

EXERCISE 27A

1. Draw the graph for each equation, given below:

(i) $x = 5$

(ii) $x + 5 = 0$

(iii) $y = 7$

(iv) $y + 7 = 0$

(v) $2x + 3y = 0$

(vi) $3x + 2y = 6$

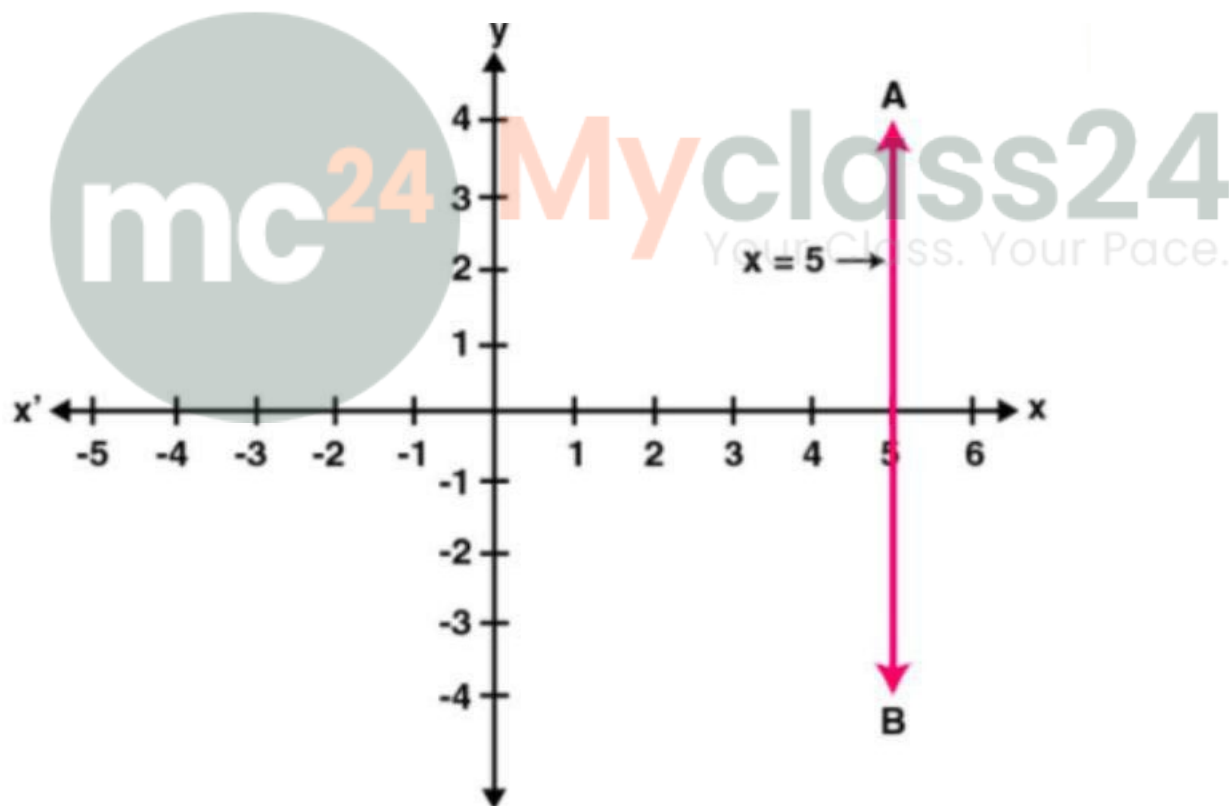
(vii) $x - 5y + 4 = 0$

(viii) $5x + y + 5 = 0$

Solution:

(i) $x = 5$

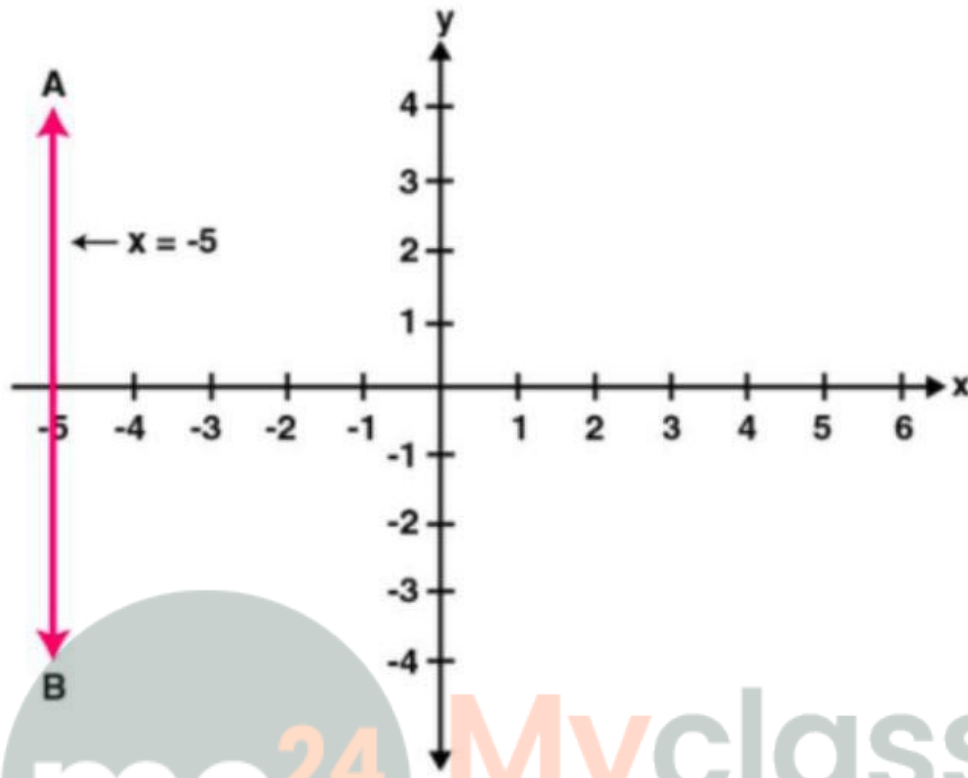
The graph $x = 5$ in the following figure is a straight line AB which is parallel to y axis at a distance of 5 units from it.



