RS Aggarwal Class 9 Mathematics Solutions

Linear Equations in Two Variables

- **Linear Equation in two Variables:** Equation of the form: $ax + by + c = 0$
  Here, a, b and c are real numbers, where a and b are not both zero.
  Example: $2x + 3y - 9 = 0$ is a linear equation of two variables because 2, 3 & -9 are all real numbers and also both $a, b \neq 0$.
- There are infinitely many solutions for a linear equation of two variables.
- The graph of every linear equation in two variables is a straight line.

Solution of an Equation in Two Variables

Example:

Given the equation $2x + 3y = 18$, determine if the ordered pair (3, 4) is a solution to the equation.

We substitute 3 in for x and 4 in for y.

$2(3) + 3(4) \; ? \; 18$

$6 + 12 \; ? \; 18$

$18 = 18$ True.

Therefore, the ordered pair (3, 4) is a solution to the equation $2x + 3y = 18$.

Exercise 8A

Question 1:

(i) The given equation is x = 5

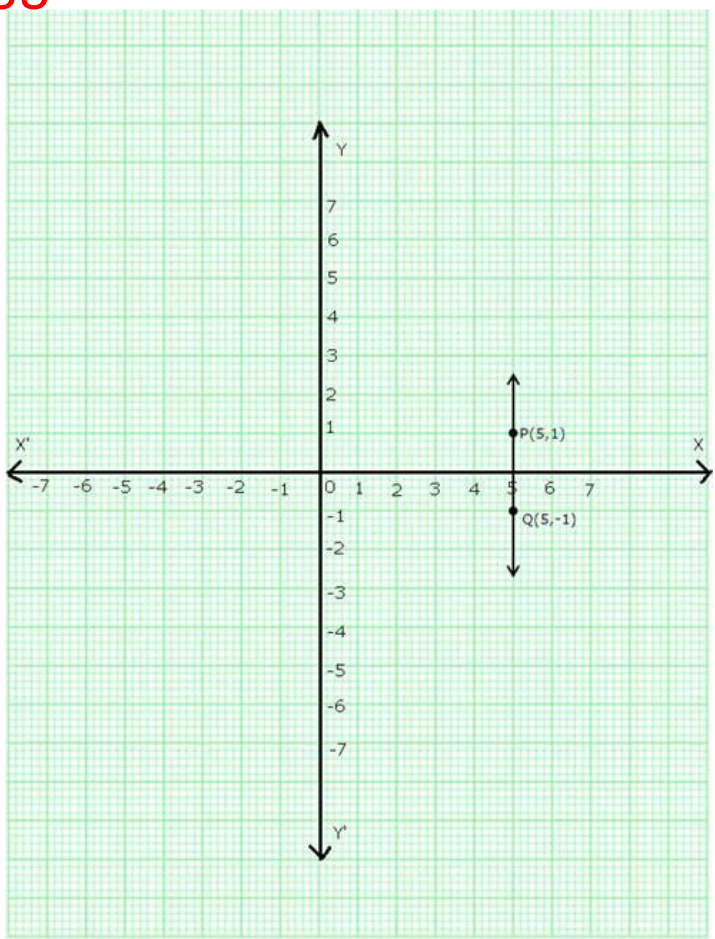
Take two solutions of the given equation as x = 5, y = 1 and x = 5, y = -1

Thus we get the following table:

x	5	5
y	1	-1

Plot points P(5,1) and Q(5,-1) on the graph paper.

Join PQ. The line PQ is the required graph.



(ii) The given equation is y = -2

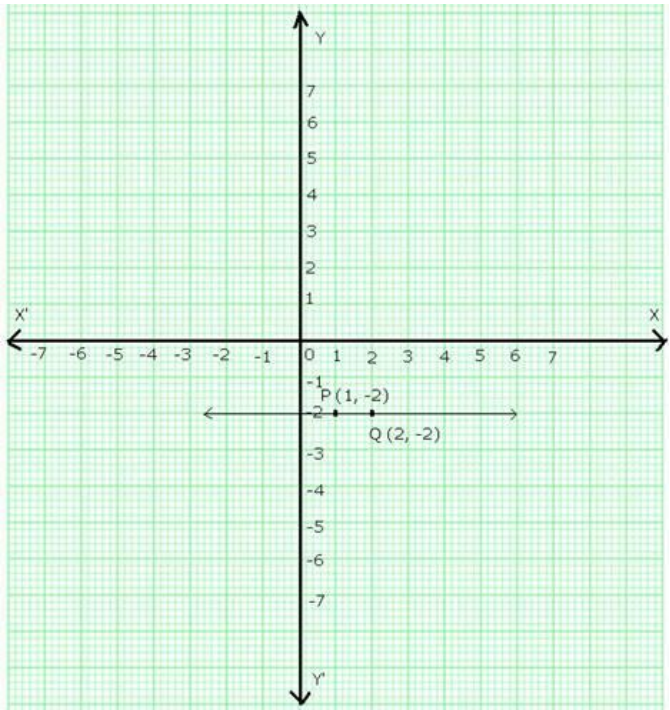
Take two solutions of the given equation as x = 1, y = -2 and x = 2, y = -2.

