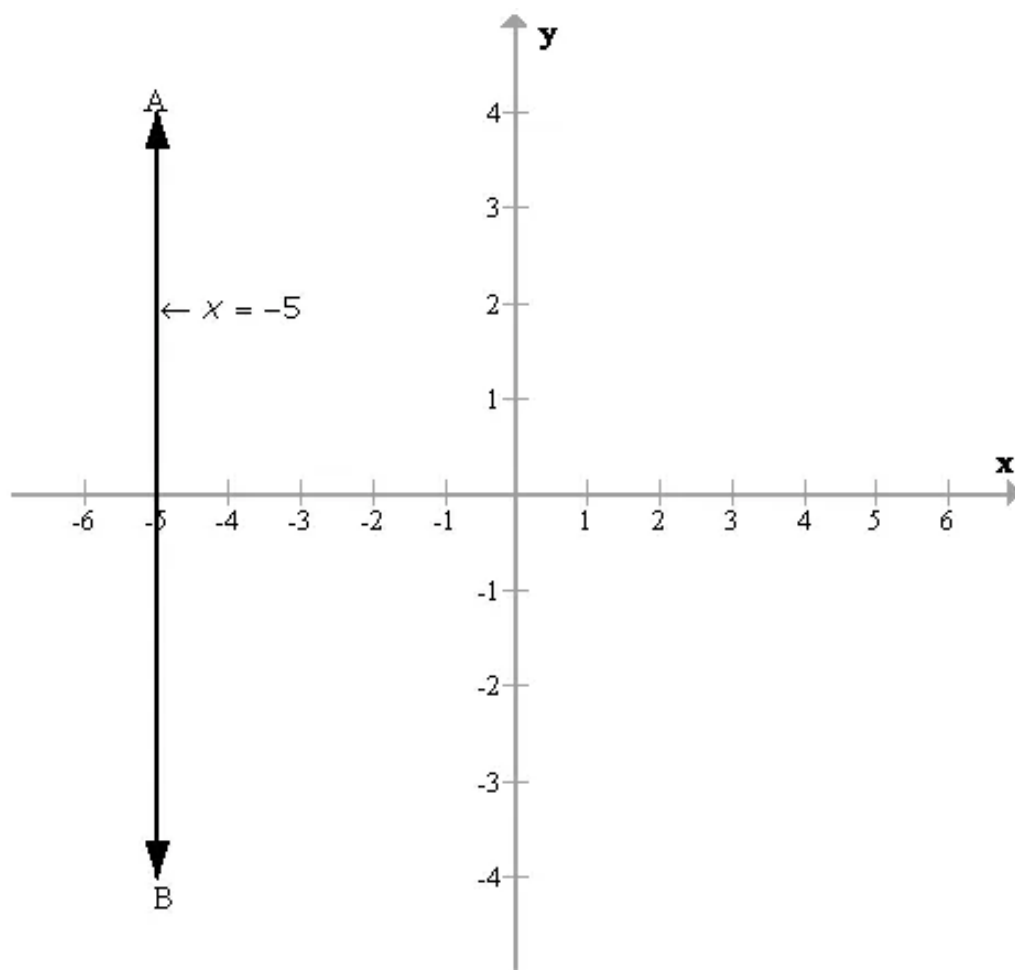


(ii)

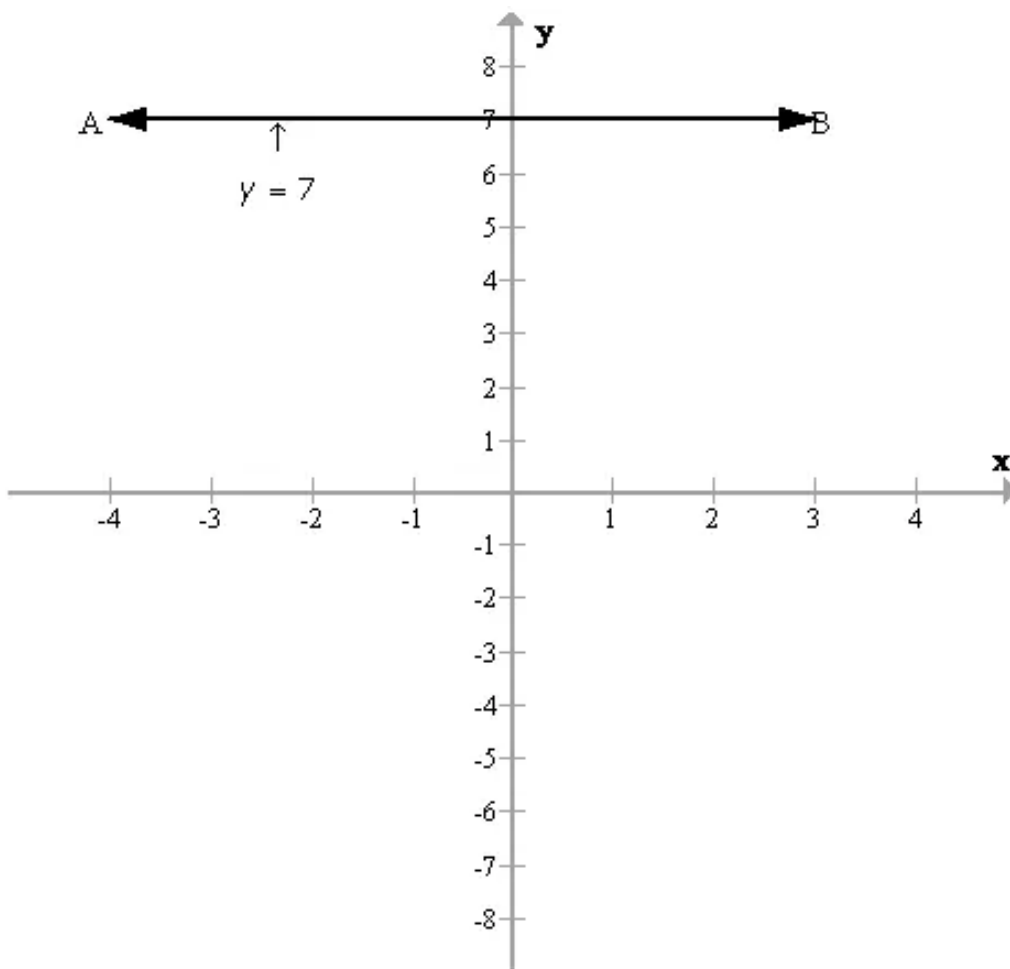
$$x + 5 = 0$$

$$x = -5$$

The graph $x = -5$ in the following figure is a straight line AB which is parallel to y axis at a distance of 5 units from it in the negative x direction.



(iii)
The graph $y = 7$ in the following figure is a straight line AB which is parallel to x axis at a distance of 7 units from it.

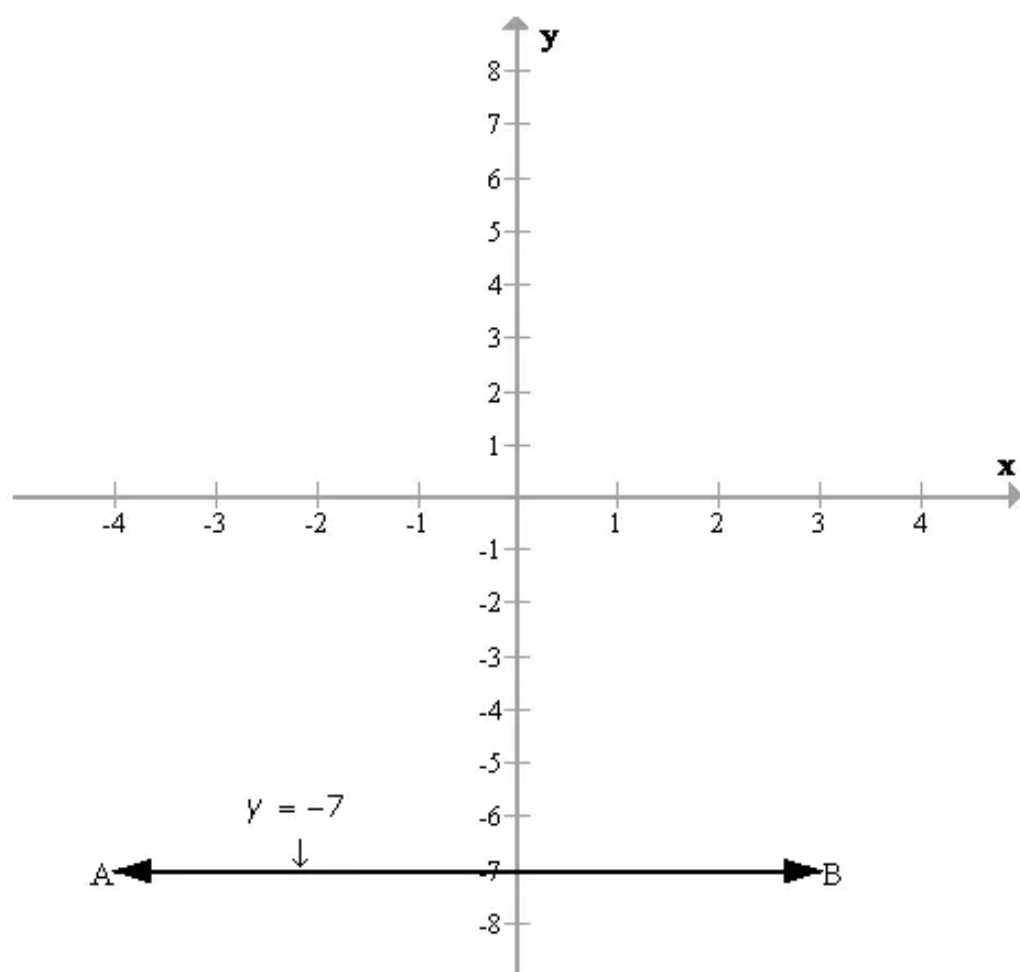


(iv)

$$y + 7 = 0$$

$$y = -7$$

The graph $y = -7$ in the following figure is a straight line AB which is parallel to x axis at a distance of 7 units from it in the negative y direction.



(v)

$$2x + 3y = 0$$

$$\Rightarrow 3y = -2x$$

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

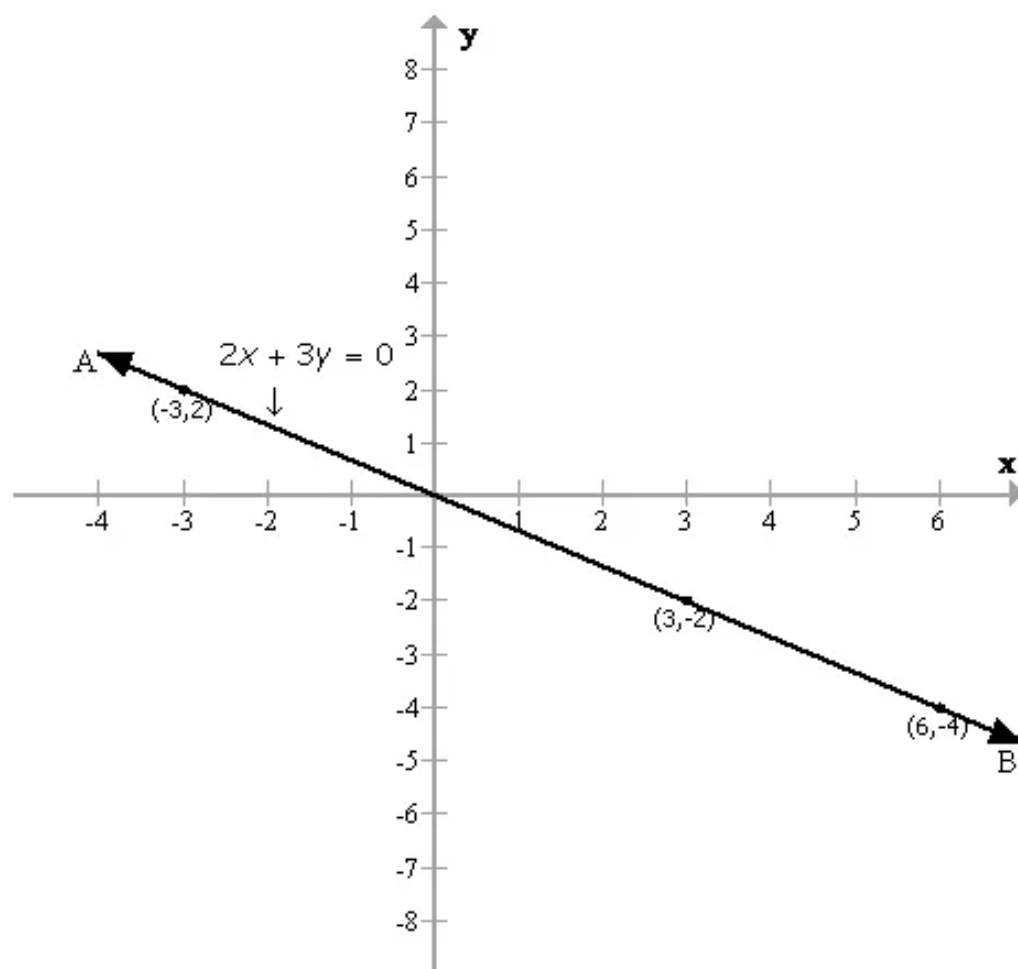
$$\text{When } x = -3; y = \frac{-2(-3)}{3} = \frac{6}{3} = 2$$

$$\text{When } x = 3; y = \frac{-2(3)}{3} = \frac{-6}{3} = -2$$

$$\text{When } x = 6; y = \frac{-2(6)}{3} = \frac{-12}{3} = -4$$

x	-3	3	6
y	2	-2	-4

Plotting these points we get the required graph as shown below:



(vi)

$$3x + 2y = 6$$

$$\Rightarrow 2y = 6 - 3x$$

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

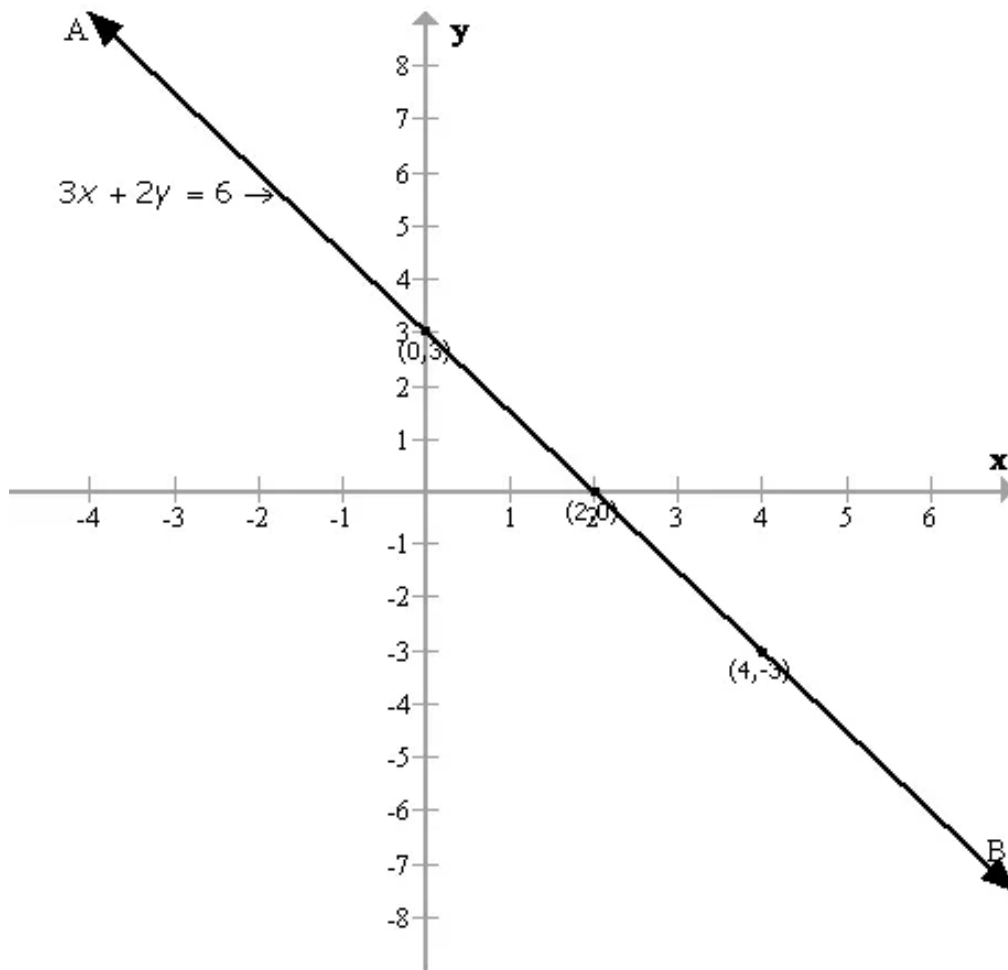
$$\text{When } x=0; y = \frac{6 - 3 \times 0}{2} = \frac{6 - 0}{2} = 3$$

$$\text{When } x=2; y = \frac{6 - 3 \times 2}{2} = \frac{6 - 6}{2} = 0$$

$$\text{When } x=4; y = \frac{6 - 3 \times 4}{2} = \frac{6 - 12}{2} = -3$$

x	0	2	4
y	3	0	-3

Plotting these points we get the required graph as shown below:



(vii)

$$x - 5y + 4 = 0$$

$$\Rightarrow 5y = 4 + x$$

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

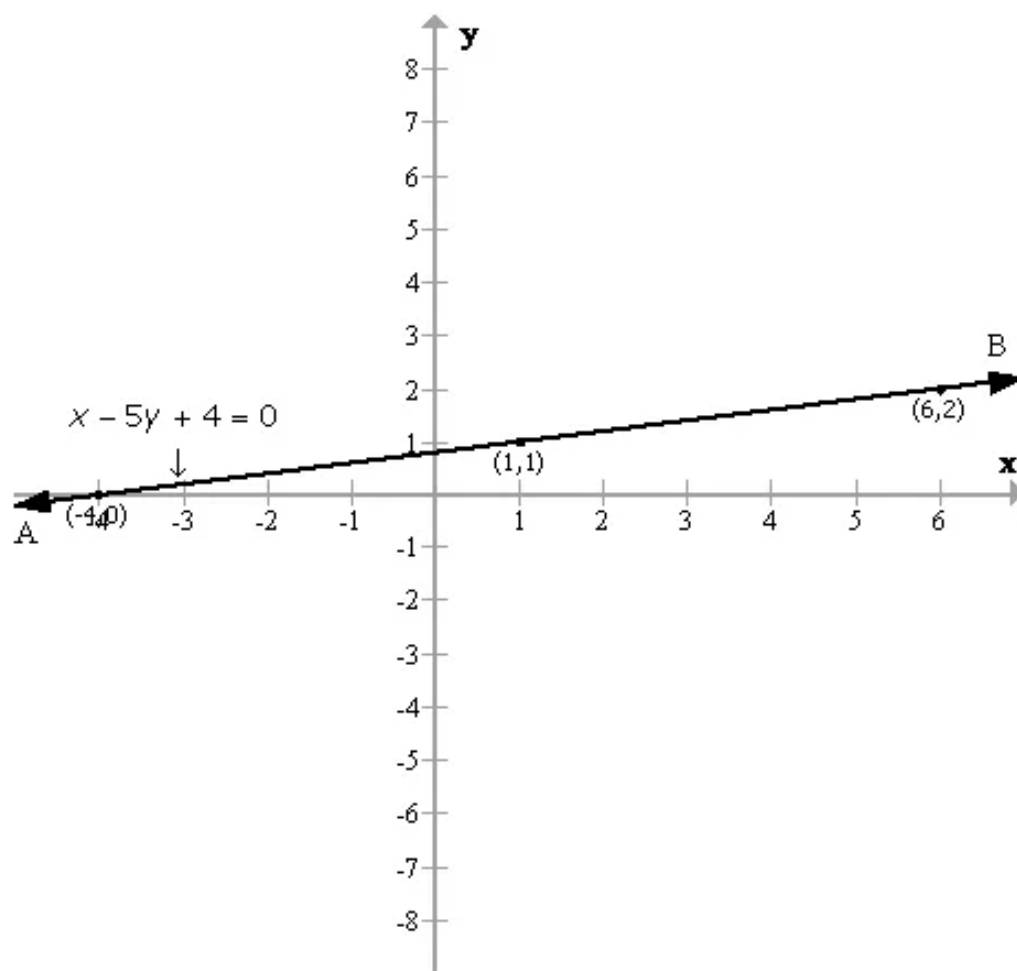
$$\text{When } x=1; y = \frac{1+4}{5} = \frac{5}{5} = 1$$

$$\text{When } x=6; y = \frac{6+4}{5} = \frac{10}{5} = 2$$

$$\text{When } x=-4; y = \frac{-4+4}{5} = \frac{0}{5} = 0$$

x	1	6	-4
y	1	2	0

Plotting these points we get the required graph as shown below:



(viii)

$$5x + y + 5 = 0$$

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

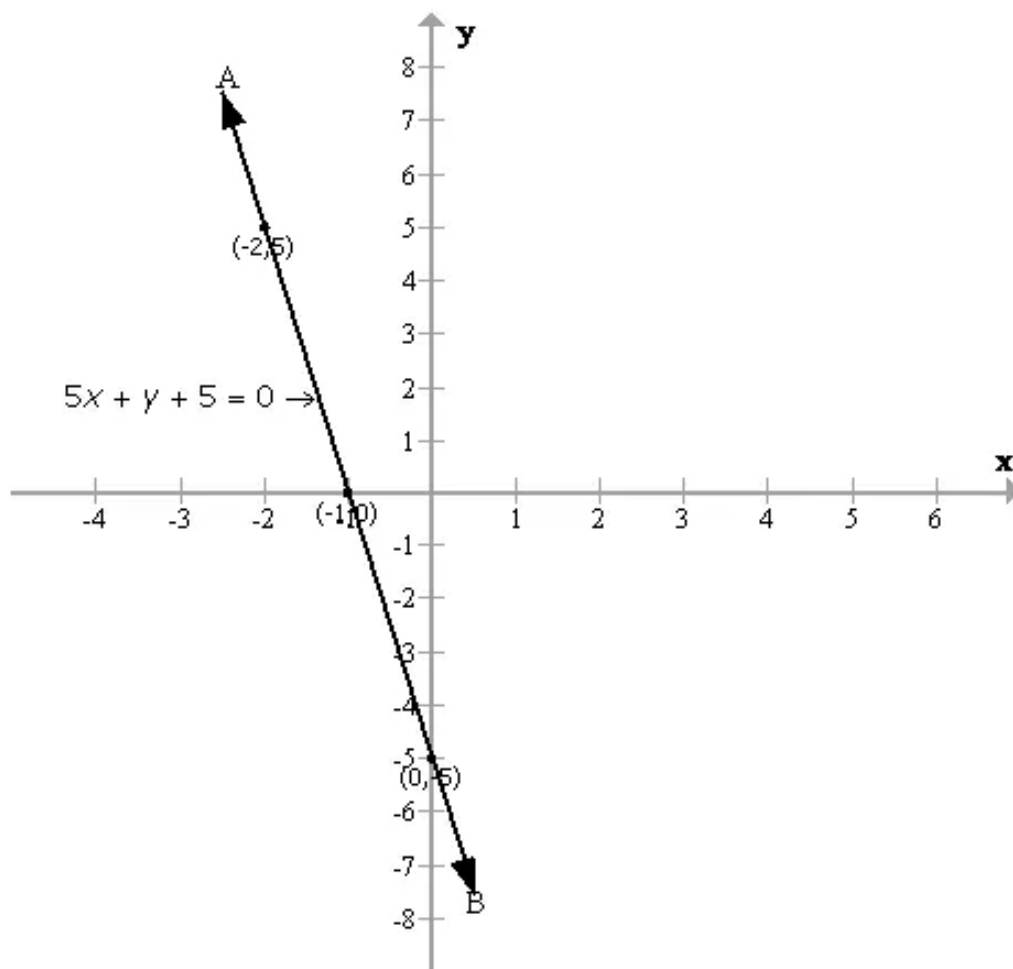
$$\text{When } x=0; y = -5 \times 0 - 5 = -0 - 5 = -5$$

$$\text{When } x=-1; y = -5 \times (-1) - 5 = 5 - 5 = 0$$

$$\text{When } x=-2; y = -5 \times (-2) - 5 = 10 - 5 = 5$$

x	0	-1	-2
y	-5	0	5

Plotting these points we get the required graph as shown below:



Solution 2:

$$(i) \frac{1}{3}x + \frac{1}{5}y = 1$$

$$\Rightarrow \frac{5x + 3y}{15} = 1$$

$$\Rightarrow 5x + 3y = 15$$

$$\Rightarrow 3y = 15 - 5x$$

$$\Rightarrow y = \frac{15 - 5x}{3}$$

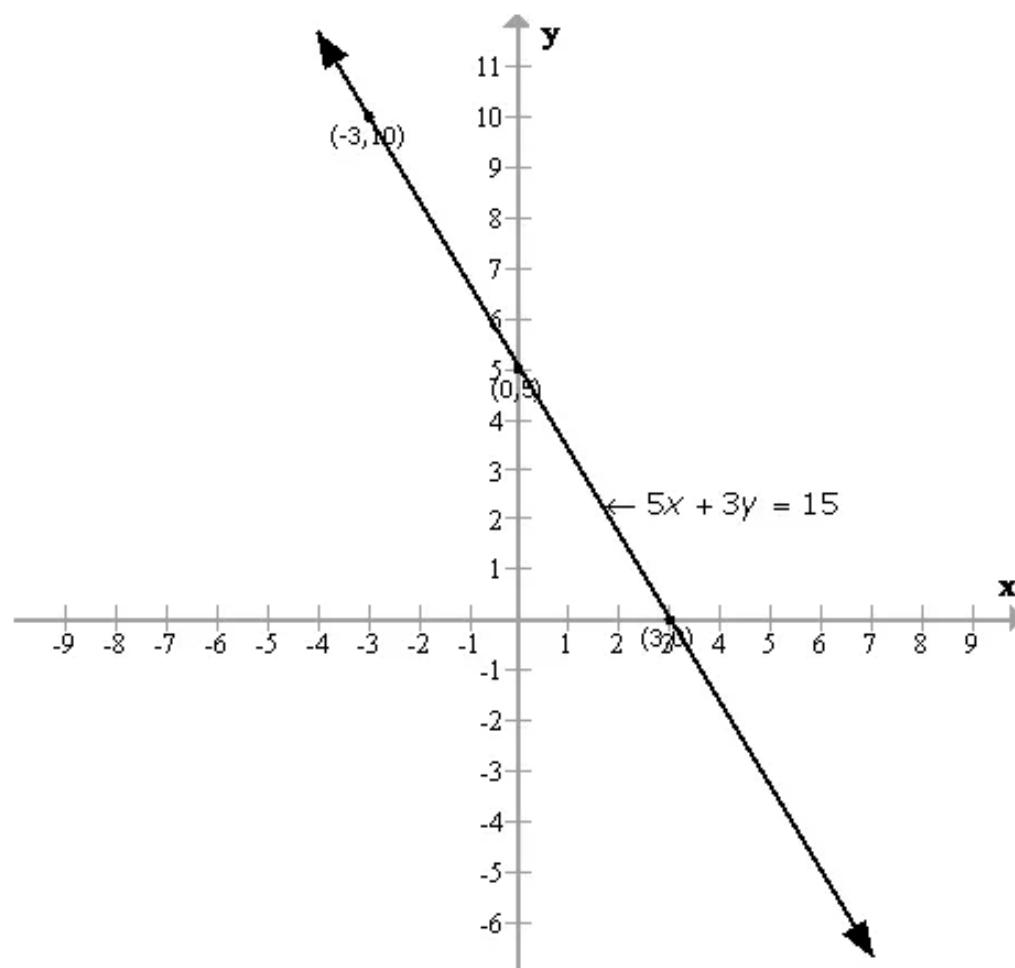
$$\text{When } x = 0; y = \frac{15 - 5 \times 0}{3} = \frac{15 - 0}{3} = 5$$

$$\text{When } x = 3; y = \frac{15 - 5 \times 3}{3} = \frac{15 - 15}{3} = 0$$

$$\text{When } x = -3; y = \frac{15 - 5 \times (-3)}{3} = \frac{15 + 15}{3} = 10$$

x	0	3	-3
y	5	0	10

Plotting these points we get the required graph as shown below:



From the figure it is clear that, the graph meets the coordinate axes at $(3, 0)$ and $(0, 5)$

$$(ii) \frac{2x+15}{3} = y-1$$

$$\Rightarrow 2x+15=3(y-1)$$

$$\Rightarrow 2x+15=3y-3$$

$$\Rightarrow 2x-3y=-15-3$$

$$\Rightarrow 2x-3y=-18$$

$$\Rightarrow -3y=-18-2x$$

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

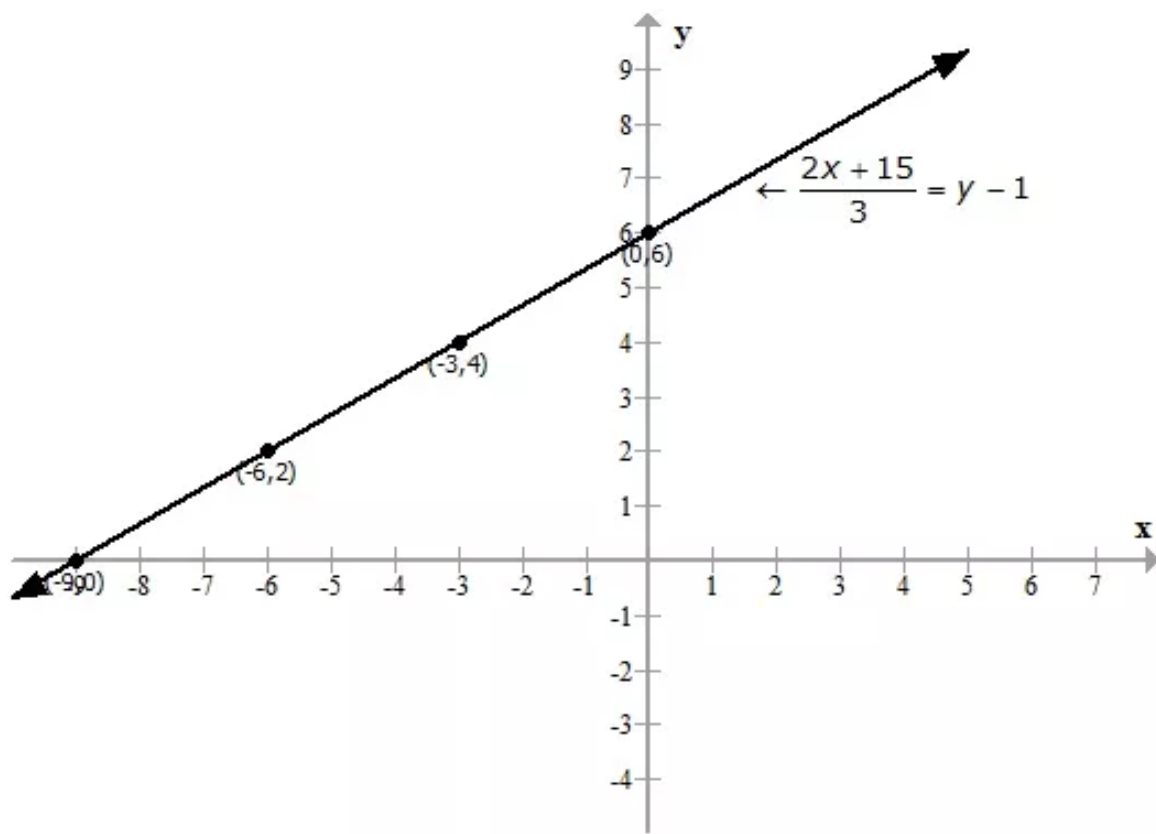
$$\text{When } x=0, y = \frac{-18-[2 \times 0]}{-3} = \frac{-18-0}{-3} = 6$$

$$\text{When } x=-3, y = \frac{-18-[2 \times (-3)]}{-3} = \frac{-18+6}{-3} = 4$$

$$\text{When } x=-6, y = \frac{-18-[2 \times (-6)]}{-3} = \frac{-18+12}{-3} = 2$$

x	0	-3	-6
y	6	4	2

Plotting these points we get the required graph as shown below:



From the figure it is clear that, the graph meets the coordinate axes at $(-9, 0)$ and $(0, 6)$