(ii) $x + 5 = 0$

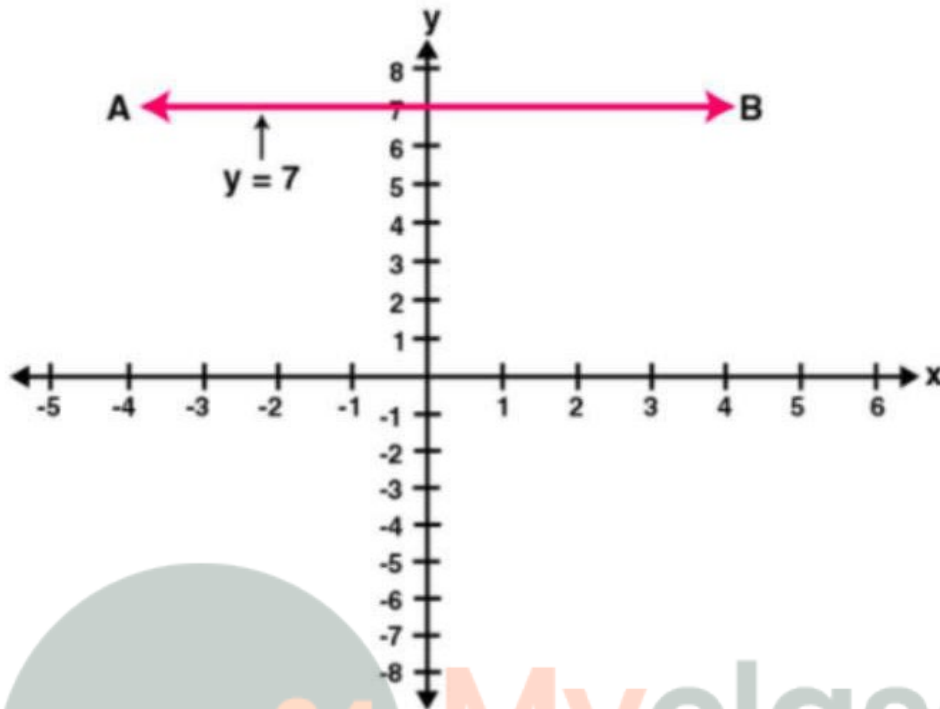
Therefore $x = -5$

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) $y = 7$

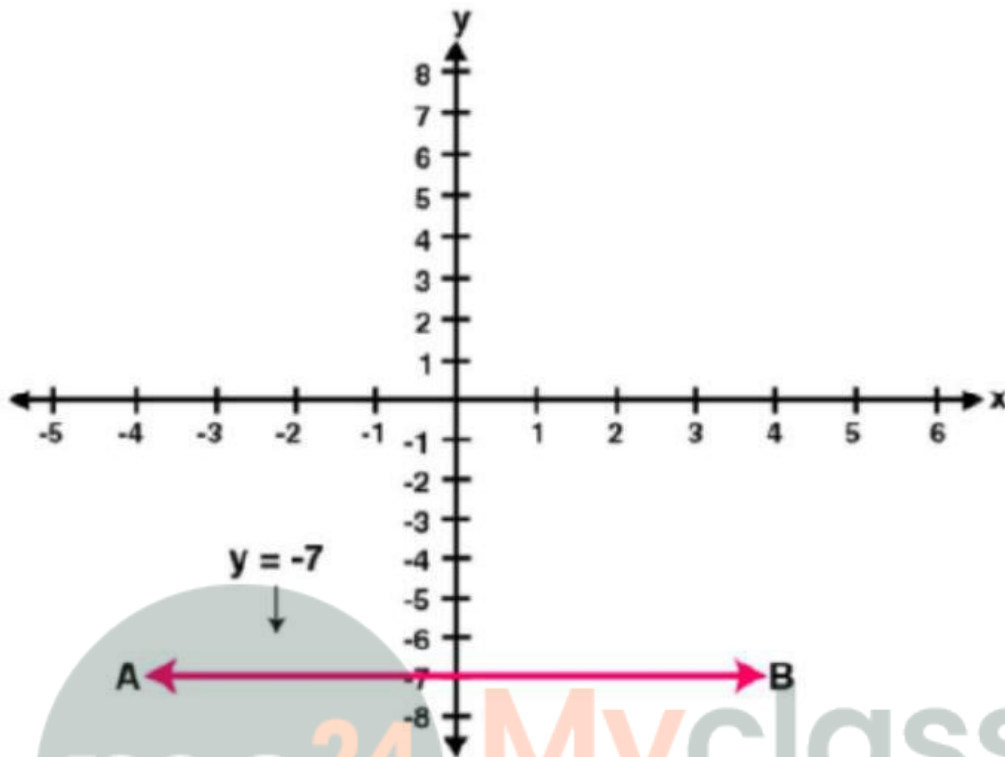
The graph $y = 7$ in the following figure is a straight line AB which is parallel to x axis at a distance of 7 units from it.



(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.

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(v) Given $2x + 3y = 0$

$$3y = -2x$$

Therefore, $y = -2x/3$

$$\text{If } x = -3, \text{ then } y = -2(-3)/3 = 6/3 = 2$$

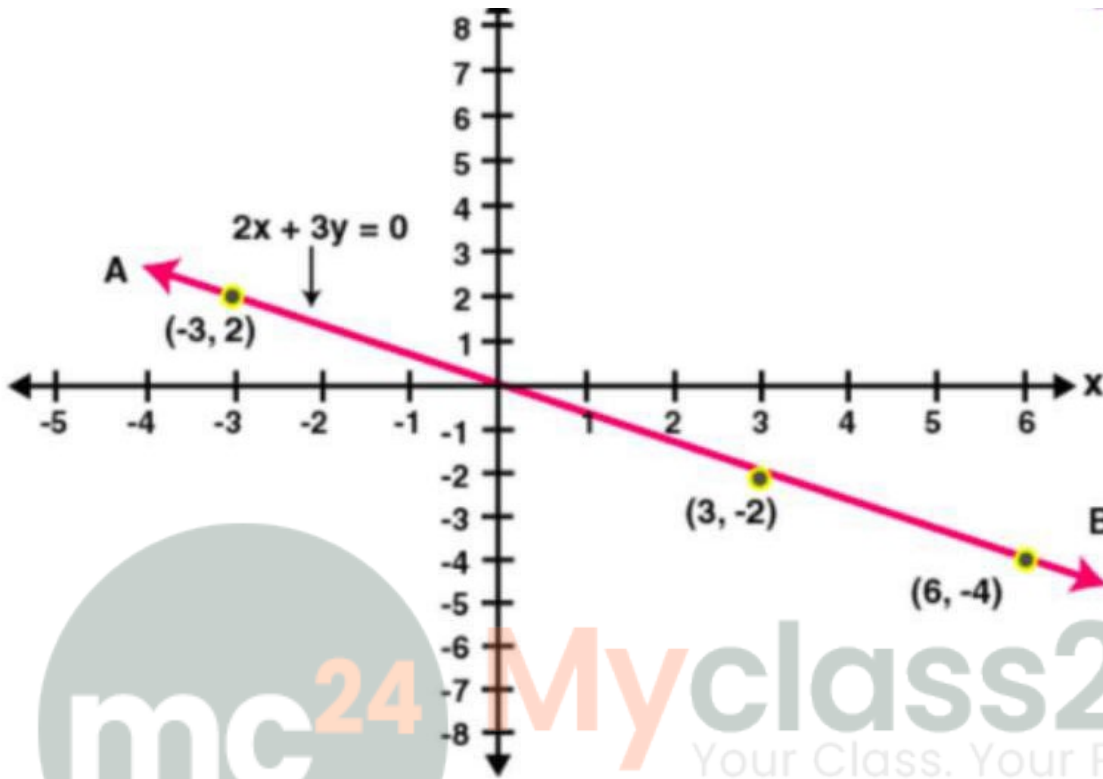
$$\text{If } x = 3, \text{ then } y = -2(3)/3 = -6/3 = -2$$

$$\text{If } x = 6, \text{ then } y = -2(6)/3 = -12/3 = -4$$

The points are

x	-3	3	6
y	2	-2	-4

Plotting these points, we get the required graph as given below:



(vi) Given $3x + 2y = 6$

$$2y = 6 - 3x$$

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

$$\text{If } x = 0, \text{ then } y = \frac{6 - 3 \times 0}{2} = \frac{6 - 0}{2} = 3$$

