Unit 8

Linear Graphs and Their Application

Exercise 8.1

Q1. Determine the quadrant of the coordinate plane in which the following points lie: P(-4, 3), Q(-5, -2), R(2, 2) and S(2, -6).

P (-4, 3) lies in Second quadrant.

Q(-5, -2) lies in third quadrant.

R(2, 2) lies in first quadrant.

S(2, -6) lies in forth quadrant.

Q 2. Draw the graph of each of the following

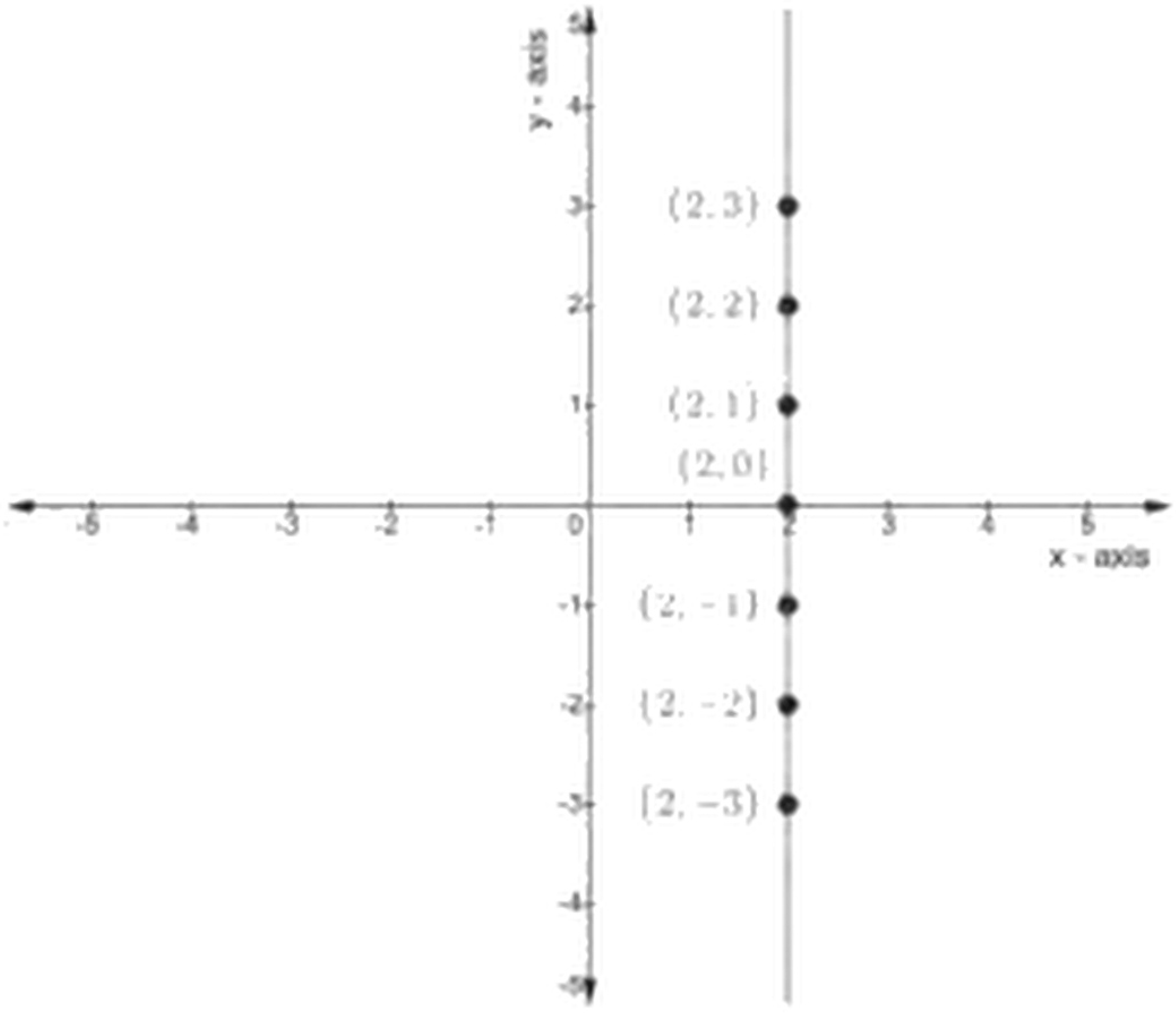
(i) x = 2

Solution:

Table for the points of the equation x = 2 is as under:

X	2	2	2	2	2	2	2
Y	-	-2	-1	0	1	2	-

Thus, the graph of the equation x = 2 is as shown below.