Thus we have the following table:

x	1	2
y	-2	-2

Plot points P(1,-2) and Q(2,-2) on the graph paper. Join PQ. The line PQ is the required

graph.



(iii) The given equation is

x + 6 = 0

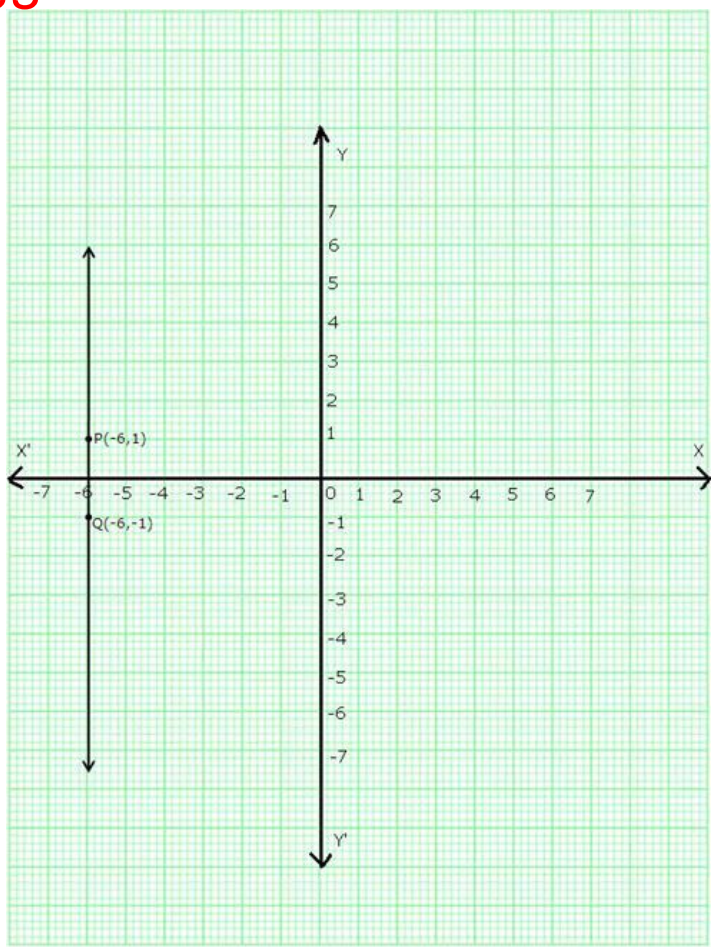
⇒ x = -6

Let x = -6 & y = 1

x = -6 & y = -1

x	-6	-6
y	1	-1

Plot points P(-6,1) and Q(-6,-1) on the graph paper. Join PQ. The line PQ is the required graph.



(iv) The given equation is

$x + 7 = 0$

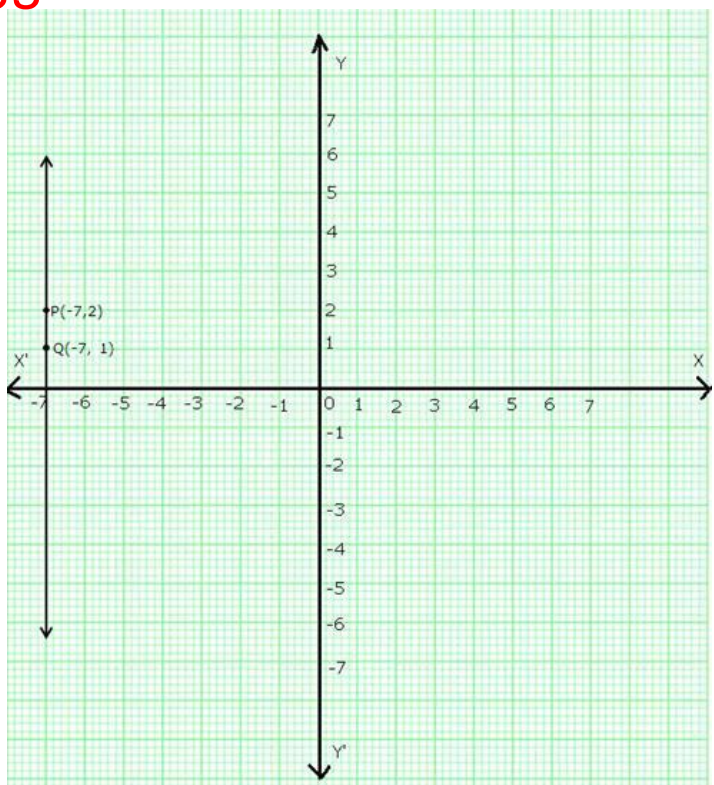
$\Rightarrow x = -7$

Let $x = -7, y = 2$ and $x = -7, y = 1$

Thus we have the following table:

x	-7	-7
y	2	1

Plot points P(-7,2) and Q(-7,1) on the graph paper. Join PQ. The line PQ is the required graph.



(v) y = 0 represents the x-axis

(vi) x = 0 represents the y-axis.

Question 2:

The given equation is y = 3x.

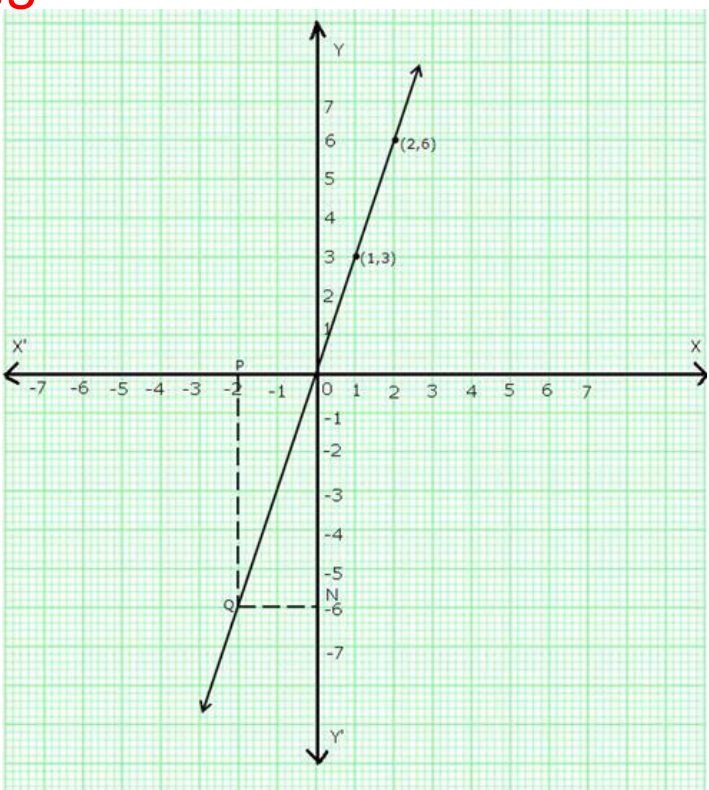
Putting x = 1, y = 3 (1) = 3

Putting x = 2, y = 3 (2) = 6

Thus, we have the following table:

x	1	2
y	3	6

Plot points (1,3) and (2,6) on a graph paper and join them to get the required graph.



Take a point P on the left of y-axis such that the distance of point P from the y-axis is 2 units.

Draw PQ parallel to y-axis cutting the line $y = 3x$ at Q. Draw QN parallel to x-axis meeting y-axis at N.

So, $y = ON = -6$.

Question 3:

The given equation is,

$x + 2y - 3 = 0$

$\Rightarrow x = 3 - 2y$

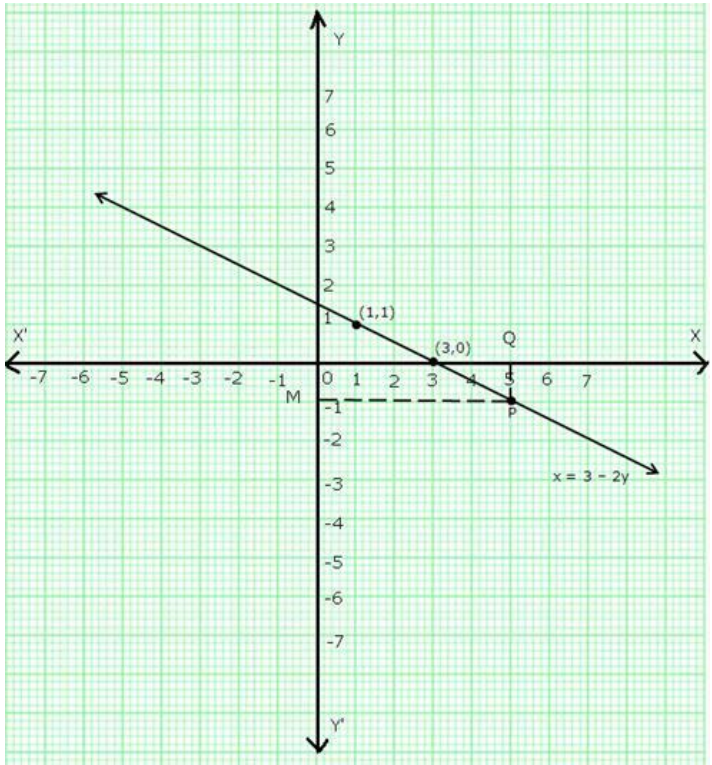
Putting $y = 1$, $x = 3 - (2 \times 1) = 1$