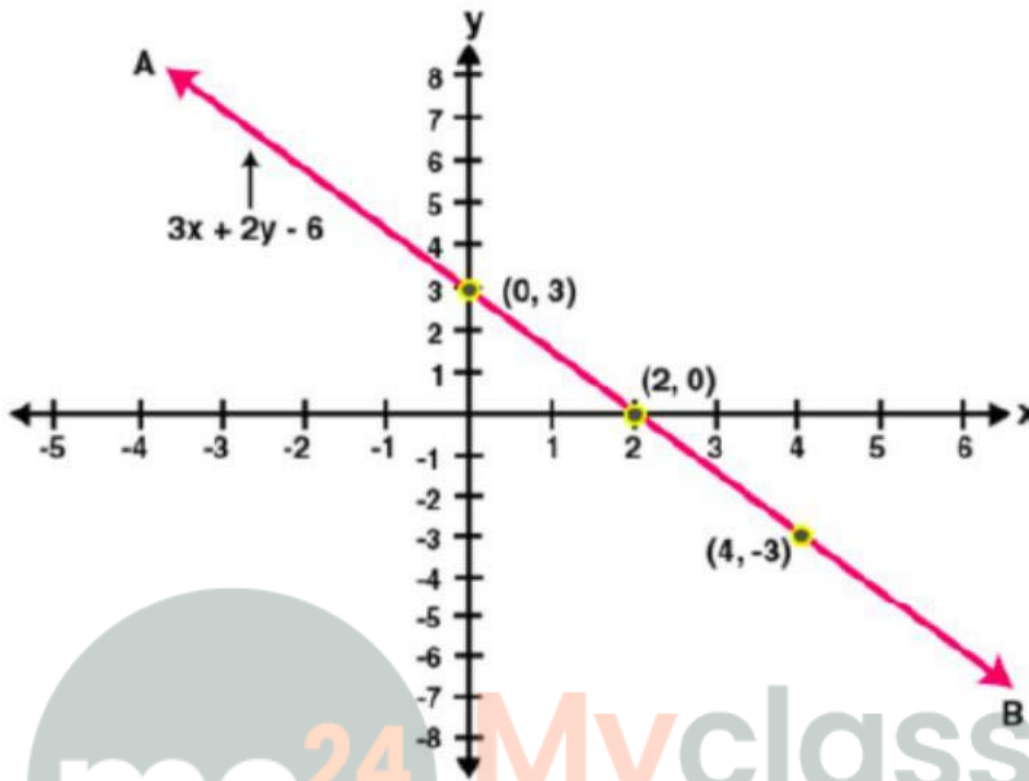
$$\text{If } x = 2, \text{ then } y = \frac{6 - 3 \times 2}{2} = \frac{6 - 6}{2} = 0$$

$$\text{If } x = 4, \text{ then } y = \frac{6 - 3 \times 4}{2} = \frac{6 - 12}{2} = -3$$

The points are

x	0	2	4
y	3	0	-3

Plotting these points, we get the required graph as given below:



(vii) Given $x - 5y + 4 = 0$

$$5y = 4 + x$$

$$\text{Therefore, } y = 4 + x/5$$

$$\text{If } x = 1, \text{ then } y = (1 + 4)/5 = 5/5 = 1$$

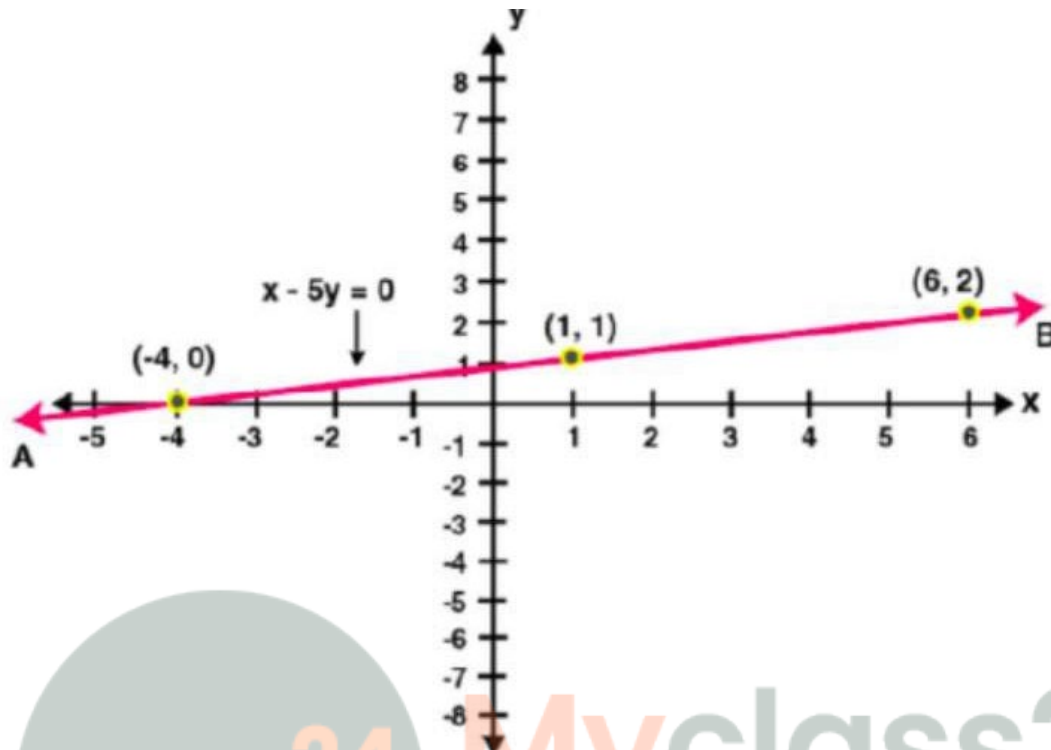
$$\text{If } x = 6, \text{ then } y = (6 + 4)/5 = 10/5 = 2$$

$$\text{If } x = -4, \text{ then } y = (-4 + 4)/5 = 0/5 = 0$$

The points are

x	1	6	-4
y	1	2	0

Plotting these points, we get the required graph as given below:



(viii) Given $5x + y + 5 = 0$

$$y = -5x - 5$$

$$\text{If } x = 0, \text{ then } y = -5(0) - 5 = 0 - 5 = -5$$

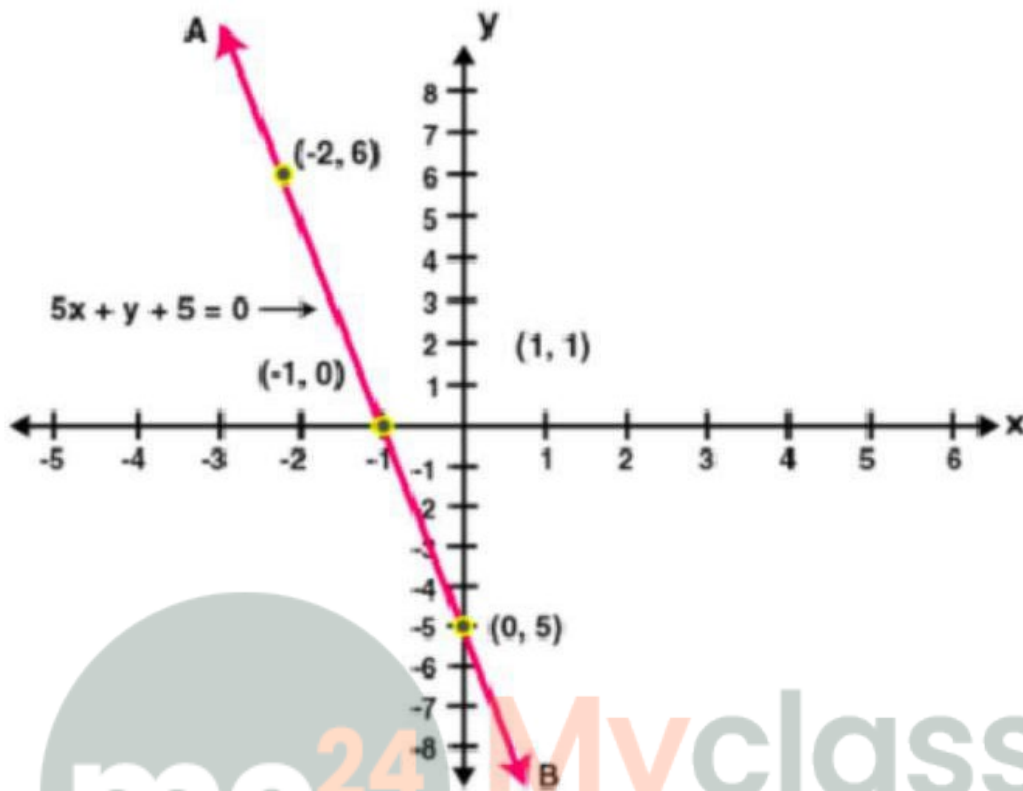
$$\text{If } x = -1, \text{ then } y = -5(-1) - 5 = 5 - 5 = 0$$

$$\text{If } x = -2, \text{ then } y = -5(-2) - 5 = 10 - 5 = 5$$

The points are

x	0	-1	-2
y	-5	0	5

Plotting these points, we get the required graph as given below:



2. Draw the graph for each equation given below; hence find the co-ordinates of the points where the graph drawn meets the co-ordinate axes:

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

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

Solution:

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

Taking LCM. We get

$$5x + 3y / 15 = 1$$

On cross multiplication, we get

$$5x + 3y = 15$$

$$3y = 15 - 5x$$

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

If $x = 0$, then $y = \frac{15 - 5 \times 0}{3} = \frac{15 - 0}{3} = 5$

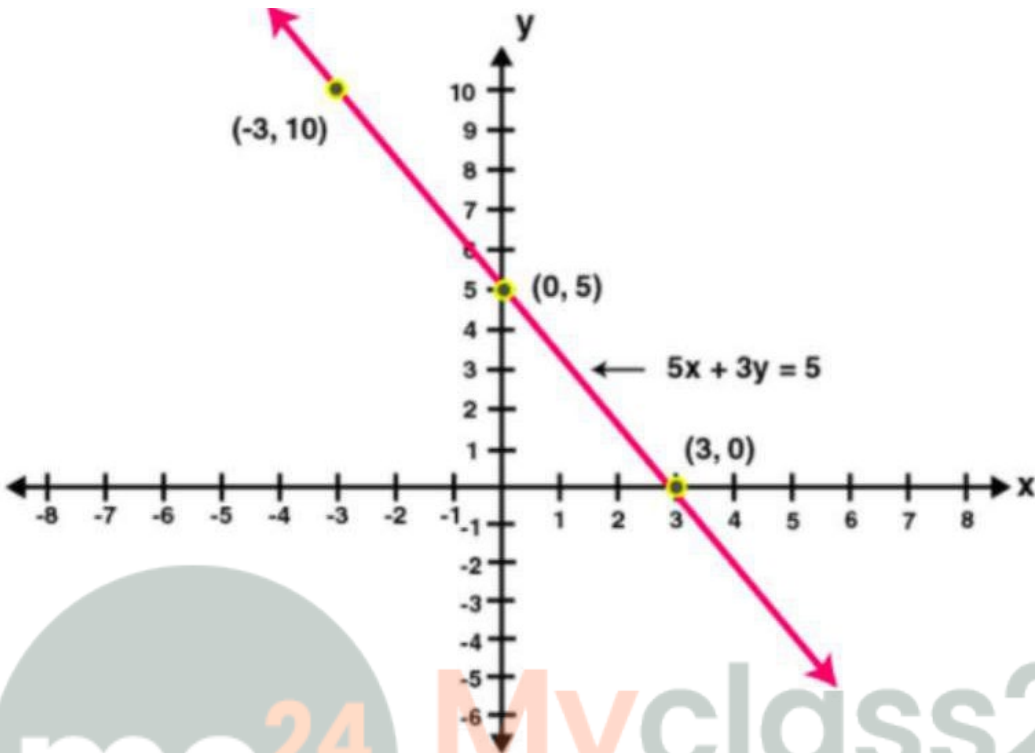
If $x = 3$, then $y = \frac{15 - 5 \times 3}{3} = \frac{15 - 15}{3} = 0$

If $x = -3$, then $y = \frac{15 - 5 \times -3}{3} = \frac{15 + 15}{3} = 10$

The points are

X	0	3	-3
Y	5	0	10

Plotting these points, we get the required graph as given below:



Hence the graph meets the coordinate axis at (3, 0) and (0, 5)

(ii) Given $(2x + 15)/3 = y - 1$

On cross multiplication we get

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

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

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

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

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

$$y = (-18 - 2x)/-3$$

$$\text{If } x = 0, \text{ then } y = (-18 - 2 \times 0)/-3 = (-18 - 0)/-3 = 6$$

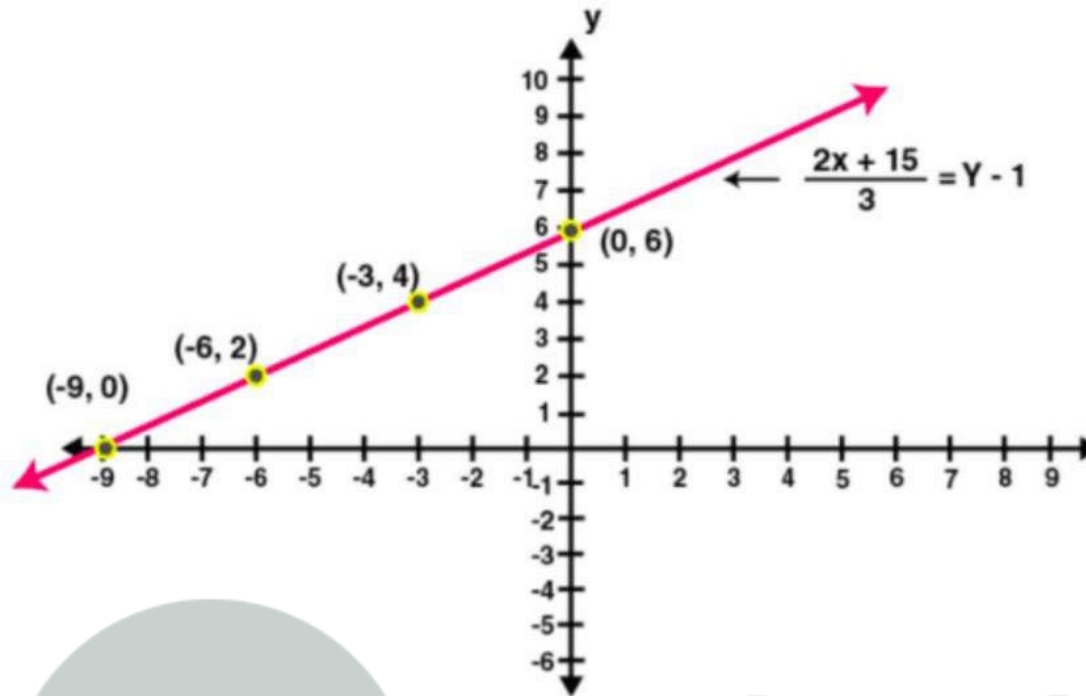
$$\text{If } x = -3, \text{ then } y = (-18 - 2 \times -3)/-3 = (-18 + 6)/-3 = 4$$

$$\text{If } x = -6, \text{ then } y = (-18 - 2 \times -6)/-3 = (-18 + 12)/-3 = 2$$

The points are

x	0	-3	-6
y	6	4	2

Plotting these points, we get the required graph as given below:



Hence, the graph meets the coordinate axis at $(-9, 0)$ and $(0, 6)$

3. Draw the graph of the straight line given by the equation $4x - 3y + 36 = 0$. Calculate the area of the triangle formed by the line drawn and the co-ordinate axes.