Solution 3:

$$4x - 3y + 36 = 0$$

$$\Rightarrow 4x - 3y = -36$$

$$\Rightarrow -3y = -36 - 4x$$

$$\Rightarrow 3y = 36 + 4x$$

$$\Rightarrow y = \frac{36 + 4x}{3}$$

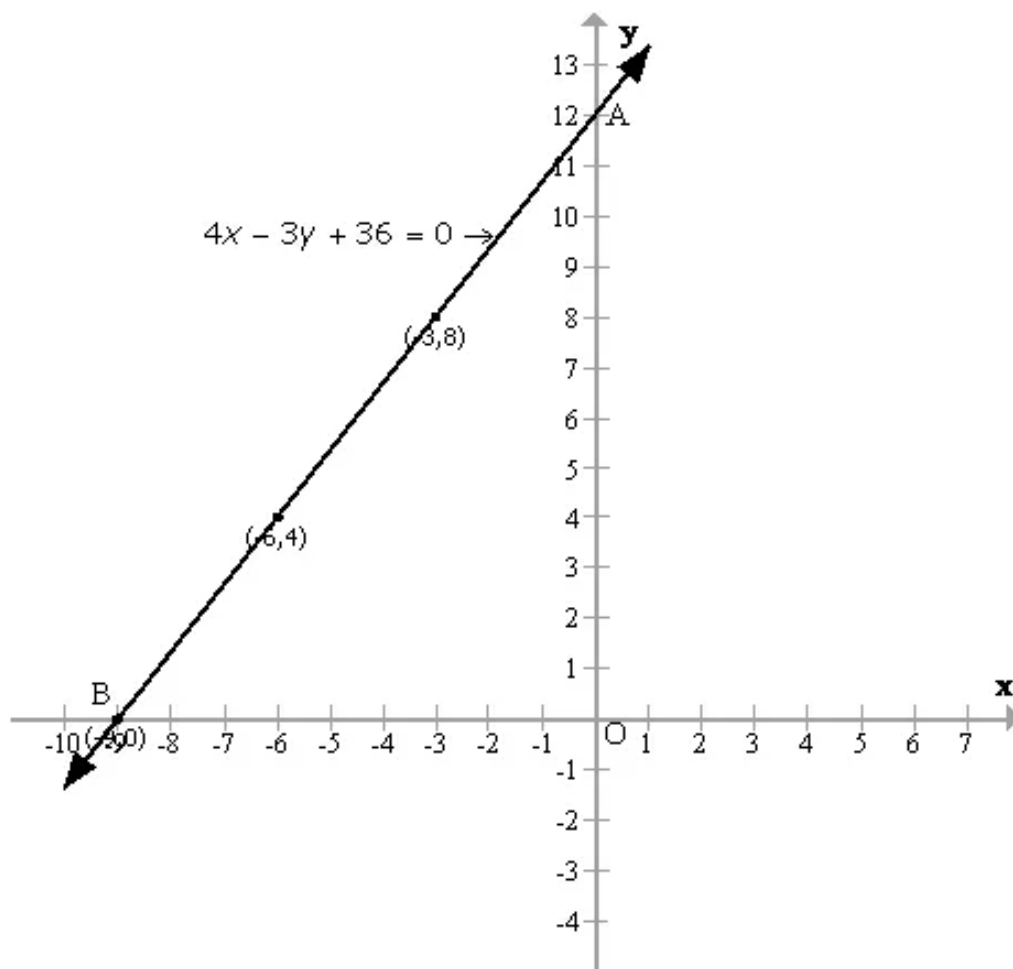
$$\text{When } x = -6, y = \frac{36 + 4 \times (-6)}{3} = \frac{36 - 24}{3} = 4$$

$$\text{When } x = -3, y = \frac{36 + 4 \times (-3)}{3} = \frac{36 - 12}{3} = 8$$

$$\text{When } x = -9, y = \frac{36 + 4 \times (-9)}{3} = \frac{36 - 36}{3} = 0$$

x	-9	-3	-6
y	0	8	4

Plotting these points we get the required graph as shown below:



The straight line cuts the co-ordinate axis at A(0, 12) and B(-9, 0).

$\therefore$ The triangle $\triangle AOB$ is formed.

$$\begin{aligned}
 \text{Area of the triangle AOB} &= \frac{1}{2} \times AO \times OB \\
 &= \frac{1}{2} \times 12 \times 9 \\
 &= 54 \text{ sq. units}
 \end{aligned}$$

$\therefore$ Area of the triangle is 54 sq. units

Solution 4:

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

$$\Rightarrow 2x = 3y + 5$$

$$\Rightarrow x = \frac{3y + 5}{2}$$

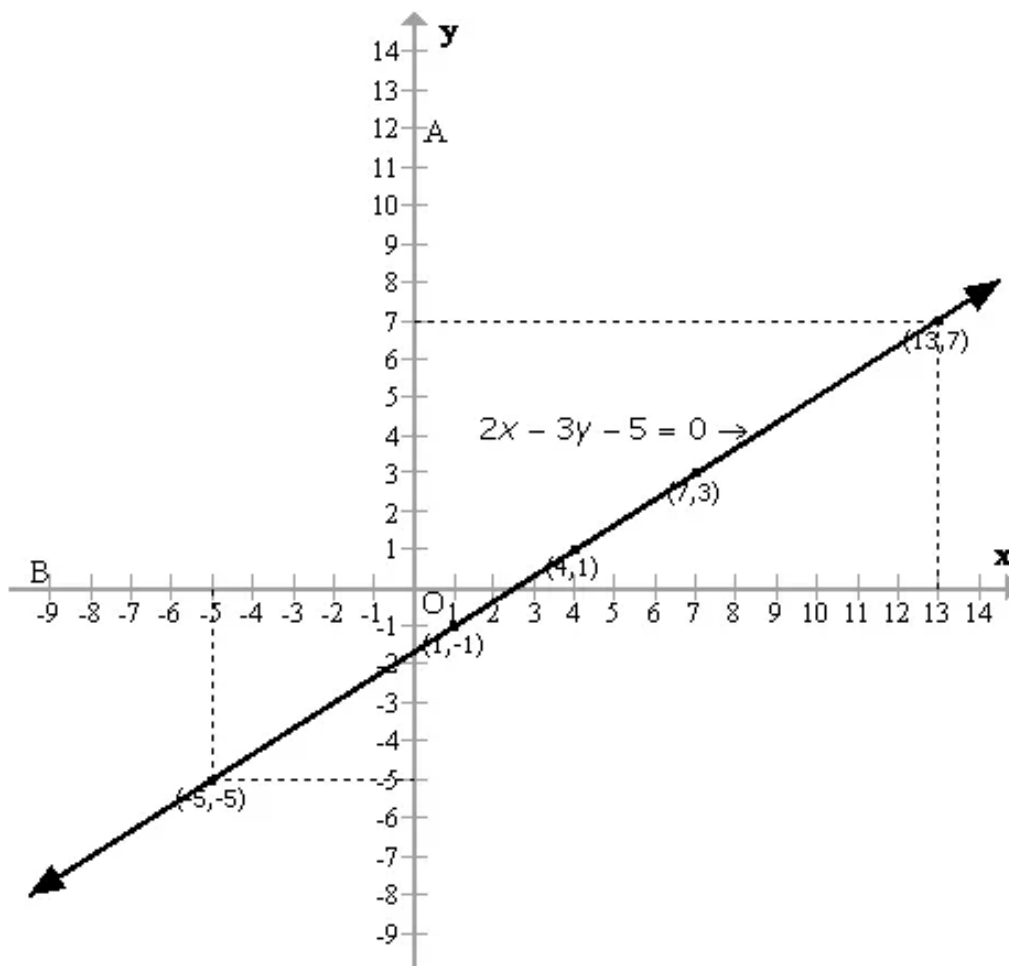
$$\text{When } y = 1, x = \frac{3(1) + 5}{2} = \frac{8}{2} = 4$$

$$\text{When } y = 3, x = \frac{3(3) + 5}{2} = \frac{9 + 5}{2} = 7$$

$$\text{When } y = -1, x = \frac{3(-1) + 5}{2} = \frac{5 - 3}{2} = 1$$

x	4	7	1
y	1	3	-1

Plotting these points we get the required graph as shown below:



The value of x , when $y=7$:

We have the equation of the line as

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

Now substitute $y=7$ and $x=x_1$:

$$x_1 = \frac{3(7) + 5}{2} = \frac{21 + 5}{2} = \frac{26}{2} = 13$$

The value of x , when $y=-5$:

Now substitute $y=-5$ and $x=x_2$:

$$x_2 = \frac{3(-5) + 5}{2} = \frac{-15 + 5}{2} = \frac{-10}{2} = -5$$

Solution 5:

$$4x + 3y + 6 = 0$$

$$\Rightarrow 3y = -4x - 6$$

$$\Rightarrow y = \frac{-4x - 6}{3}$$

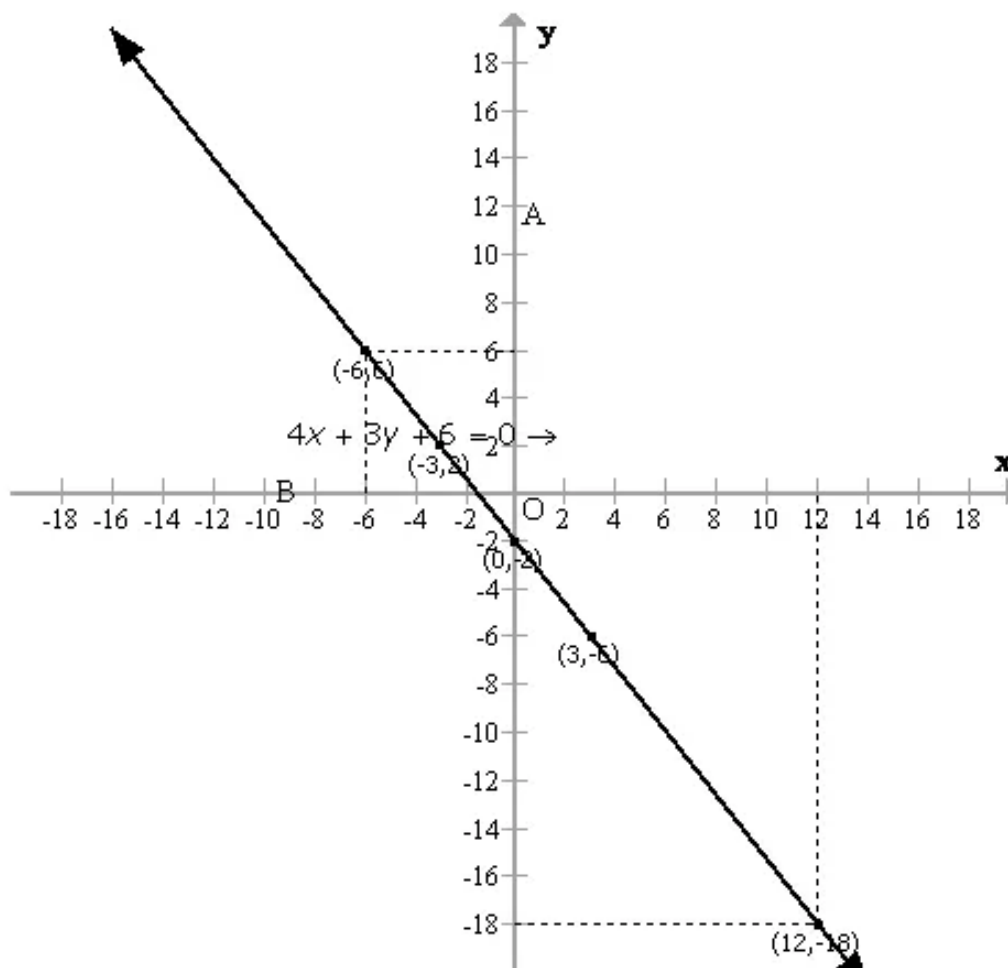
$$\text{When } x = 0, y = \frac{-4(0) - 6}{3} = \frac{-6}{3} = -2$$

$$\text{When } x = 3, y = \frac{-4(3) - 6}{3} = \frac{-12 - 6}{3} = -6$$

$$\text{When } x = -3, y = \frac{-4(-3) - 6}{3} = \frac{12 - 6}{3} = 2$$

x	0	3	-3
y	-2	-6	2

Plotting these points we get the required graph as shown below:



The value of y , when $x=12$:

We have the equation of the line as

$$y = \frac{-4x - 6}{3}$$

Now substitute $x=12$ and $y=y_1$:

$$y_1 = \frac{-4(12) - 6}{3} = \frac{-48 - 6}{3} = \frac{-54}{3} = -18$$

The value of y , when $x=-6$:

Now substitute $x=-6$ and $y=y_2$:

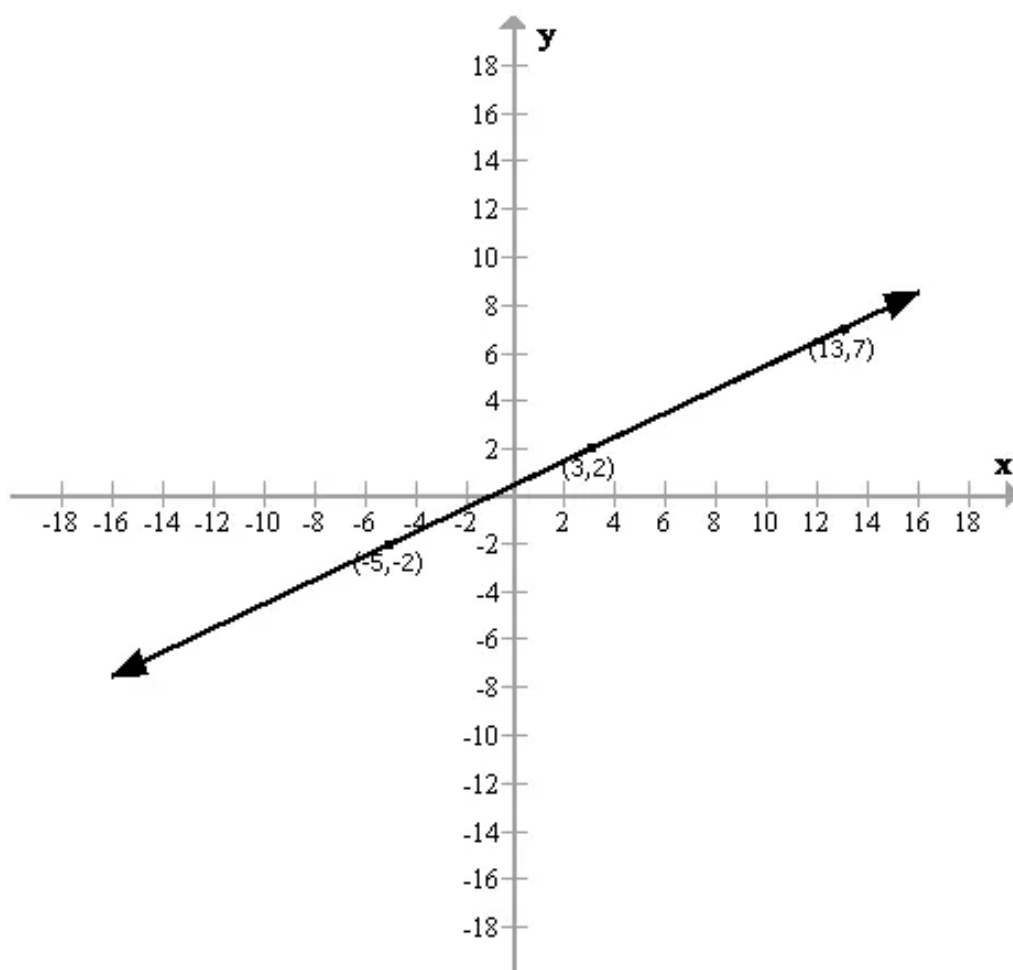
$$y_2 = \frac{-4(-6) - 6}{3} = \frac{24 - 6}{3} = \frac{18}{3} = 6$$

Solution 6:

The table is:

x	-5	-1	3	b	13
y	-2	a	2	5	7

Plotting the points as shown in the above table, we get the following required graph:

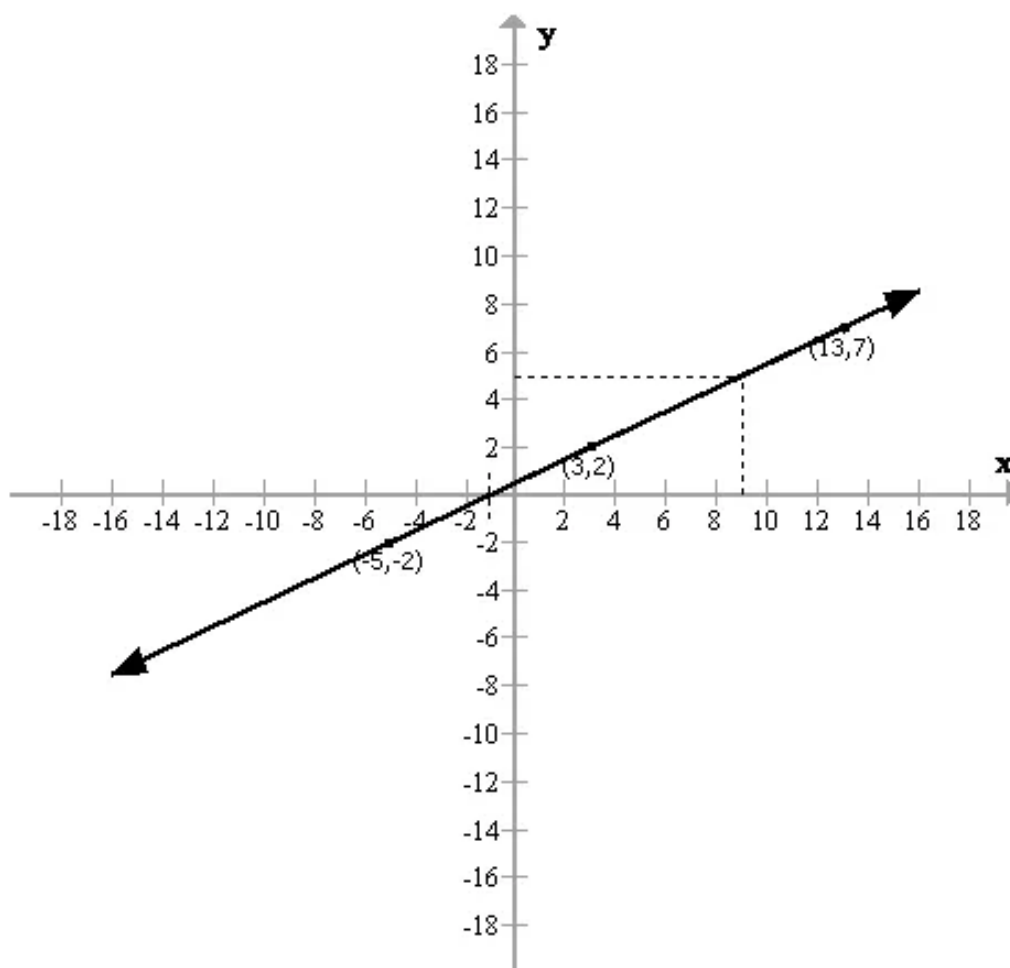


When $x = -1$, then $y=0$

$$\Rightarrow a=0$$

When $y =5$, then $x=9$

$$\Rightarrow b=9$$



Let $y = px + q$ (1)

be a linear relation between x and y

Substitute $x=9$ and $y=5$ in the equation (1), we have,

$$5 = 9p + q \text{(2)}$$

Substitute $x = -1$ and $y = 0$ in the equation (1), we have,

$$0 = -p + q \text{(3)}$$

Subtracting (3) from (2), we have,

$$5 = 10p$$

$$\Rightarrow p = \frac{5}{10}$$

$$\Rightarrow p = \frac{1}{2}$$

From (3), we have,

$$p = q$$

$$\therefore q = \frac{1}{2}$$

Thus, the linear relation is

$$y = px + q$$

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

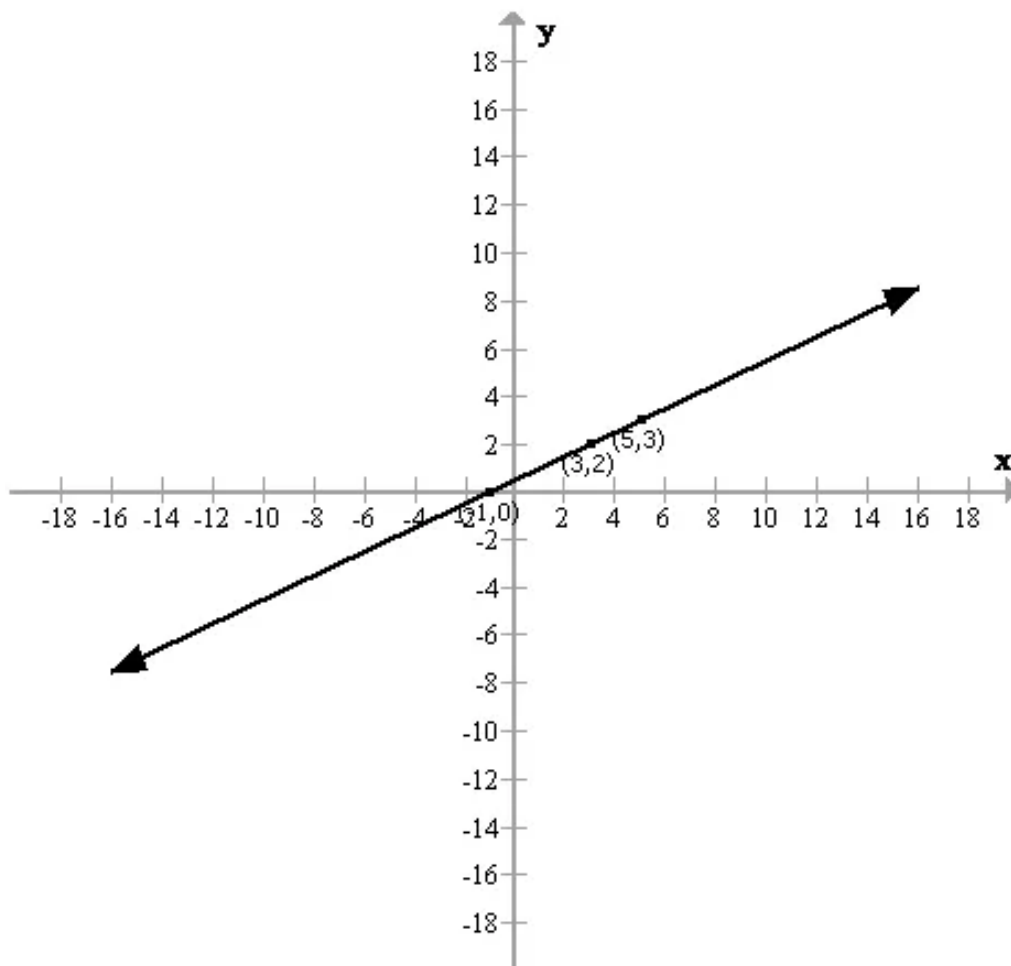
$$\Rightarrow y = \frac{x + 1}{2}$$

Solution 7:

The table is:

x	a	3	-5	5	c	-1
y	-1	2	b	3	4	0

Plotting the points as shown in the above table, we get the following required graph:



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

$$\Rightarrow a = -3$$

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

$$\Rightarrow b = -2$$

When $y = 4$, then $x = 7$

$$\Rightarrow c = 7$$

Let $y = px + q$ (1)

be a linear relation between x and y

Substitute $x = -3$ and $y = -1$ in the equation (1), we have,

$$-1 = -3p + q \text{(2)}$$

Substitute $x = -5$ and $y = -2$ in the equation (1), we have,

$$-2 = -5p + q \text{(3)}$$

Subtracting (3) from (2), we have,

$$1 = 2p$$

$$\Rightarrow p = \frac{1}{2}$$

From (3), we have,

$$-2 = -5p + q$$

$$\Rightarrow -2 = -5\left(\frac{1}{2}\right) + q$$

$$\Rightarrow -4 = -5 + 2q$$

$$\Rightarrow 2q = 5 - 4$$

$$\Rightarrow 2q = 1$$

$$\therefore q = \frac{1}{2}$$

Thus, the linear relation is

$$y = px + q$$

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

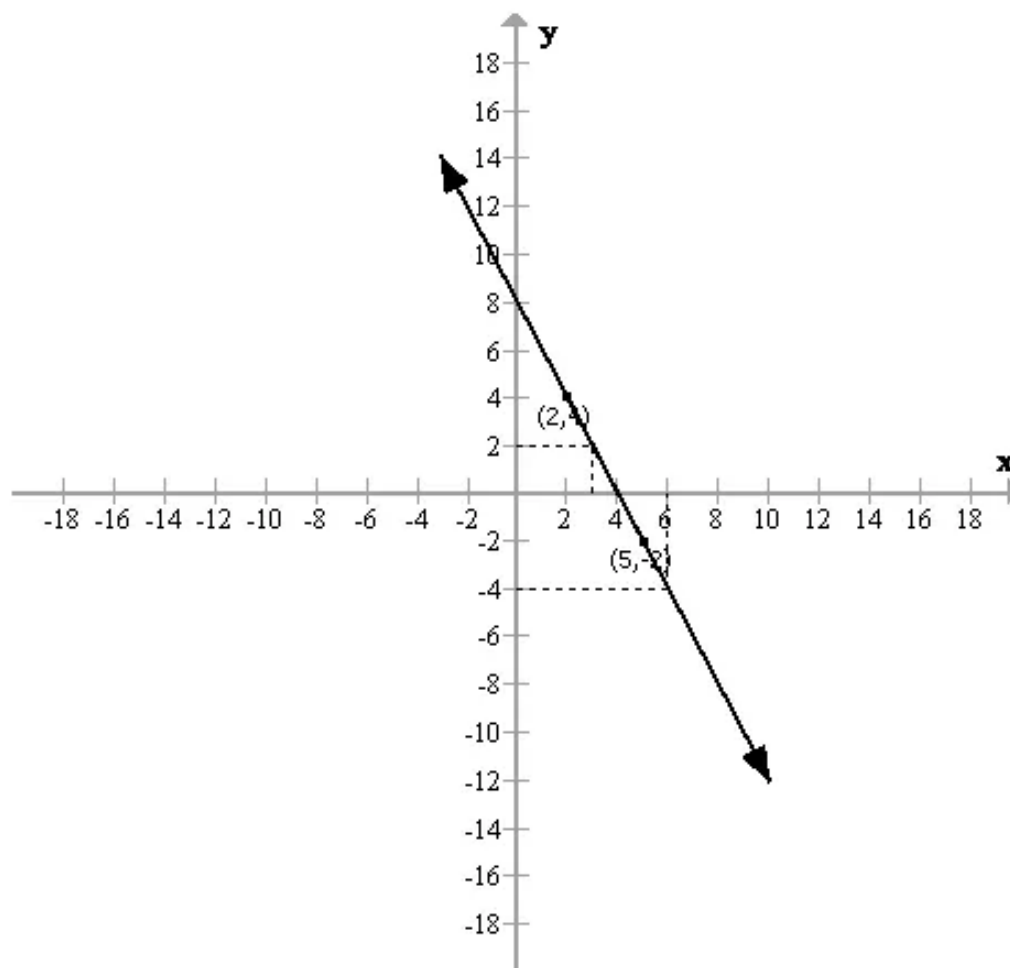
$$\Rightarrow y = \frac{x + 1}{2}$$

Solution 8:

The table is:

x	2	3	5	m
y	4	n	-2	-4

Plotting the points as shown in the above table, we get the following required graph:



Plotting the points in the graph we get the above required graph.

Now draw a line $x=3$, parallel to y -axis to meet the line

It meets the line at $y=2$ and therefore, $n=2$

Now draw a line $y=-4$, parallel to x -axis to meet the line

It meets the line at $x=6$ and therefore, $m=6$

Thus the values of m and n are 6 and 2 respectively.

Solution 9:

Consider the equation

$$x - 3y = 18$$

$$\Rightarrow -3y = 18 - x$$

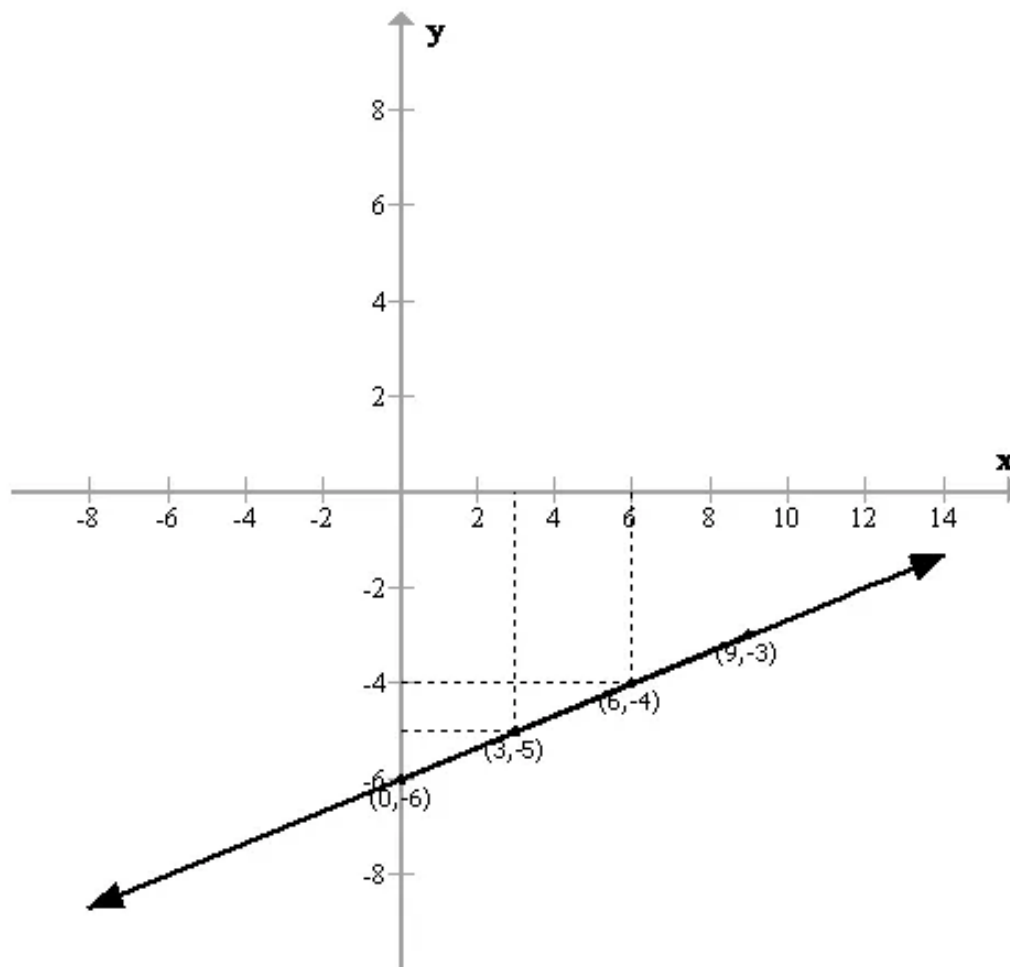
$$\Rightarrow 3y = x - 18$$

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

The table for $x - 3y = 18$ is

x	9	0	6	3
y	-3	-6	-4	-5

Plotting the above points, we get the following required graph:



From the above figure, we have
 $m=3$ and $n=-4$

Solution 10:

(i)

$$2x + 3y = 1$$

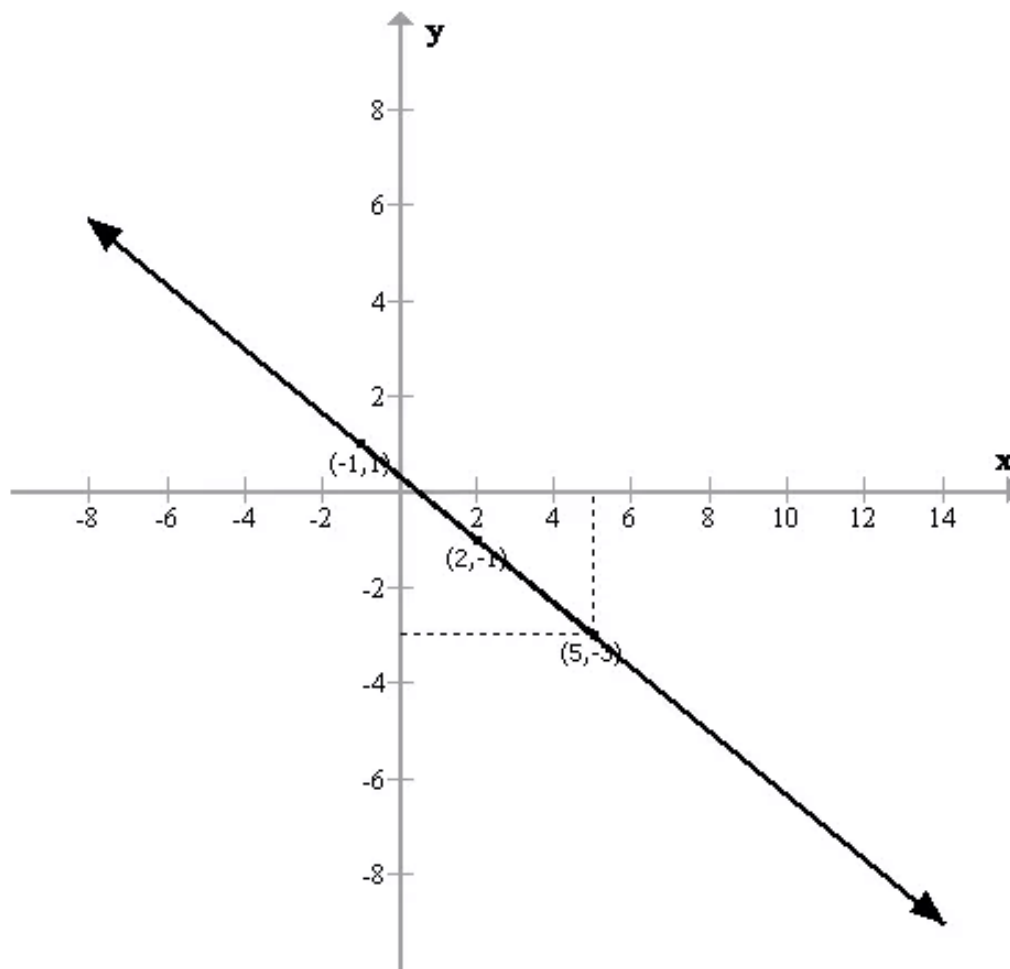
$$\Rightarrow 3y = 1 - 2x$$

$$\Rightarrow y = \frac{1 - 2x}{3}$$

The table for $2x + 3y = 1$ is

x	-1	2	5
y	1	-1	-3

Plotting the above points in a graph, we get the following graph:



From the above graph, it is clear that $k=5$

(ii)

$$x - 2y + 1 = 0$$

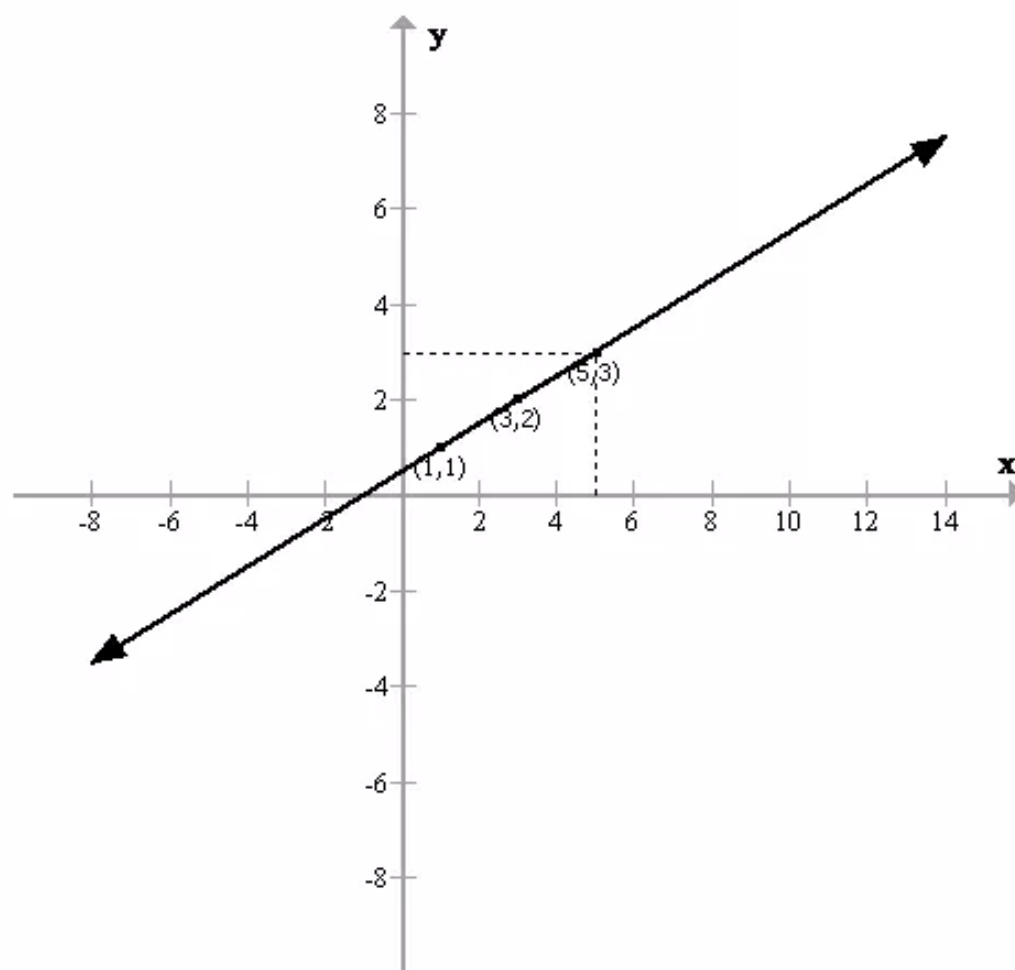
$$\Rightarrow 2y = x + 1$$

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

The table for $x - 2y + 1 = 0$ is

x	1	3	5
y	1	2	3

Plotting the above points in a graph, we get the following graph:



From the above graph, it is clear that

$$k - 2 = 3$$

$$\Rightarrow k = 5$$

Exercise 27(B)

Solution 1:

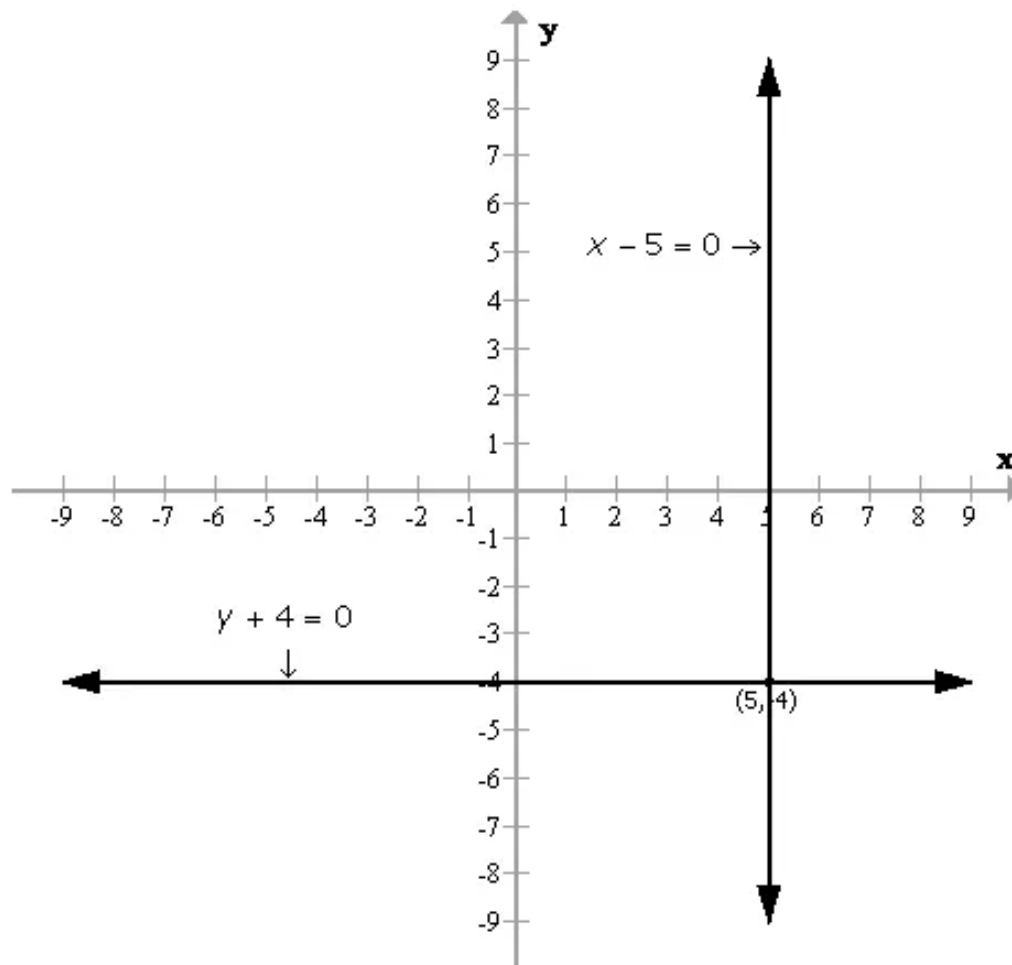
(i)

$$x - 5 = 0 \Rightarrow x = 5$$

$$y + 4 = 0 \Rightarrow y = -4$$

Following is the graph of the two equations

$x = 5$ and $y = -4$:



(ii)

$$2x + y = 23 \Rightarrow y = 23 - 2x$$

The table for $y = 23 - 2x$ is

x	5	10	15
y	13	3	-7

Also, we have

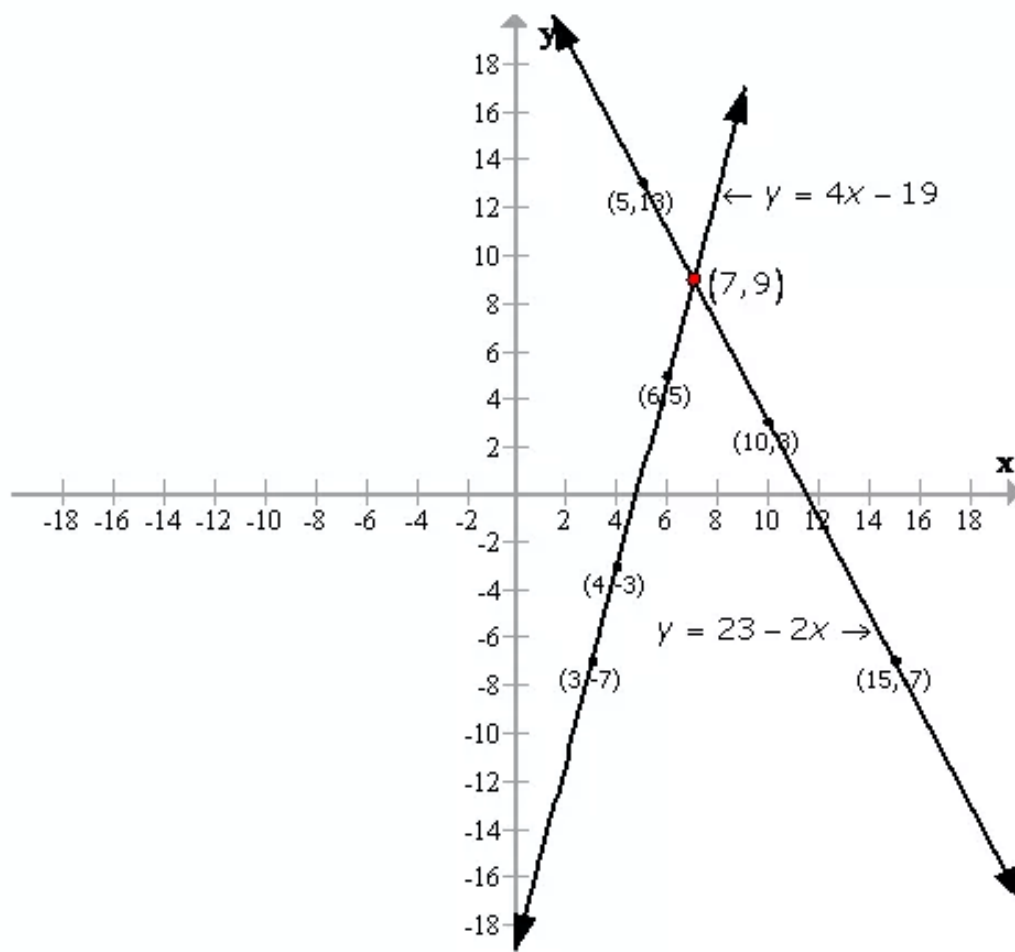
$$4x - y = 19$$

$$\Rightarrow y = 4x - 19$$

The table for $y = 4x - 19$ is

x	3	4	6
y	-7	-3	5

Plotting the points we get
the following required graph:



From the above graph, it is clear that the two lines $y=23-2x$ and $y=4x-19$ intersect at the point $(7,9)$

(iii)

$$3x + 7y = 27 \Rightarrow 3x = 27 - 7y$$

$$\Rightarrow x = \frac{27 - 7y}{3}$$

The table for $3x + 7y = 27$ is

x	9	2	-5
y	0	3	6

Also, we have

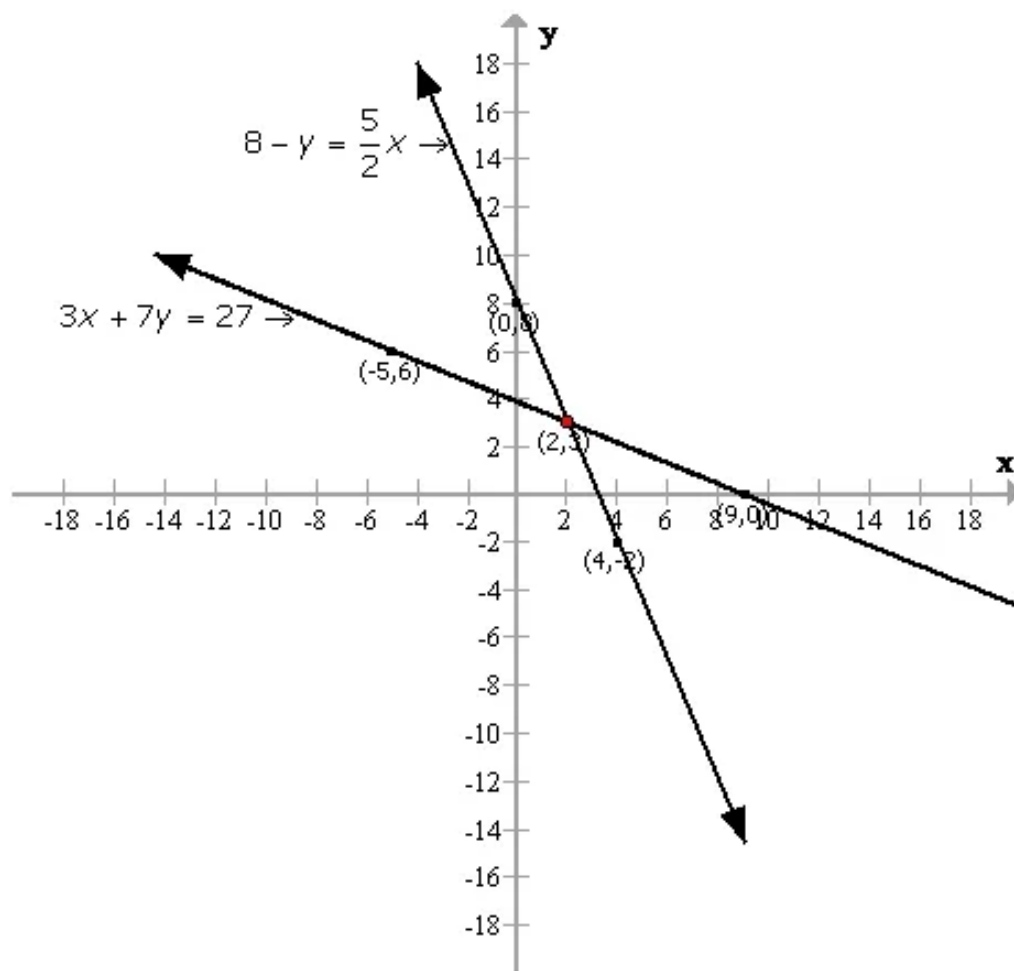
$$8 - y = \frac{5}{2}x$$

$$\Rightarrow x = (8 - y) \times \frac{2}{5}$$

The table for $5x + 2y = 16$ is

x	2	4	0
y	3	-2	8

Plotting the points we get the following required graph:



From the above graph, it is clear that the two lines $3x + 7y = 27$ and $8 - y = \frac{5}{2}x$ intersect at the point $(2, 3)$

(iv)

$$\begin{aligned}
& \frac{x+1}{4} = \frac{2}{3}(1-2y) \\
\Rightarrow & \frac{x+1}{4} = \frac{2}{3} - \frac{4y}{3} \\
\Rightarrow & 12 \times \frac{x+1}{4} = 12 \times \frac{2}{3} - 12 \times \frac{4y}{3} \\
\Rightarrow & 3(x+1) = 8 - 16y \\
\Rightarrow & 3x + 3 = 8 - 16y \\
\Rightarrow & 3x + 3 - 8 = -16y \\
\Rightarrow & 3x - 5 = -16y \\
\Rightarrow & x = \frac{5 - 16y}{3}
\end{aligned}$$