Putting $y = 0$, $x = 3 - (2 \times 0) = 3$

Thus, we have the following table:

x	1	3
y	1	0

Plot points (1,1) and (3,0) on a graph paper and join them to get the required graph.



Take a point Q on x-axis such that OQ = 5.

Draw QP parallel to y-axis meeting the line (x = 3 – 2y) at P.

Through P, draw PM parallel to x-axis cutting y-axis at M.

So, y = OM = -1.

Question 4:

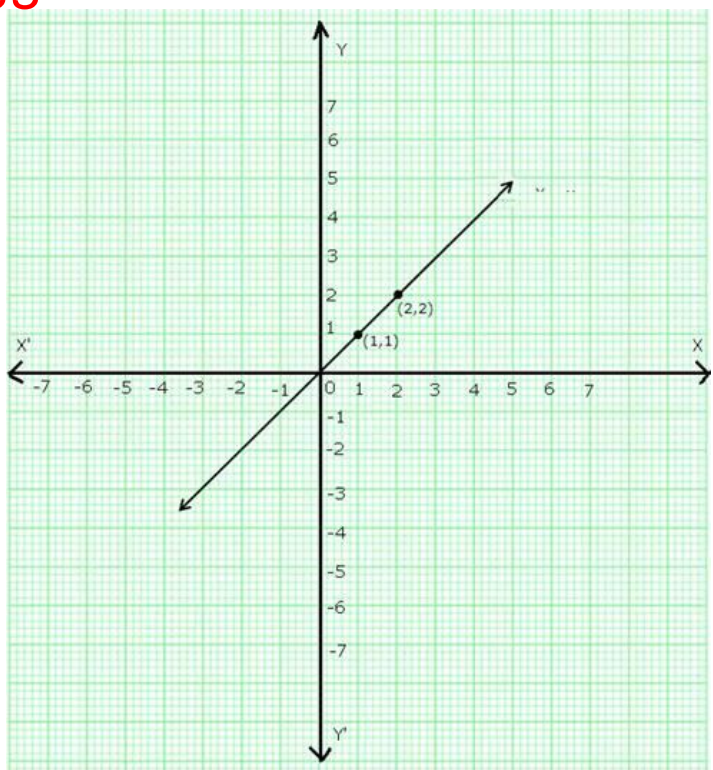
(i) The given equation is y = x

Let x = 1, then y = 1 and let x = 2, then y = 2

Thus, we have the following table:

x	1	2
y	1	2

Plot points (1,1) and (2,2) on a graph paper and join them to get the required graph.



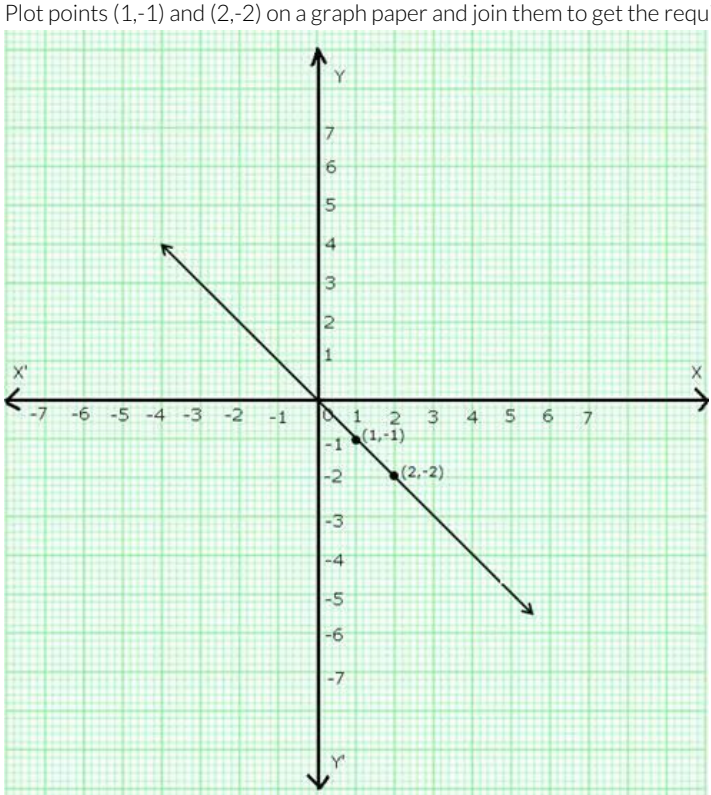
(ii) The given equation is y = -x

Now, if x = 1, y = -1 and if x = 2, y = -2

Thus, we have the following table:

x	1	2
y	-1	-2

Plot points (1,-1) and (2,-2) on a graph paper and join them to get the required graph.