Solution:

$$\text{Given } 4x - 3y + 36 = 0$$

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

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

$$3y = 36 + 4x$$

$$y = (36 + 4x)/3$$

$$\text{If } x = -6, \text{ then } y = (36 + 4 \times -6)/3 = (36 - 24)/3 = 4$$

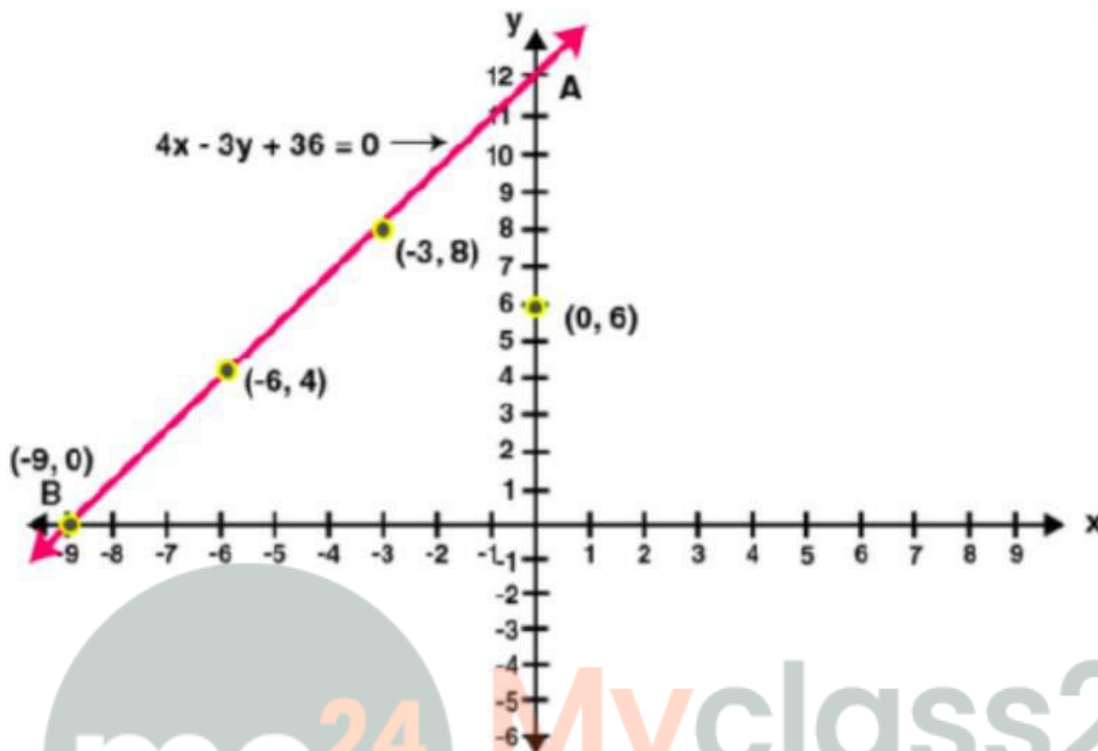
$$\text{If } x = -3, \text{ then } y = (36 + 4 \times -3)/3 = (36 - 12)/3 = 8$$

$$\text{If } x = -9, \text{ then } y = (36 + 4 \times -9)/3 = (36 - 36)/3 = 0$$

The points are

X	-9	-3	-6
Y	0	8	4

Plotting these points



Hence the straight line cuts the coordinate axis at A(0, 12) and B(-9, 0)

Therefore, the triangle AOB is formed

Area of triangle AOB = $\frac{1}{2} \times AO \times OB$

= $\frac{1}{2} \times 12 \times 9$

= 54 sq. units.

Area of triangle AOB = 54 sq. units.

4. Draw the graph of the equation $2x - 3y - 5 = 0$. From the graph, find:

(i) x_1 , the value of x , when $y = 7$

(ii) x_2 , the value of x , when $y = -5$

Solution:

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

$2x = 3y + 5$

$x = (3y + 5)/2$

If $y = 1$, then $x = (3 \times 1 + 5)/2 = 8/2 = 4$

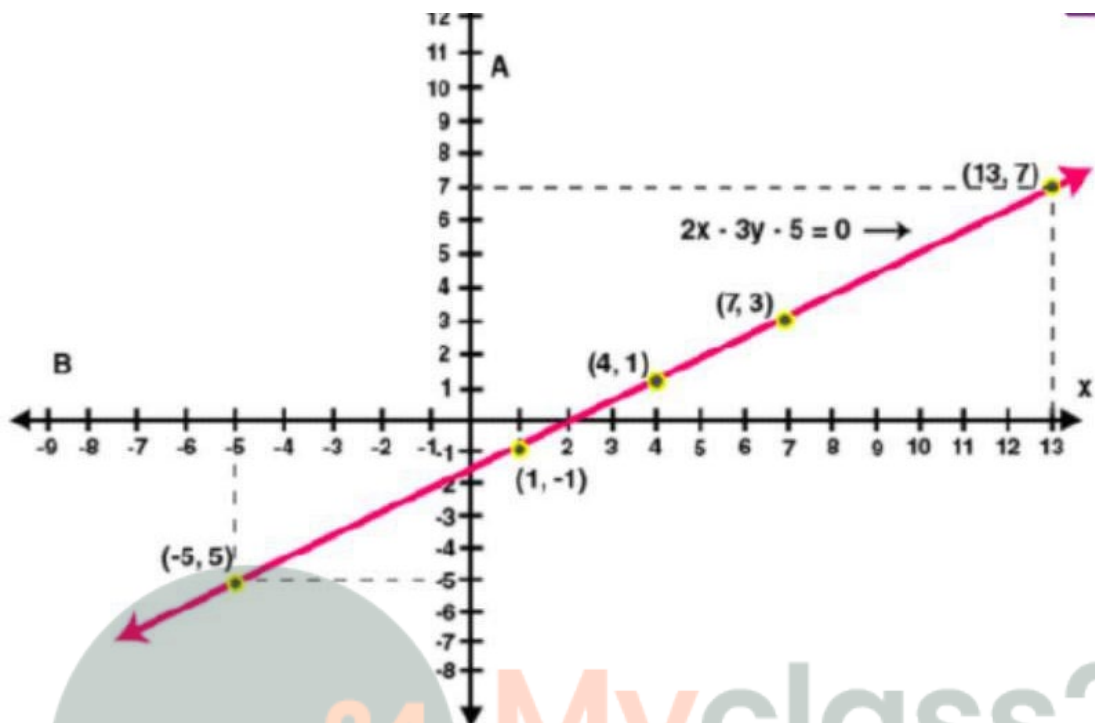
If $y = 3$, then $x = (3 \times 3 + 5)/2 = 9 + 5/2 = 14/2 = 7$