The table for $\frac{x+1}{4} = \frac{2}{3}(1-2y)$ is

x	7	-9	23
y	-1	2	-4

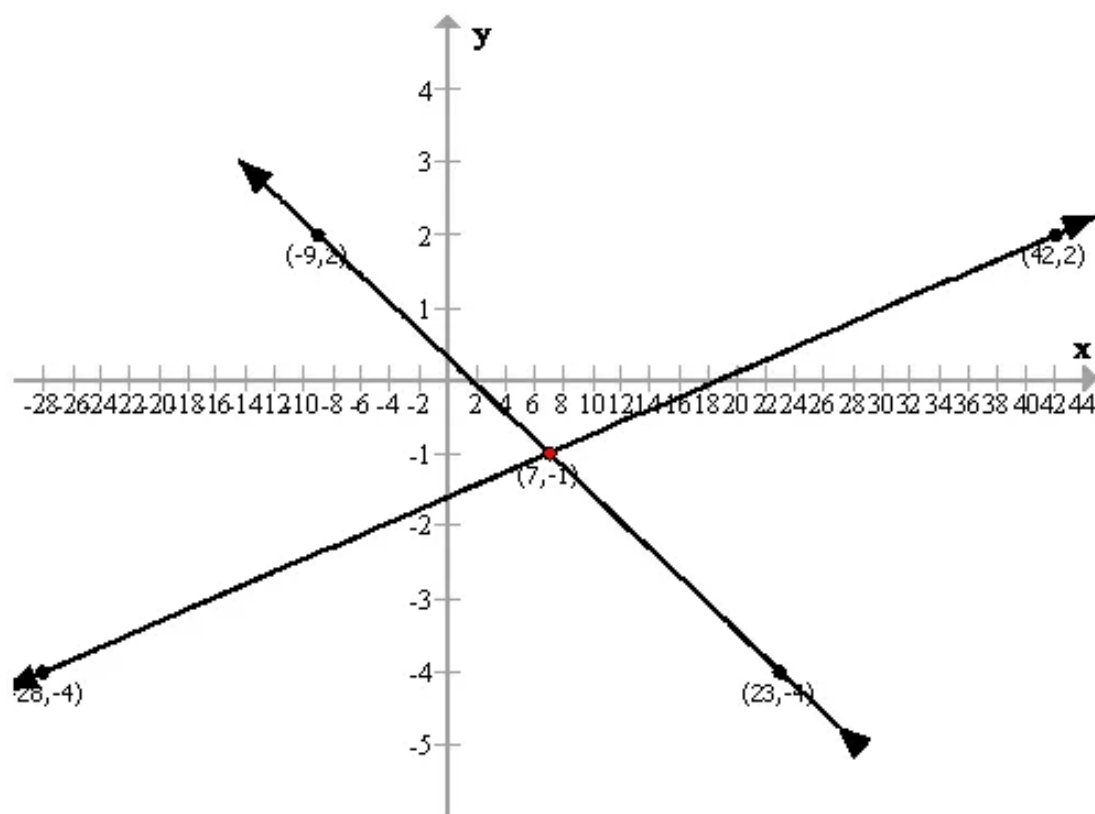
Also, we have

$$\begin{aligned}
& \frac{2+5y}{3} = \frac{x}{7} - 2 \\
\Rightarrow & 21 \times \frac{2+5y}{3} = 21 \times \frac{x}{7} - 21 \times 2 \\
\Rightarrow & 7(2+5y) = 3x - 42 \\
\Rightarrow & 14 + 35y = 3x - 42 \\
\Rightarrow & 3x = 14 + 35y + 42 \\
\Rightarrow & 3x = 56 + 35y \\
\Rightarrow & x = \frac{56 + 35y}{3}
\end{aligned}$$

The table for $\frac{2+5y}{3} = \frac{x}{7} - 2$ is

x	7	-28	42
y	-1	-4	2

Plotting the points we get
the following required graph:



From the above graph, it is dear

that the two lines $\frac{x+1}{4} = \frac{2}{3}(1-2y)$ and $\frac{2+5y}{3} = \frac{x}{7} - 2$
intersect at the point $(7, -1)$

Solution 2:

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

$$\Rightarrow x = 2y + 4$$

The table for $x - 2y - 4 = 0$ is

x	4	6	2
y	0	1	-1

Also we have

$$2x + y = 3$$

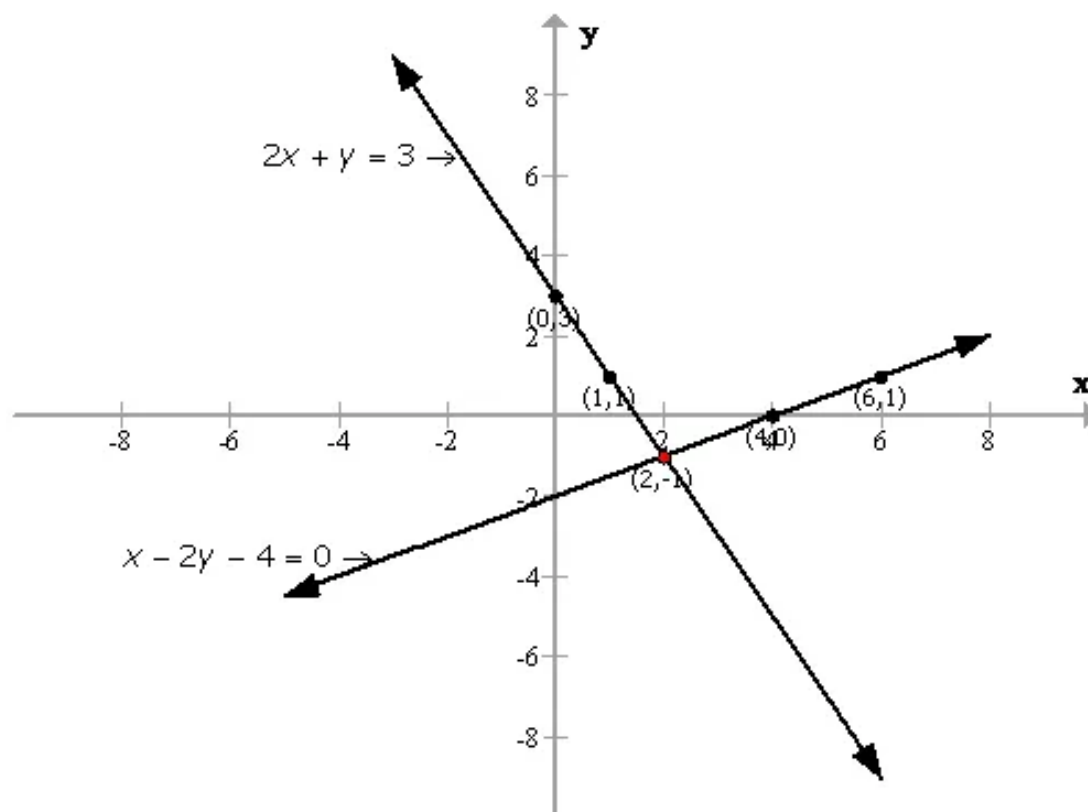
$$\Rightarrow 2x = 3 - y$$

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

The table for $2x + y = 3$ is

x	1	0	2
y	1	3	-1

Plotting the above points we get the following required graph:



From the above graph, it is clear that the two lines $x - 2y - 4 = 0$ and $2x + y = 3$ intersect at the point $(2, -1)$

Solution 3:

$$2x - y - 1 = 0$$

$$\Rightarrow 2x = y + 1$$

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

The table for $2x - y - 1 = 0$ is

x	2	1	0
y	3	1	-1

Also we have

$$2x + y = 9$$

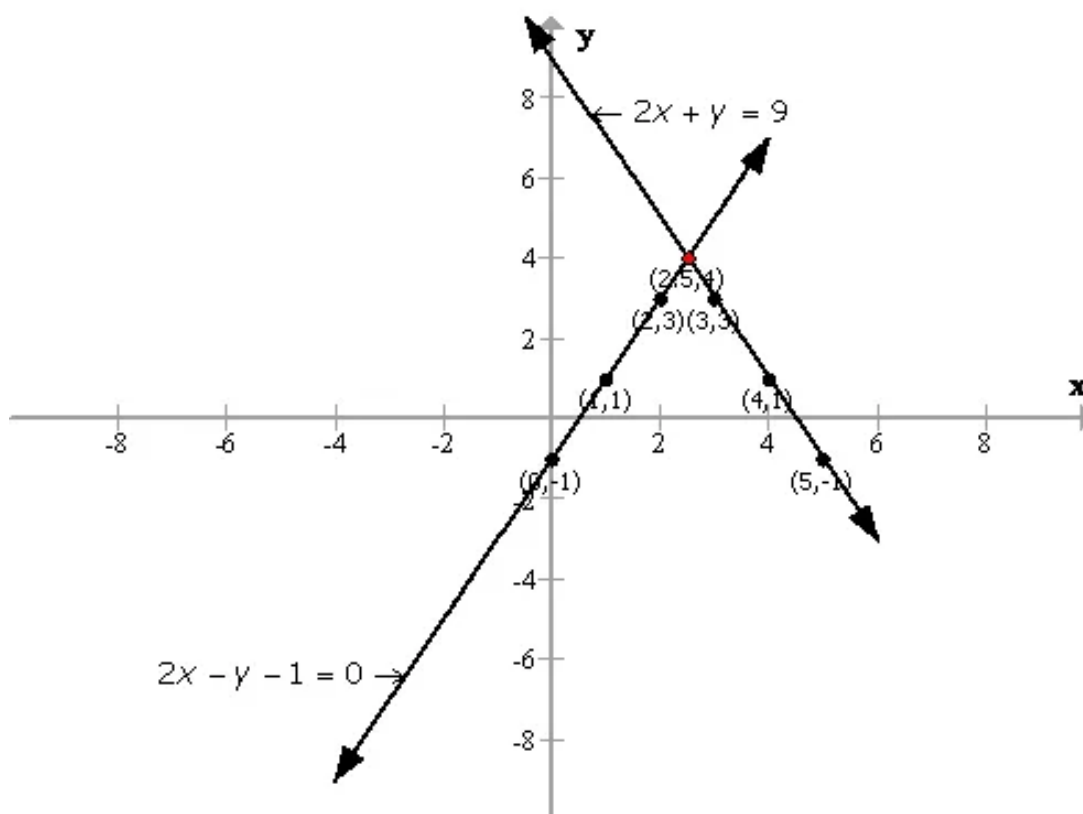
$$\Rightarrow 2x = 9 - y$$

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

The table for $2x + y = 9$ is

x	4	3	5
y	1	3	-1

Plotting the above points we get the following required graph:



From the above graph, it is clear that the two lines $2x - y - 1 = 0$ and $2x + y = 9$ intersect at the point $(2.5, 4)$

Solution 4:

$$3x + 5y = 12$$

$$\Rightarrow 3x = 12 - 5y$$

$$\Rightarrow x = \frac{12 - 5y}{3}$$

The table for $3x + 5y = 12$ is

x	4	-1	-6
y	0	3	-1

Also we have

$$3x - 5y + 18 = 0$$

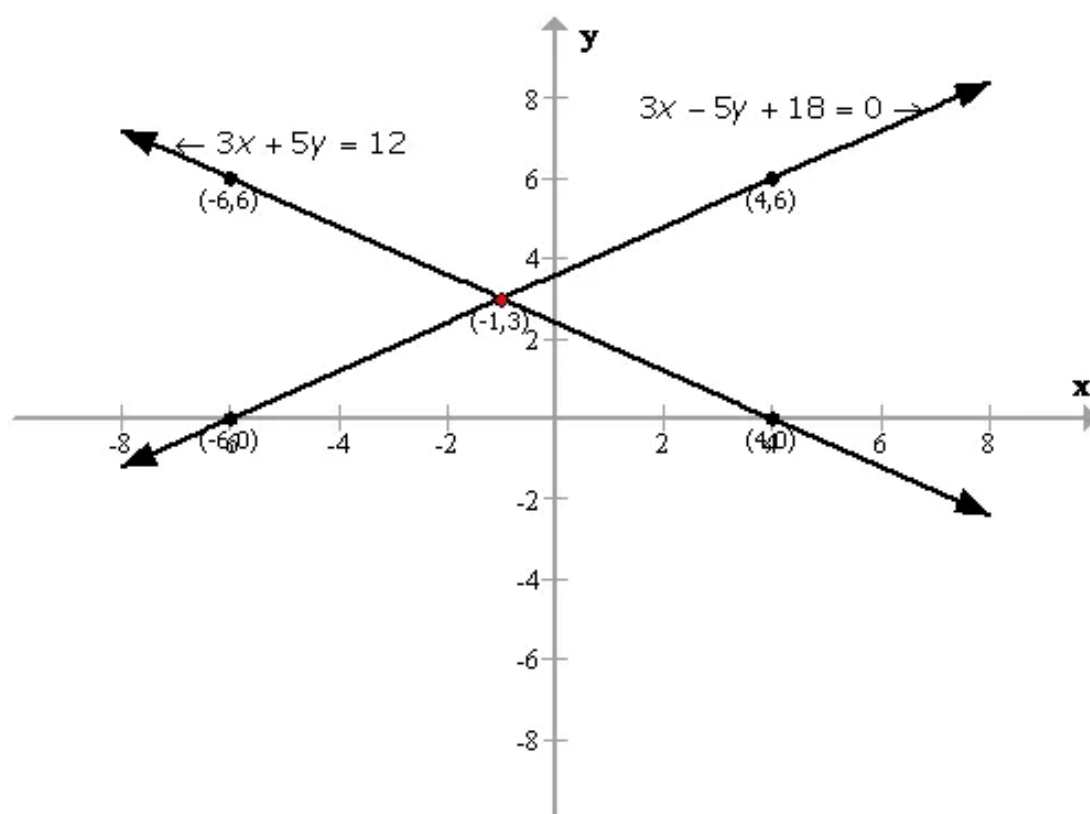
$$\Rightarrow 3x = 5y - 18$$

$$\Rightarrow x = \frac{5y - 18}{3}$$

The table for $3x - 5y + 18 = 0$ is

x	-6	4	-1
y	0	6	3

Plotting the above points we get the following required graph:



From the above graph, it is clear that the two lines $3x + 5y = 12$ and $3x - 5y + 18 = 0$ intersect at the point $(-1, 3)$.