(iii) The given equation is y + 3x = 0

⇒ y = -3x

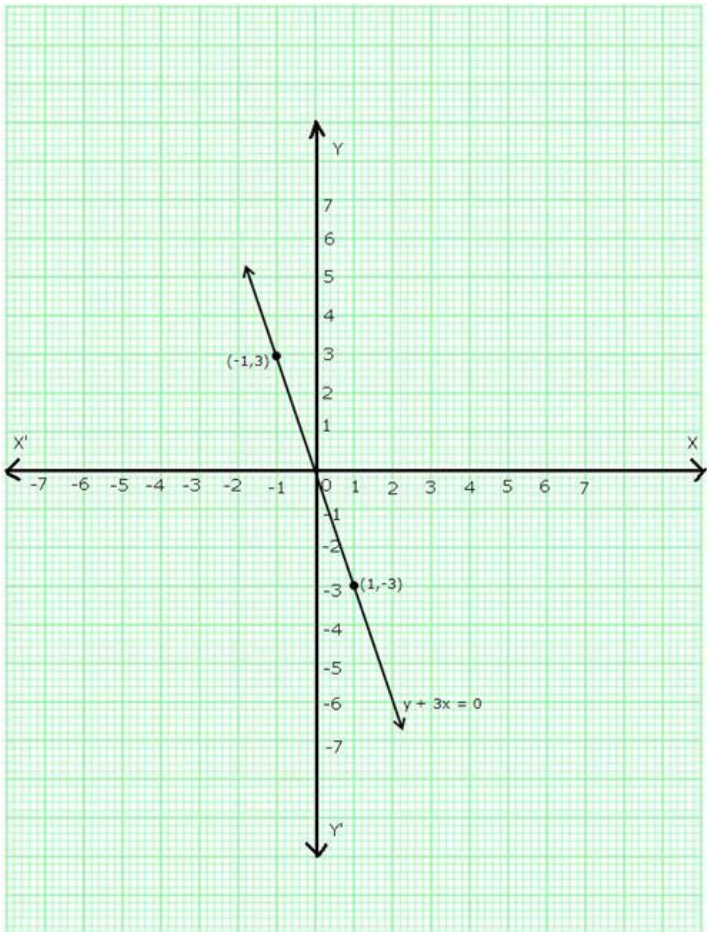
Now, if x = -1, then y = -3 (-1) = 3

And, if x = 1, then y = -3 (1) = -3

Thus we have the following table:

x	1	-1
y	-3	3

Plot points (1,-3) and (-1,3) on a graph paper and join them to get the required graph.



(iv) The given equation is 2x + 3y = 0

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

Now, if x = 3, then

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

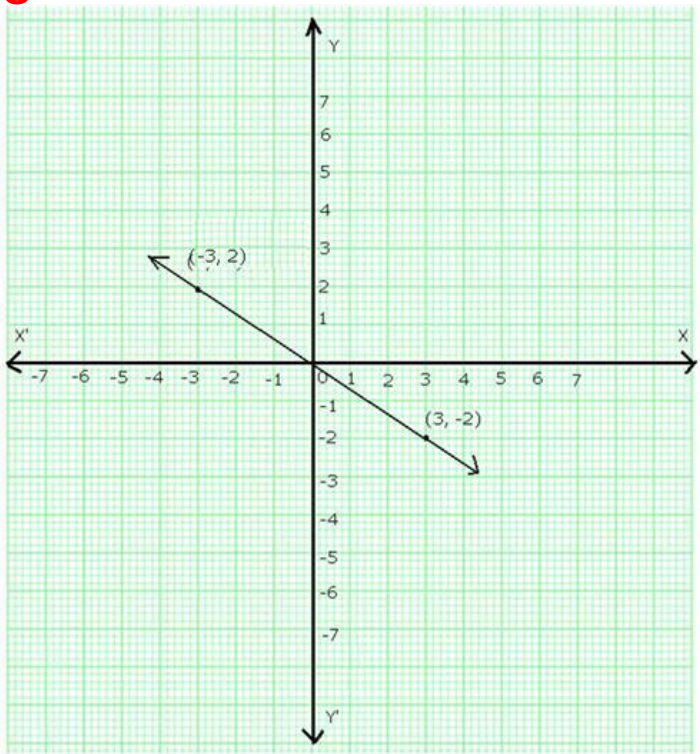
And, if x = -3, then

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

Thus, we have the following table

x	3	-3
y	-2	2

Plot points (3,-2) and (-3,2) on a graph paper and join them to get the required graph.