If $y = -1$, then $x = (3 \times -1 + 5)/2 = 5 - 3/2 = 2/2 = 1$

The points are

X	4	7	1
Y	1	3	-1

Plotting these points



The value of x , when $y = 7$
We have the equation of the line as

$$x = (3y + 5)/2$$

now substitute $y = 7$ and $x = x_1$

$$x_1 = [3(7) + 5]/2 = (21 + 5)/2 = 26/2 = 13$$

the value of x when $y = -5$

now substitute $y = -5$ and $x = x_2$

$$x_2 = [3(-5) + 5]/2 = (-15 + 5)/2 = -10/2 = -5$$

5. Draw the graph of the equation $4x + 3y + 6 = 0$. From the graph, find:

(i) y_1 , the value of y , when $x = 12$

(ii) y_2 , the value of y , when $x = -6$

Solution:

$$\text{Given } 4x + 3y + 6 = 0$$

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

$$y = (-4x - 6)/3$$

$$\text{If } x = 0, \text{ then } y = (-4 \times 0 - 6)/3 = -6/3 = -2$$

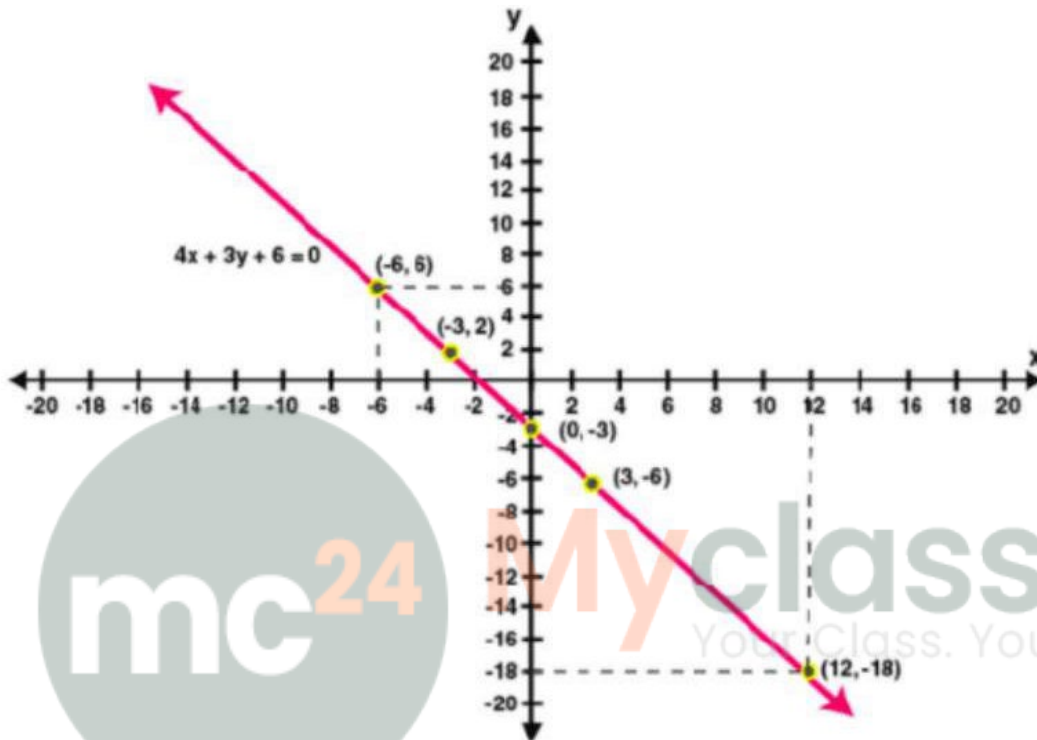
$$\text{If } x = 3, \text{ then } y = (-4 \times 3 - 6)/3 = -12 - 6/3 = -6$$

$$\text{If } x = -3, \text{ then } y = (-4 \times -3 - 6)/3 = 12 - 6/3 = 2$$

The points are

X	0	3	-3
Y	-2	-6	2

Plotting these points



The value of y , when $x = 12$

We have the equation of the line as

$$y = (-4x - 6)/3$$

now substitute $x = 12$ and $y = y_1$

$$y_1 = [-4(12) - 6]/3 = (-48 - 6)/3 = -54/3 = -18$$

the value of y , when $x = -6$

now substitute $x = -6$ and $y = y_2$

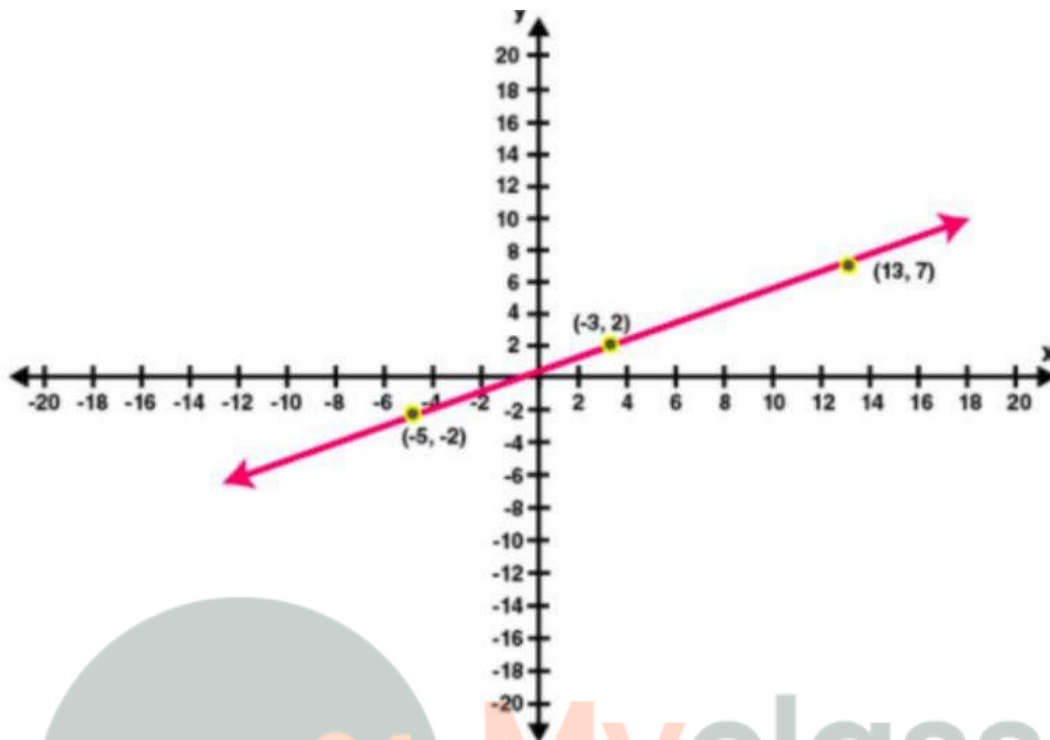
$$y_2 = [-4(-6) - 6]/3 = (24 - 6)/3 = 18/3 = 6$$

6. Use the table given below to draw the graph.

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

From your graph, find the values of 'a' and 'b'. State a linear relation between the variables x and y .

Solution:



When $x = -1$, $y = 0$ that is $a = 0$

When $y = 5$, $x = 9$ that is $b = 9$

Let $y = px + q$ (1)