Solution 5:

(i)

$$x + y + 3 = 0$$

$$\Rightarrow x = -3 - y$$

The table for $x + y + 3 = 0$ is

x	1	0	-2
y	-4	-3	-1

Also we have

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

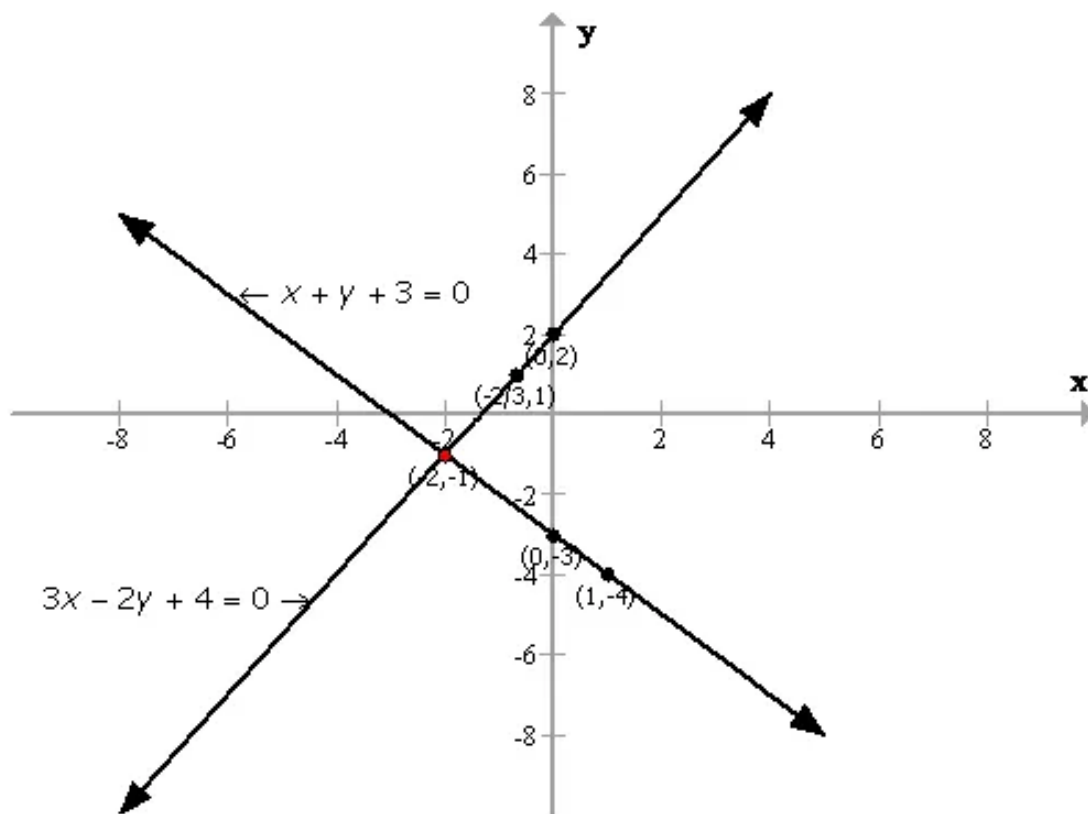
$$\Rightarrow 3x = 2y - 4$$

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

The table for $3x - 2y + 4 = 0$ is

x	0	-2	$-\frac{2}{3}$
y	2	-1	1

Plotting the above points we get the following required graph:



(ii)

From the above graph, it is clear that the two lines $x + y + 3 = 0$ and $3x - 2y + 4 = 0$ intersect at the point $(-2, -1)$

(iii)

Applying Pythagoras Theorem,

the distance from the origin $= \sqrt{(-2 - 0)^2 + (-1 - 0)^2}$

$$= \sqrt{2^2 + 1^2}$$

$$= \sqrt{4 + 1}$$

$$= \sqrt{5}$$

$$= 2.2 \text{ cm (approx)}$$

Solution 6:

$$y - 2 = 0$$

$$\Rightarrow y = 2$$

$$y + 1 = 3(x - 2)$$

$$\Rightarrow y + 1 = 3x - 6$$

$$\Rightarrow y = 3x - 6 - 1$$

$$\Rightarrow y = 3x - 7$$

The table for $y + 1 = 3(x - 2)$ is

x	1	2	3
y	-4	-1	2

Also we have

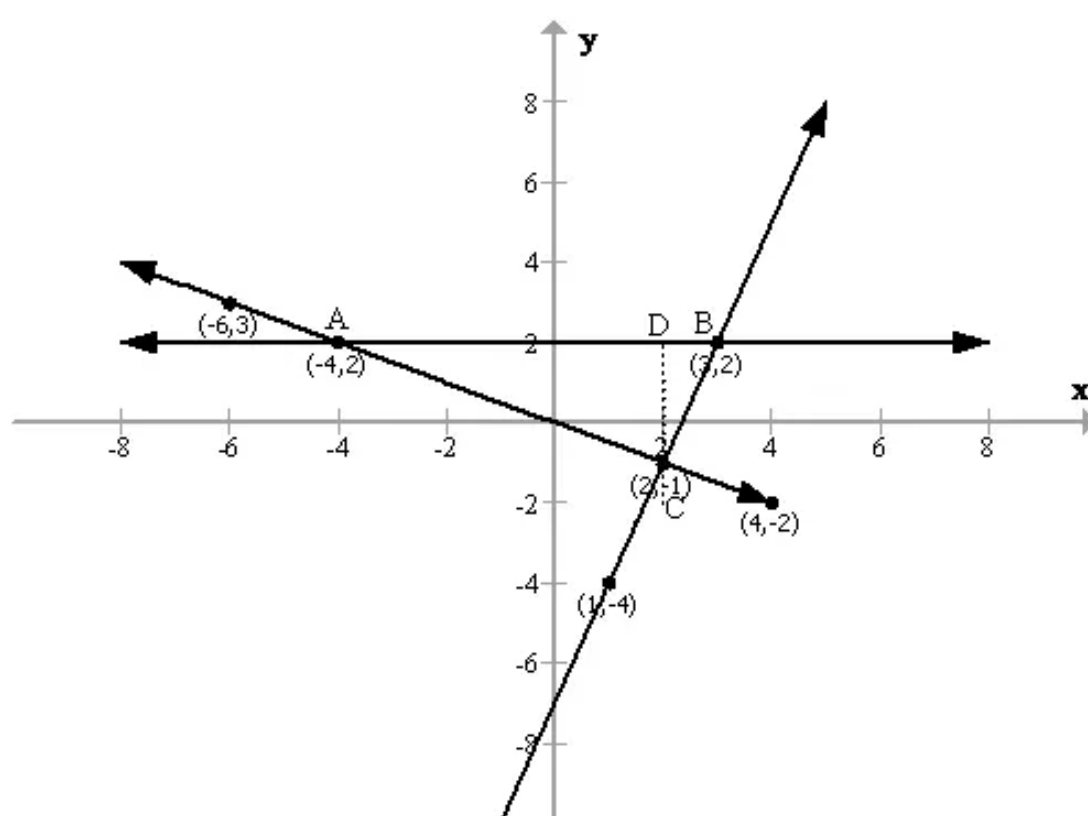
$$x + 2y = 0$$

$$\Rightarrow x = -2y$$

The table for $x + 2y = 0$ is

x	-4	4	-6
y	2	-2	3

Plotting the above points we get the following required graph:



$$\begin{aligned}
 \text{The area of the triangle } ABC &= \frac{1}{2} \times AB \times CD \\
 &= \frac{1}{2} \times 7 \times 3 \\
 &= \frac{21}{2} \\
 &= 10.5 \text{ sq. units}
 \end{aligned}$$

(ii)

The coordinates of the vertices of the triangle are $(-4, 2)$, $(3, 2)$ and $(2, -1)$

Solution 7:

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

The table of $3x + y + 5 = 0$ is

x	1	-3	-2
y	-8	4	1

$$3y - x = 5 \Rightarrow x = 3y - 5$$

The table of $3y - x = 5$ is

x	-2	1	7
y	1	2	4

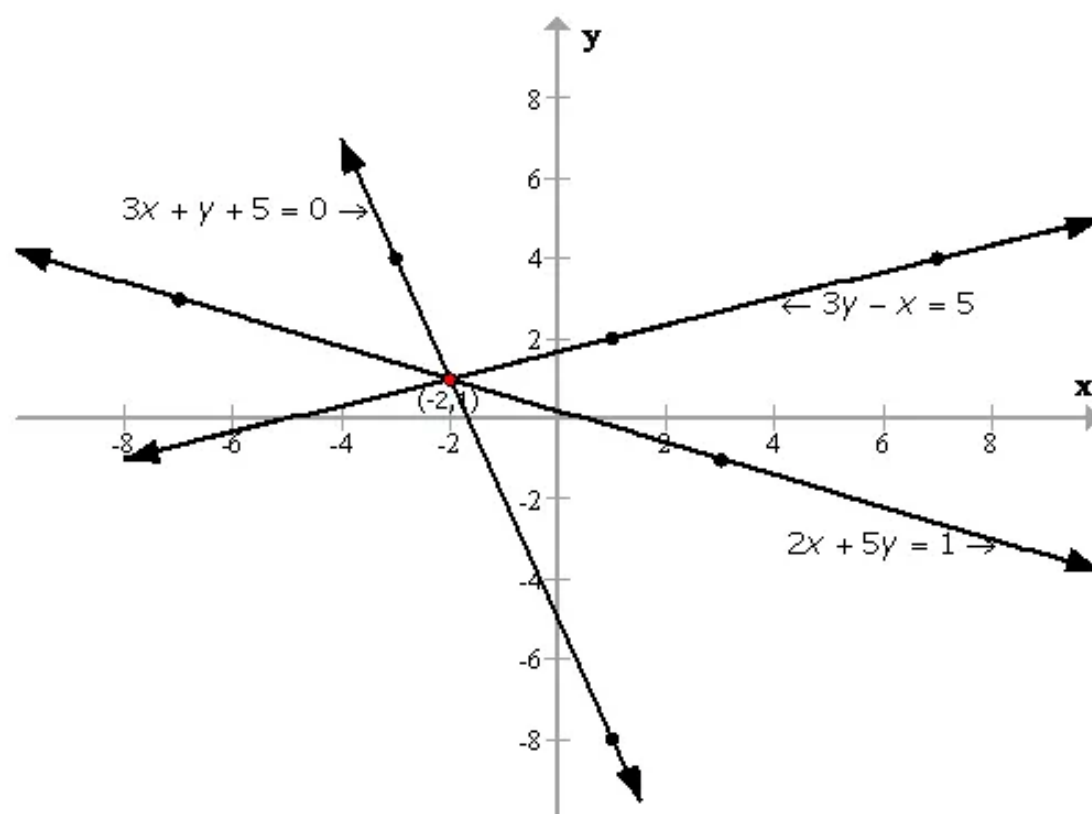
$$2x + 5y = 1$$

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

The table of $2x + 5y = 1$ is

x	3	-7	-2
y	-1	3	1

Plotting the above points, we get the following required graph:



The graph shows that the lines of these equations are concurrent.

Solution 8:

$$6y = 5x + 10$$

$$\Rightarrow y = \frac{5x + 10}{6}$$

The table of $6y = 5x + 10$ is

x	4	-2	-8
y	5	0	-5

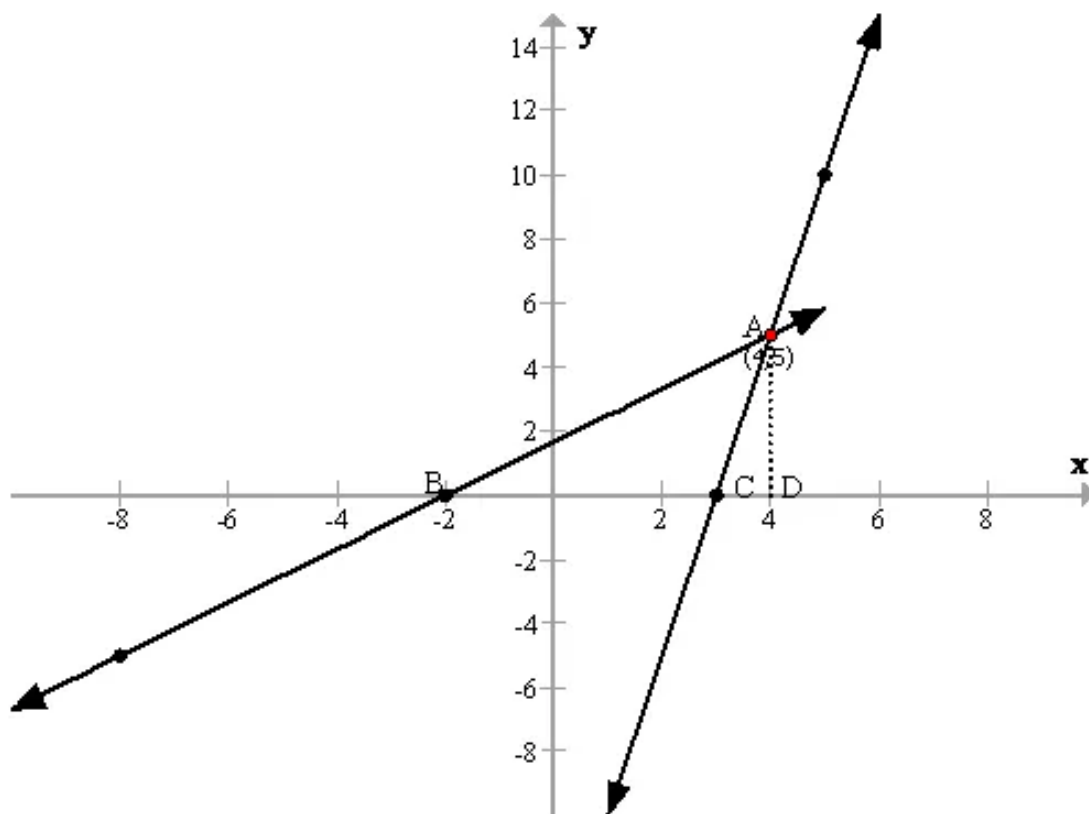
Also, we have

$$y = 5x - 15$$

The table of $y = 5x - 15$ is

x	3	4	5
y	0	5	10

Plotting the points in a graph, we get the following graph.



(i)

The two lines intersect at $(4,5)$

$\therefore AD \perp BC$

$AD = 5$ units and $BC = 5$ units

(ii)

$$\begin{aligned}\text{The area of the triangle} &= \frac{1}{2} \times BC \times AD \\ &= \frac{1}{2} \times 5 \times 5 \\ &= \frac{25}{2} \text{ sq. units} \\ &= 12.5 \text{ sq. units}\end{aligned}$$

Solution 9:

Given that C.P. is $50 + 3x$

Table of C.P.

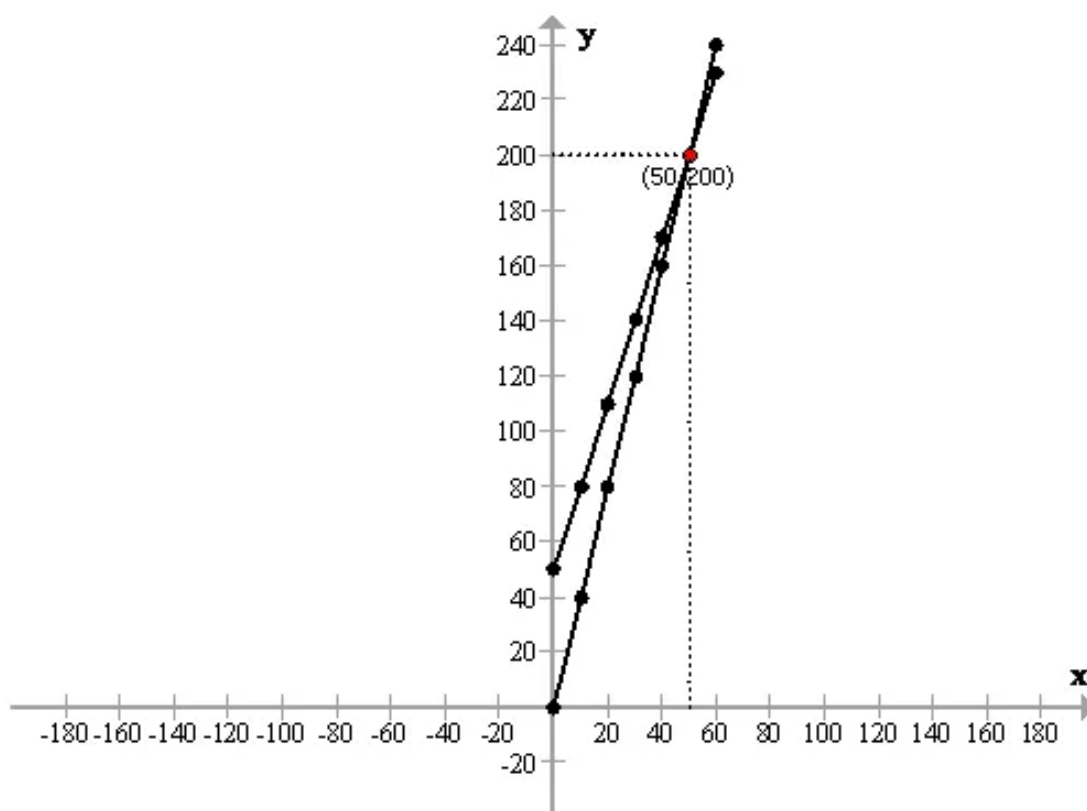
x	0	10	20	30	40	50	60
C.P	50	80	110	140	170	200	230

and S.P. $= 4x$

$\therefore$ Table of S.P.

x	0	10	20	30	40	50	60
S.P	0	40	80	120	160	200	240

Now plotting the points on a graph and we get the following required graph:



(i)

No. of articles to be manufactured and sold are 50 when there is no loss and no profit.

$$C.P = S.P = \text{Rs.}200$$

(ii)

(a)

On article 30,

$$C.P = \text{Rs.}140 \text{ and } S.P. = 120$$

$$\text{Therefore Loss} = 140 - 120 = \text{Rs.}20$$

(b)