(v) The given equation is $3x - 2y = 0$

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

Now, if $x = 2$,

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

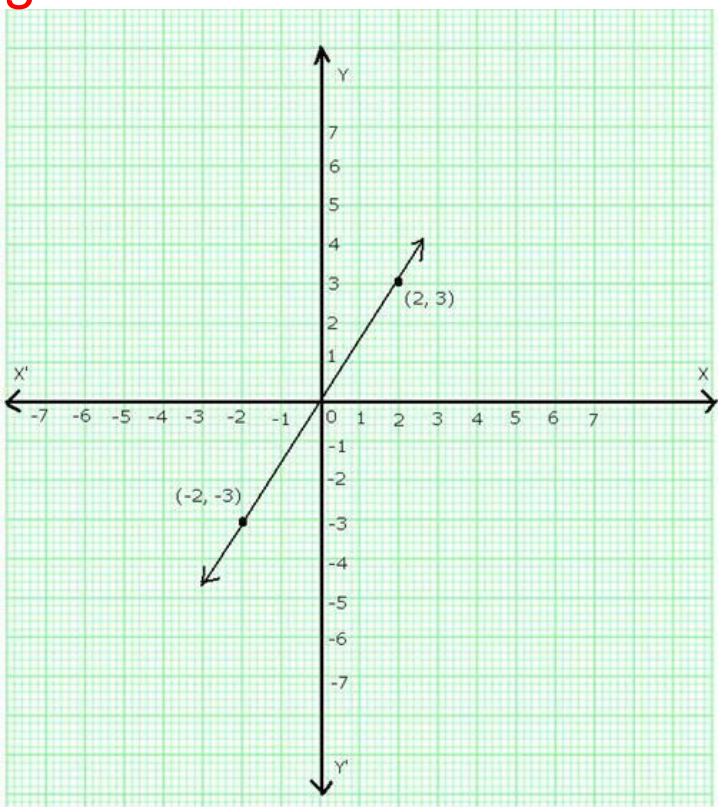
And, if $x = -2$,

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

Thus, we have the following table:

x	2	-2
y	3	-3

Plot points (2,3) and (-2,-3) on a graph paper and join them to get the required graph.



(vi) The given equation is $2x + y = 0$

$\Rightarrow y = -2x$

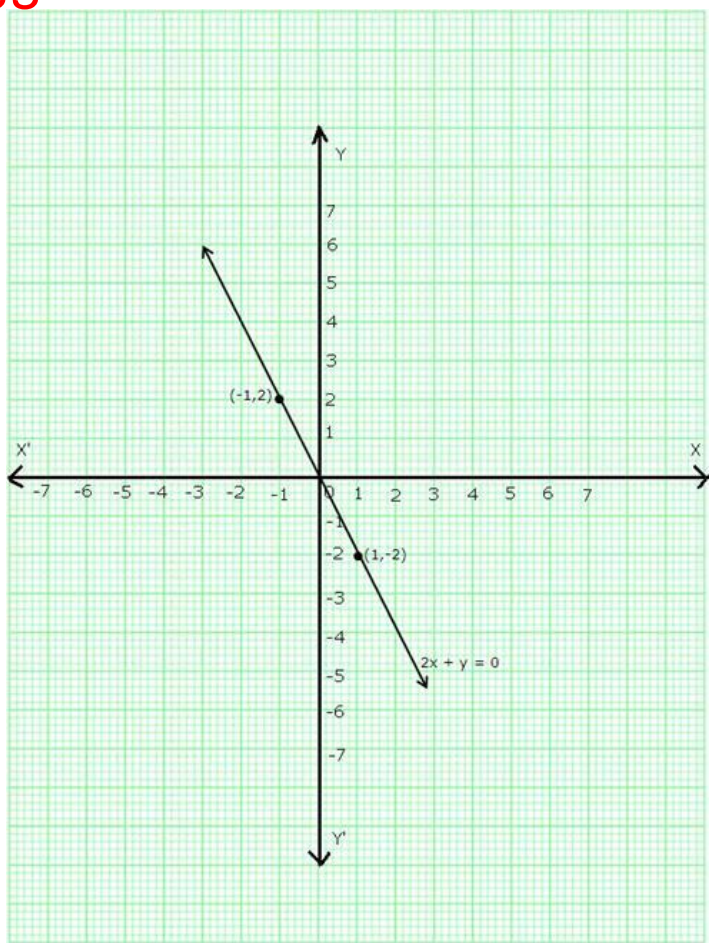
Now, if $x = 1$, then $y = -2\ 1 = -2$

And, if $x = -1$, then $y = -2\ (-1) = 2$

Thus, we have the following table:

x	1	-1
y	-2	2

Plot points (1,-2) and (-1,2) on a graph paper and join them to get the required graph.