Be a linear relation between x and y

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

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

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

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

Subtracting (3) from (2) we have

$$5 = 10p$$

$$p = 5/10$$

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

from 3 we have

$$p = q$$

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

thus linear relation is

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

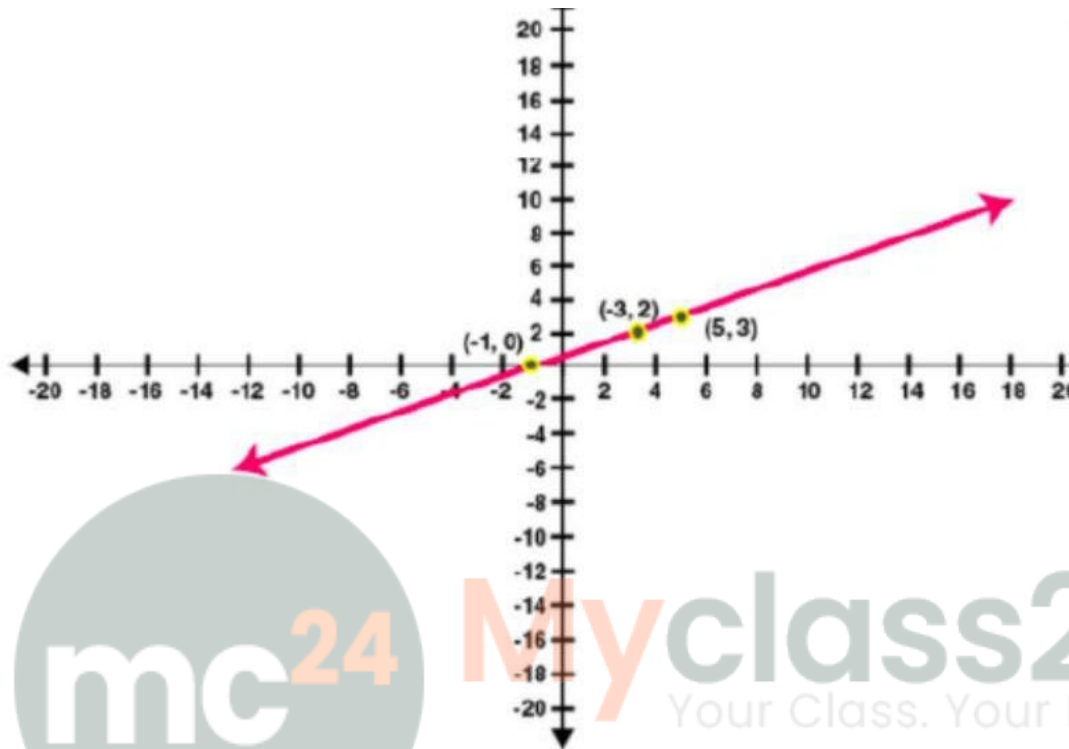
$$y = (x + 1)/2$$

7. Draw the graph obtained from the table below:

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

Use the graph to find the values of a , b and c . State a linear relation between the variables x and y .

Solution:



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

$a = -3$

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

$b = -2$

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

$c = 7$

let $y = px + q$ (1)

be a linear relation between x and y

substitute $x = -3$ and $y = -1$ in the equation (1)

$-1 = -3p + q$ (2)

substitute $x = -5$ and $y = -2$ in the equation (1)

$-2 = -5p + q$ (3)

Subtracting (3) from (2) we have

$1 = 2p$

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

from (3), We have

$-2 = -5p + q$

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

$-4 = -5 + 2q$

$2q = 5 - 4$

$$2q = 1$$

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

thus, the linear relation is

$$y = px + q$$

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

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

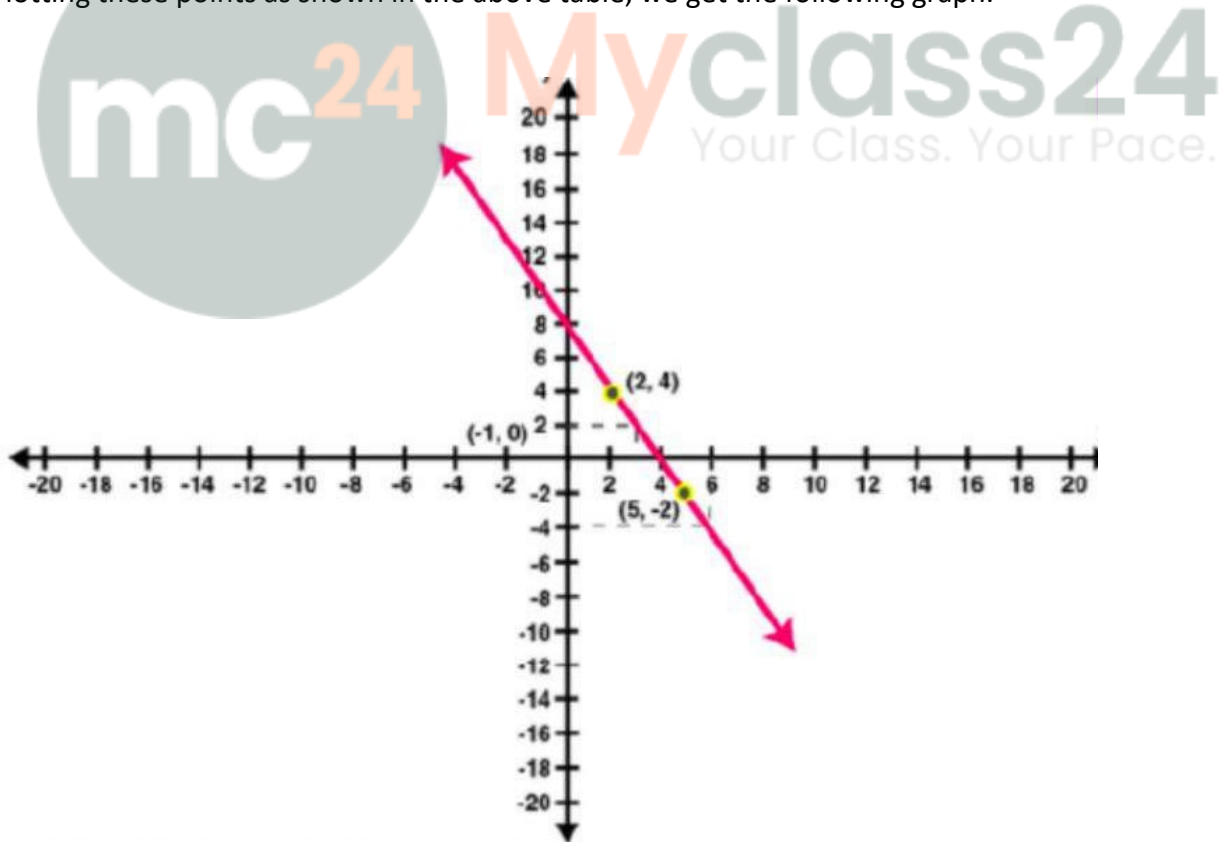
8. A straight line passes through the points (2, 4) and (5, -2). Taking 1 cm = 1 unit; mark these points on a graph paper and draw the straight line through these points. If points (m, -4) and (3, n) lie on the line drawn; find the values of m and n.

Solution:

The table is

X	2	3	5	m
Y	4	n	-2	-4

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



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

It meets the line at $y = 2$

Therefore $n = 2$

Now draw a line $y = -4$ parallel to x – axis to meet the line
 It meets the line at $x = 6$
 Therefore $m = 6$
 Thus, the value of m and n are 6 and 2 respectively

9. Draw the graph (straight line) given by equation $x - 3y = 18$. If the straight-line drawn passes through the points $(m, -5)$ and $(6, n)$; find the values of m and n .

Solution:

According to the question

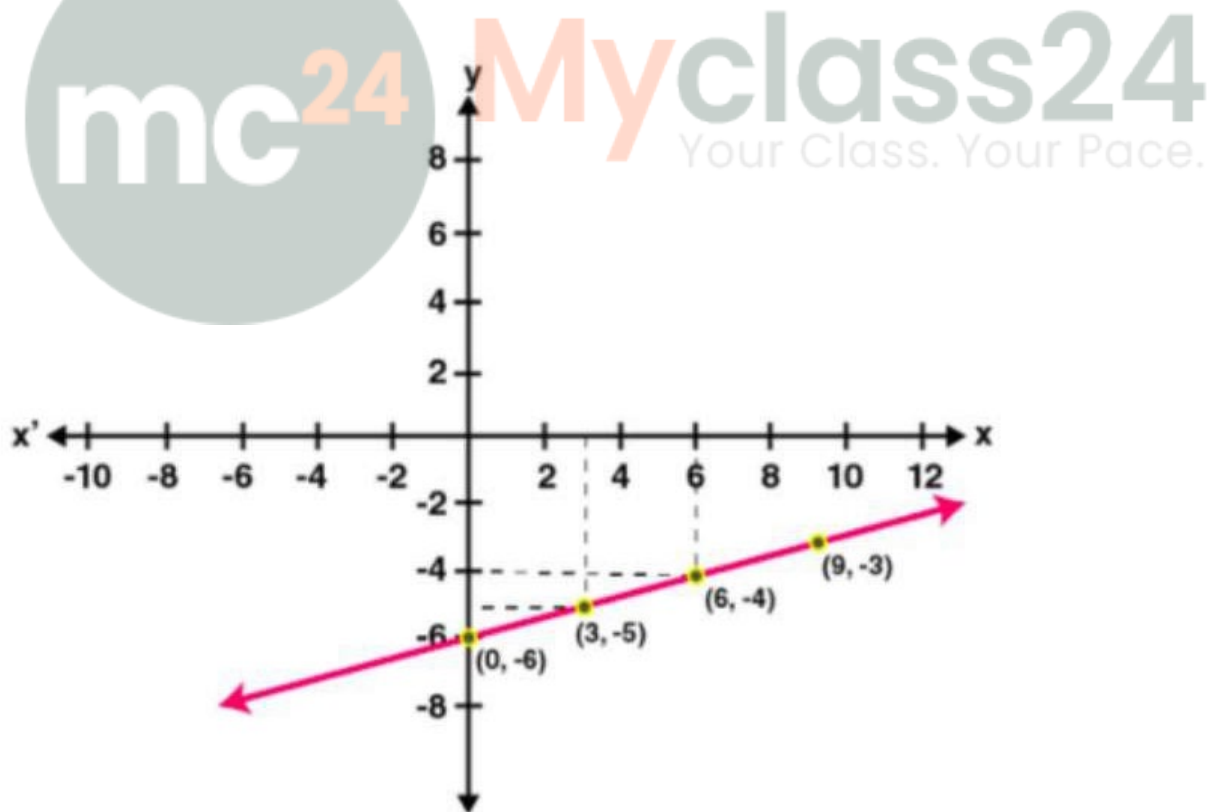
$$x - 3y = 18$$

$$-3y = x - 18$$

$$y = (x - 18)/3$$

the points are

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



Hence, from the graph we can conclude that $M = 3$ AND $N = 4$

10. Use the graphical method to find the value of k , if:

(i) $(k, -3)$ lies on the straight line $2x + 3y = 1$

(ii) $(5, k - 2)$ lies on the straight line $x - 2y + 1 = 0$

Solution:

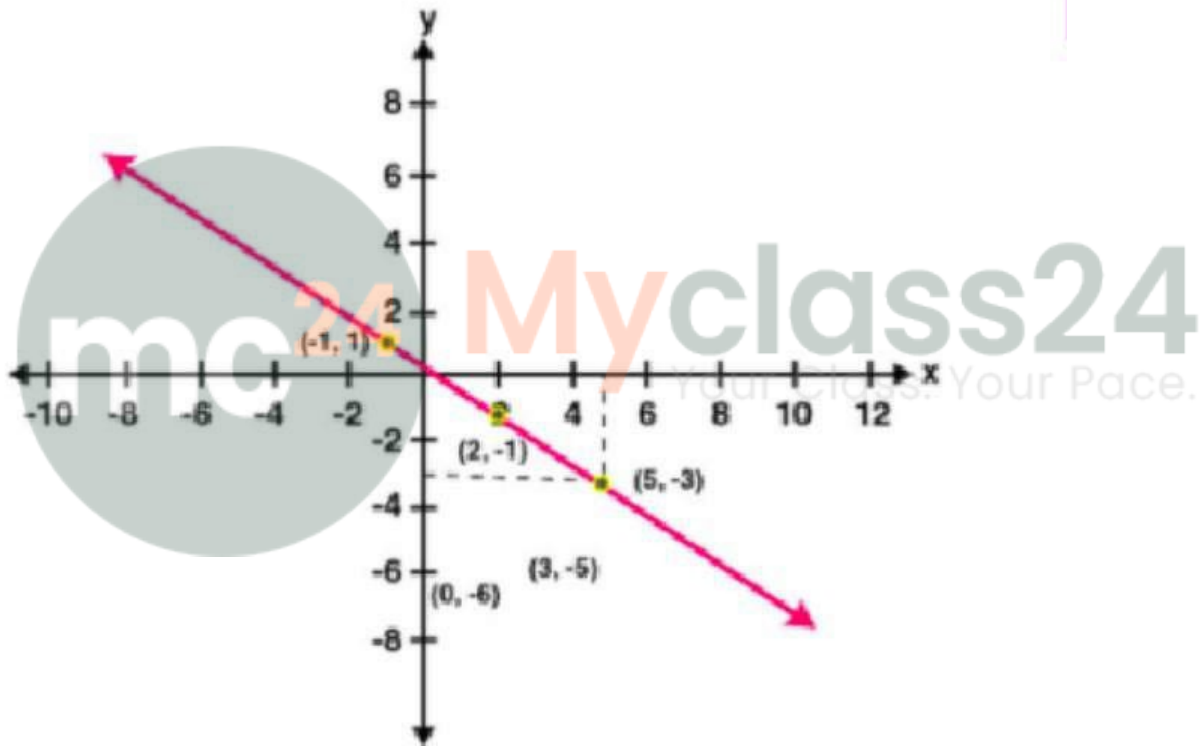
(i) Given $2x + 3y = 1$

$$3y = 1 - 2x$$

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

the points are

x	-1	2	5
Y	1	-1	-3



Hence from the graph we can say $k = 5$

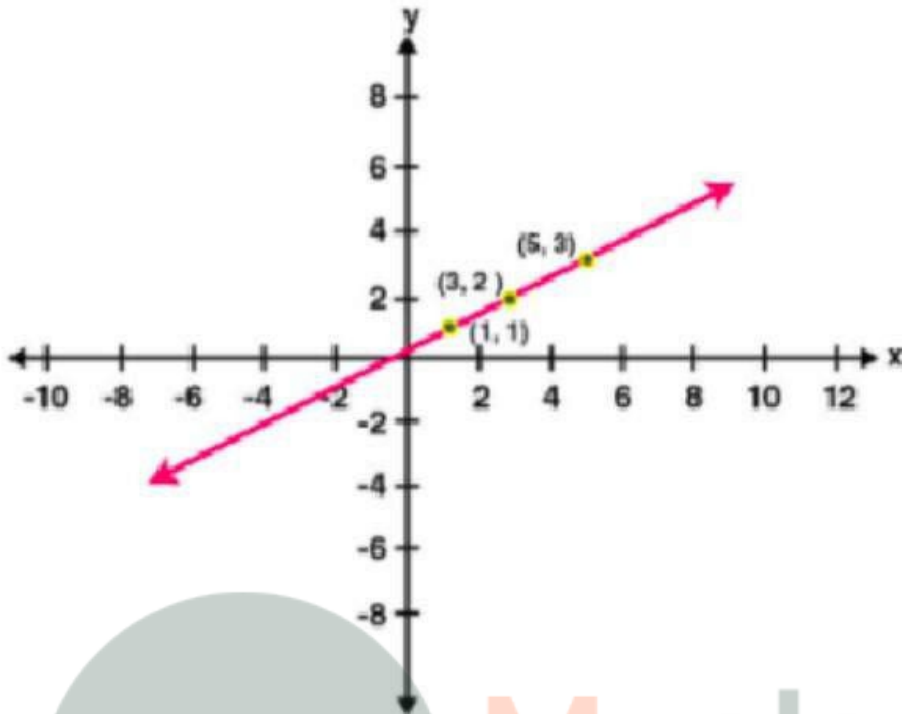
(ii) Given $x - 2y + 1 = 0$

$$2y = x + 1$$

$$y = (x + 1)/2$$

the points are

x	1	3	5
Y	1	2	3



Hence, from the graph we can say $k - 2 = 3$
Implies $k = 5$