On article 60,

$$C.P.=\text{Rs.}230 \text{ and } S.P.= \text{Rs.}240$$

$$\text{Therefore Profit} = 240 - 230 = \text{Rs.}10$$

Solution 10:

$$2y - x = 8;$$

$$y = \frac{8+x}{2};$$

The table of $2y - x = 8$ is

x	-6	-2	0
y	1	3	4

$$5y - x = 14 \Rightarrow x = 5y - 14$$

The table of $x = 5y - 14$ is

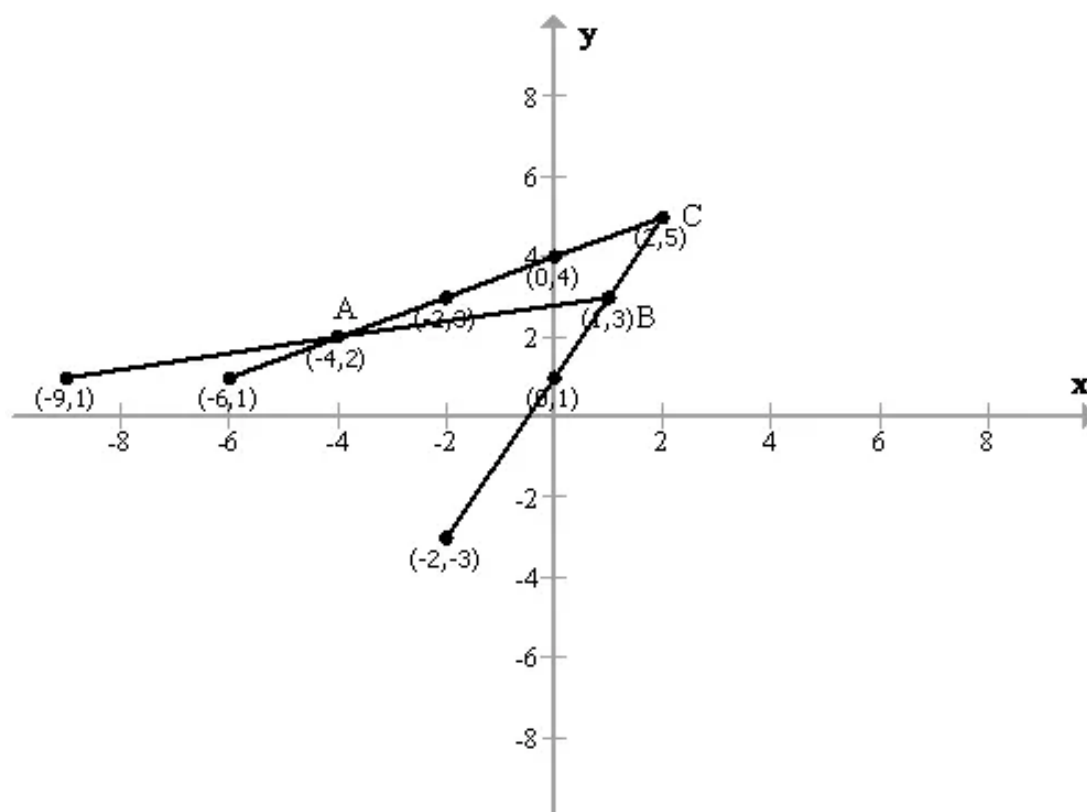
x	-9	-4	1
y	1	2	3

$$y - 2x = 1 \Rightarrow y = 1 + 2x$$

The table of $y - 2x = 1$ is

x	2	-2	0
y	5	-3	1

Now plotting the points on a graph and we get the following required graph:



Thus, the vertices of the triangle $\triangle ABC$ are:

$A(-4, 2)$, $B(1, 3)$ and $C(2, 5)$

Solution 11:

$$x + y = 0$$

$$y = -x;$$

The table of $x + y = 0$ is

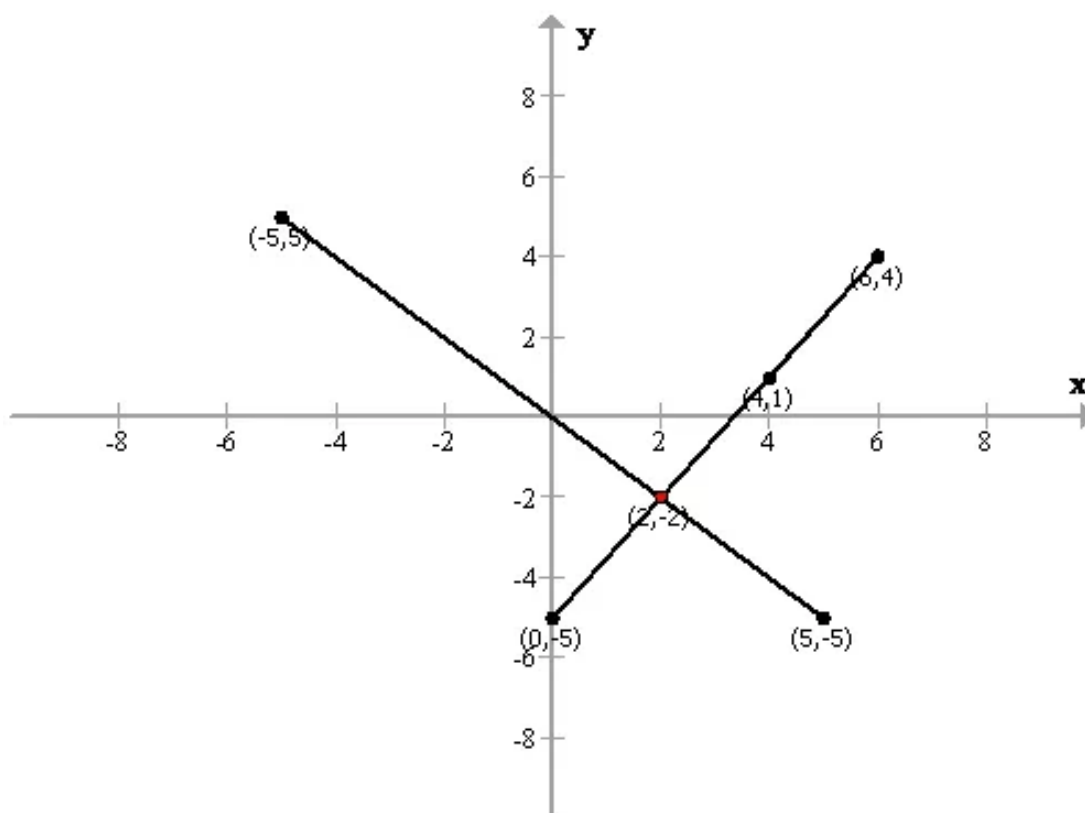
x	5	2	-5
y	-5	-2	5

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

The table of $3x - 2y = 10$ is

x	4	6	2
y	1	4	-2

Now plotting the points on a graph and we get the following required graph:



The two lines intersect at $(2, -2)$

$\therefore x = 2$ and $y = -2$

Solution 12:

$$x + 2y = 4$$

$$\Rightarrow x = 4 - 2y$$

The table of $x + 2y = 4$ is

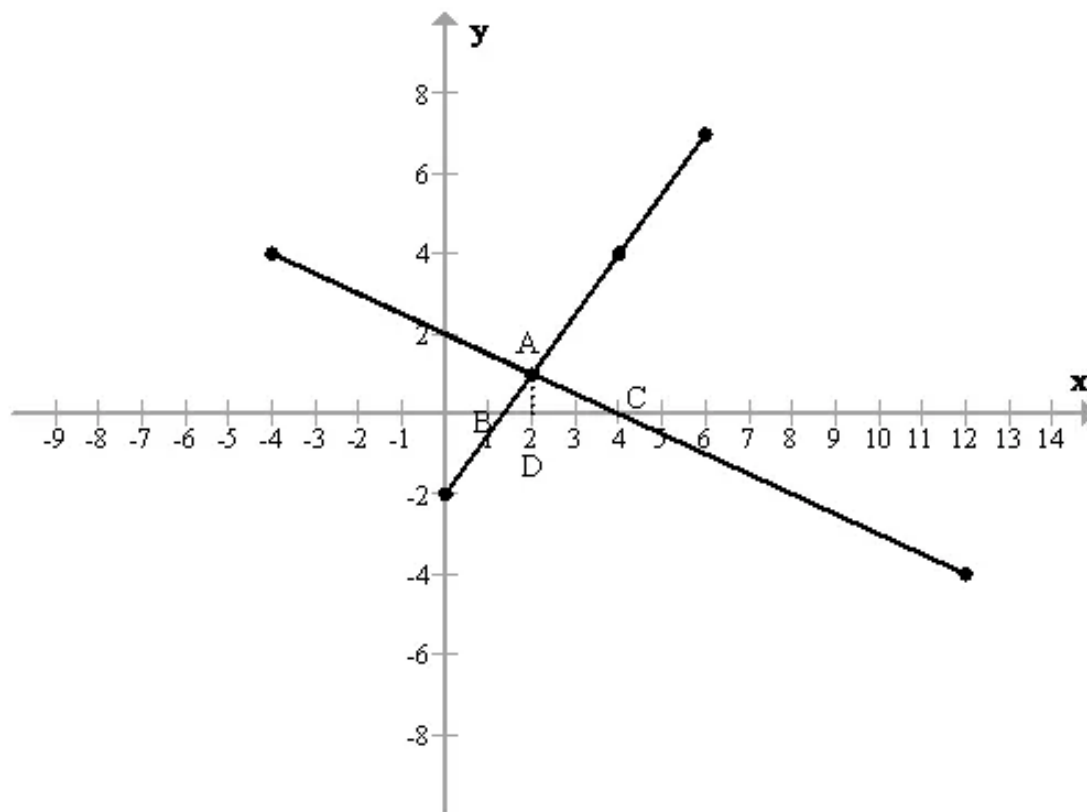
x	2	-4	12
y	1	4	-4

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

The table of $3x - 2y = 4$ is

x	2	4	6
y	1	4	7

Now plotting the points on a graph and we get the following required graph:



Therefore the solution of the given system of equations is (2,1).

Thus the vertices of the triangle are:

$$A(2,1), B\left(\frac{4}{3}, 0\right) \text{ and } C(4,0)$$

$$AD \perp BC \text{ and } D \equiv (2,0)$$

$$\therefore AD = 1 \text{ and } BC = 2\frac{2}{3} \text{ units} = \frac{8}{3} \text{ units}$$

$$\begin{aligned} \text{Area of the triangle } ABC &= \frac{1}{2} \times AD \times BC \\ &= \frac{1}{2} \times 1 \times \frac{8}{3} \\ &= \frac{4}{3} \text{ sq. units} \\ &= 1\frac{1}{3} \text{ sq. units} \end{aligned}$$

Solution 13:

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

The table for $y = \frac{3x + 2}{2}$ is

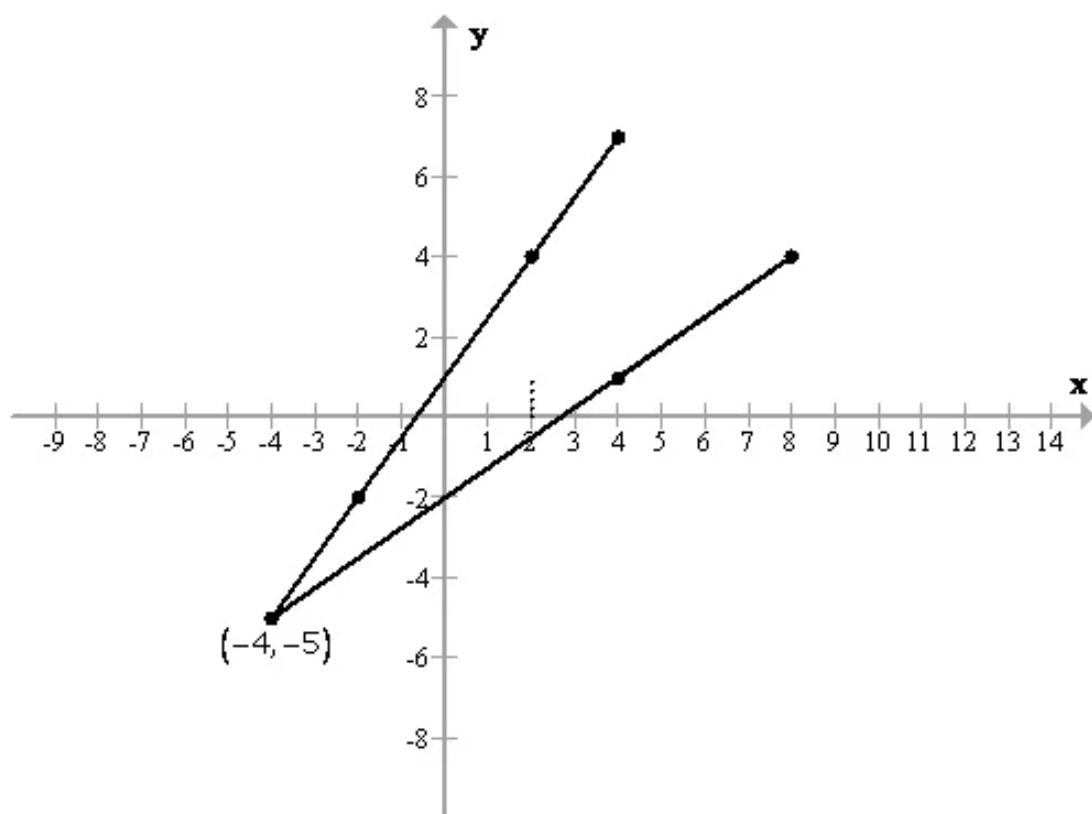
x	2	4	-2
y	4	7	-2

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

The table for $y = \frac{3}{4}x - 2$ is

x	4	-4	8
y	1	-5	4

Now plotting the points on a graph and we get the following required graph:



Thus the value of 'x' is - 4.

Solution 14:

$$2x + 3y = 4$$

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

The table for $2x + 3y = 4$ is

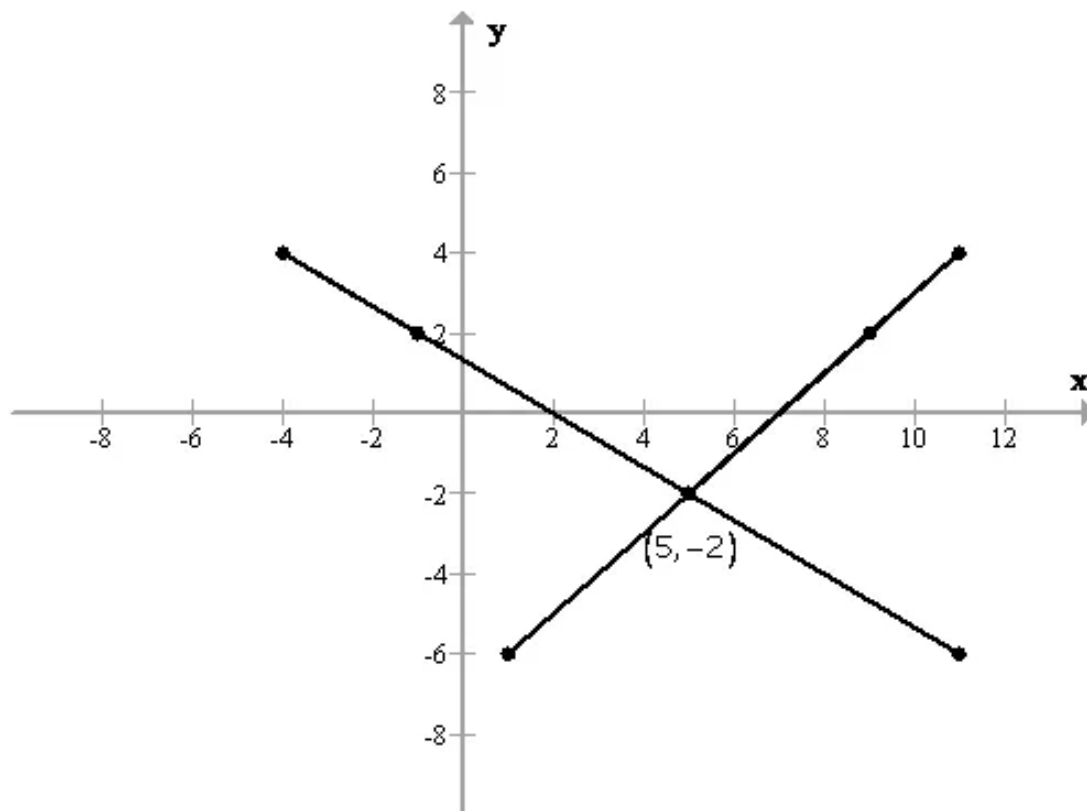
x	-1	-4	5
y	2	4	-2

$$x - y = 7 \Rightarrow x = y + 7$$

The table for $x - y = 7$ is

x	5	11	9
y	-2	4	2

Now plotting the points on a graph and we get the following required graph:



The point at which the paths of the submarine and the destroyer intersect are $(5, -2)$