Question 5:

The given equation is, 2x – 3y = 5

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

Now, if x = 4, then

$$y = \frac{2(4)-5}{3} = \frac{8-5}{3} = 1$$

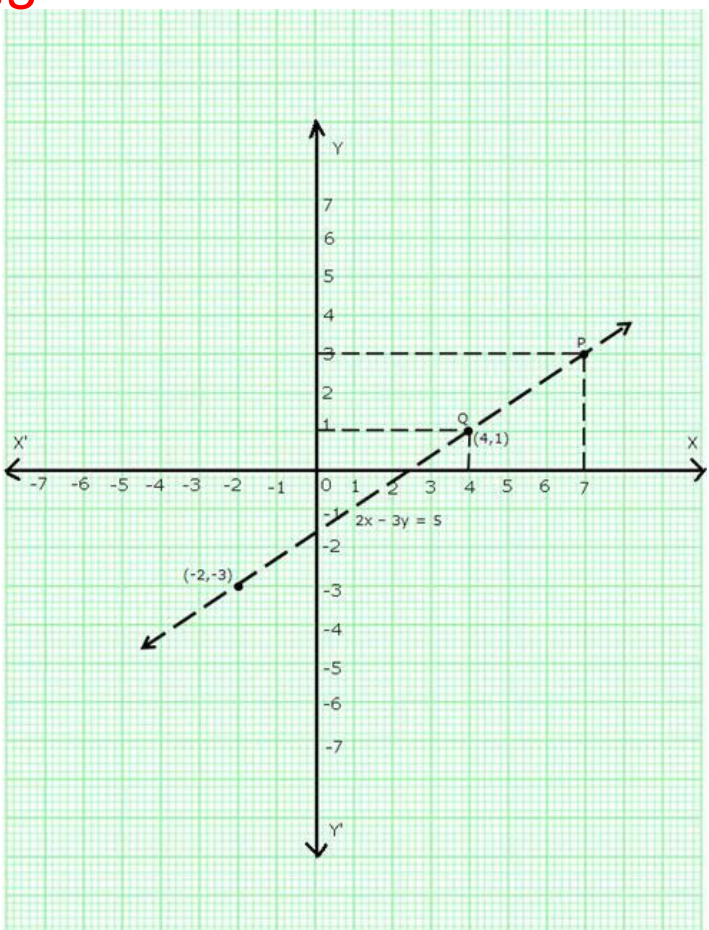
And, if x = -2, then

$$y = \frac{2(-2)-5}{3} = \frac{-4-5}{3} = \frac{-9}{3} = -3$$

Thus, we have the following table:

x	4	-2
y	1	-3

Plot points (4,1) and (-2,-3) on a graph paper and join them to get the required graph.



(i) When x = 4, draw a line parallel to y-axis at a distance of 4 units from y-axis to its right cutting the line at Q and through Q draw a line parallel to x-axis cutting y-axis which is found to be at a distance of 1 units above x-axis.

Thus, y = 1 when x = 4.

(ii) When y = 3, draw a line parallel to x-axis at a distance of 3 units from x-axis and above it, cutting the line at point P. Through P, draw a line parallel to y-axis meeting x-axis at a point which is found be 7 units to the right of y axis.

Thus, when y = 3, x = 7.

Question 6:

The given equation is 2x + y = 6

⇒ y = 6 – 2x

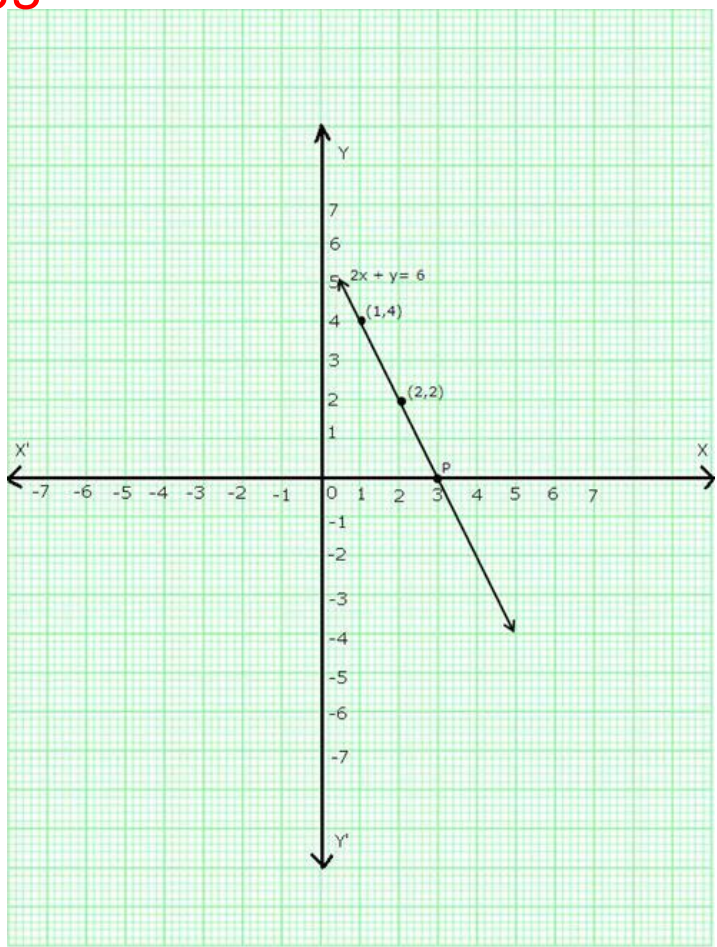
Now, if x = 1, then y = 6 – 2 (1) = 4

And, if x = 2, then y = 6 – 2 (2) = 2

Thus, we have the following table:

x	1	2
y	4	2

Plot points (1,4) and (2,2) on a graph paper and join them to get the required graph.



We find that the line cuts the x-axis at a point P which is at a distance of 3 units to the right of y-axis.

So, the co-ordinates of P are (3,0).

Question 7:

The given equation is 3x + 2y = 6

⇒ 2y = 6 – 3x

⇒ $y = \frac{6-3x}{2}$

Now, if x = 2, then

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

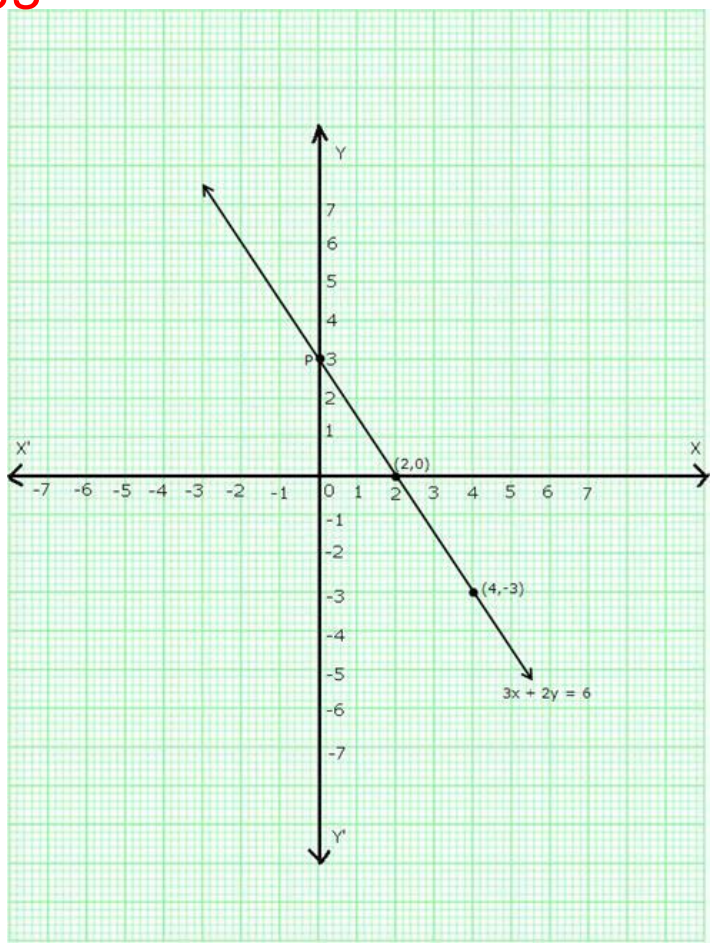
And, if x = 4, then

$$y = \frac{6-3(4)}{2} = \frac{-6}{2} = -3$$

Thus, we have the following table:

x	2	4
y	0	-3

Plot points (2, 0) and (4,-3) on a graph paper and join them to get the required graph.



We find that the line 3x + 2y = 6 cuts the y-axis at a point P which is 3 units above the x-axis.

So, co-ordinates of P are (0,3).