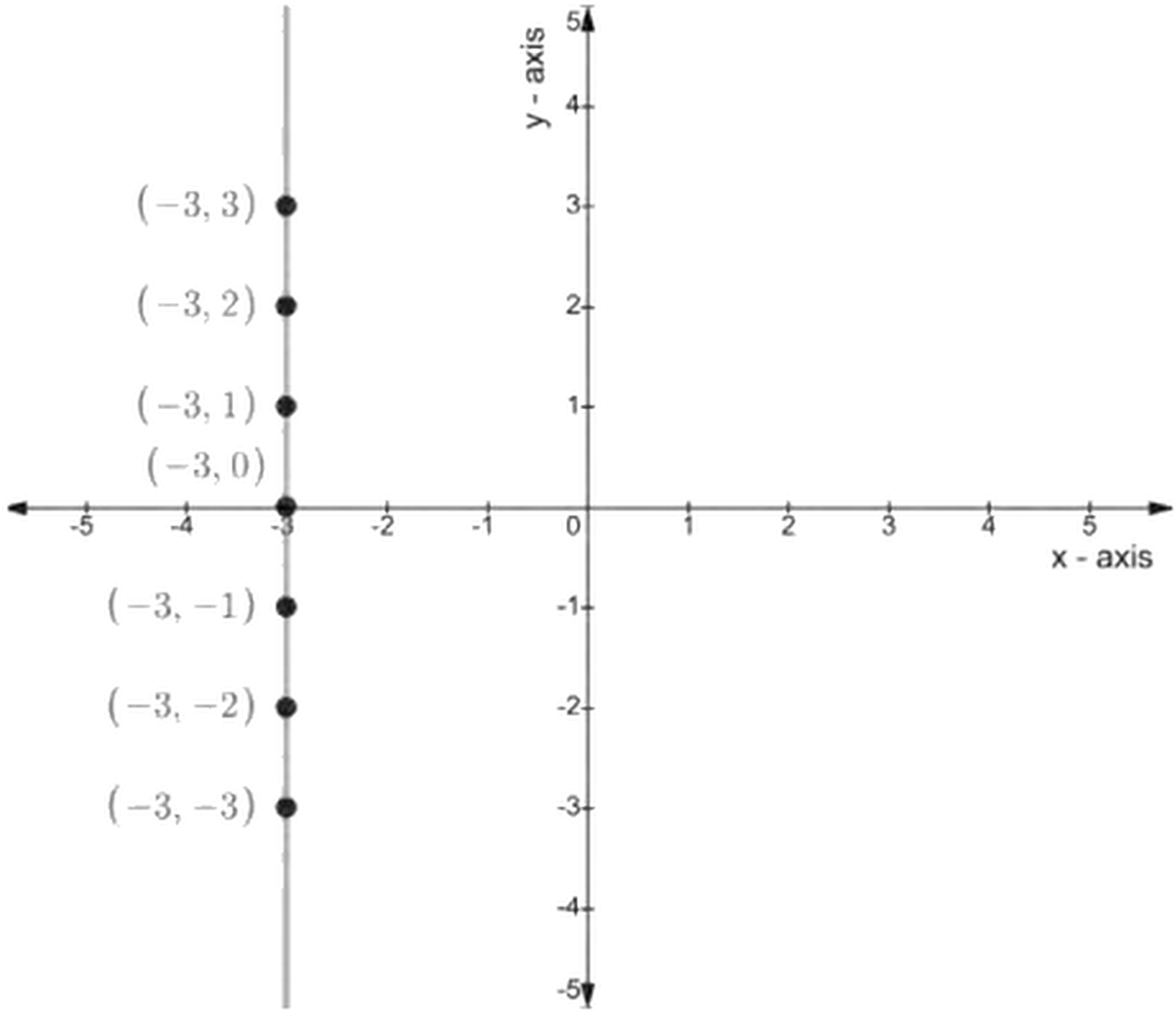
(ii) x = -3

Solution:

Table for the points of the equation x = - 3 is as under:

X	-3	-3	-3	-3	-3	-3	-3
Y	-	-2	-1	0	1	2	-

Thus, the graph of the equation x = -3 is as shown below.



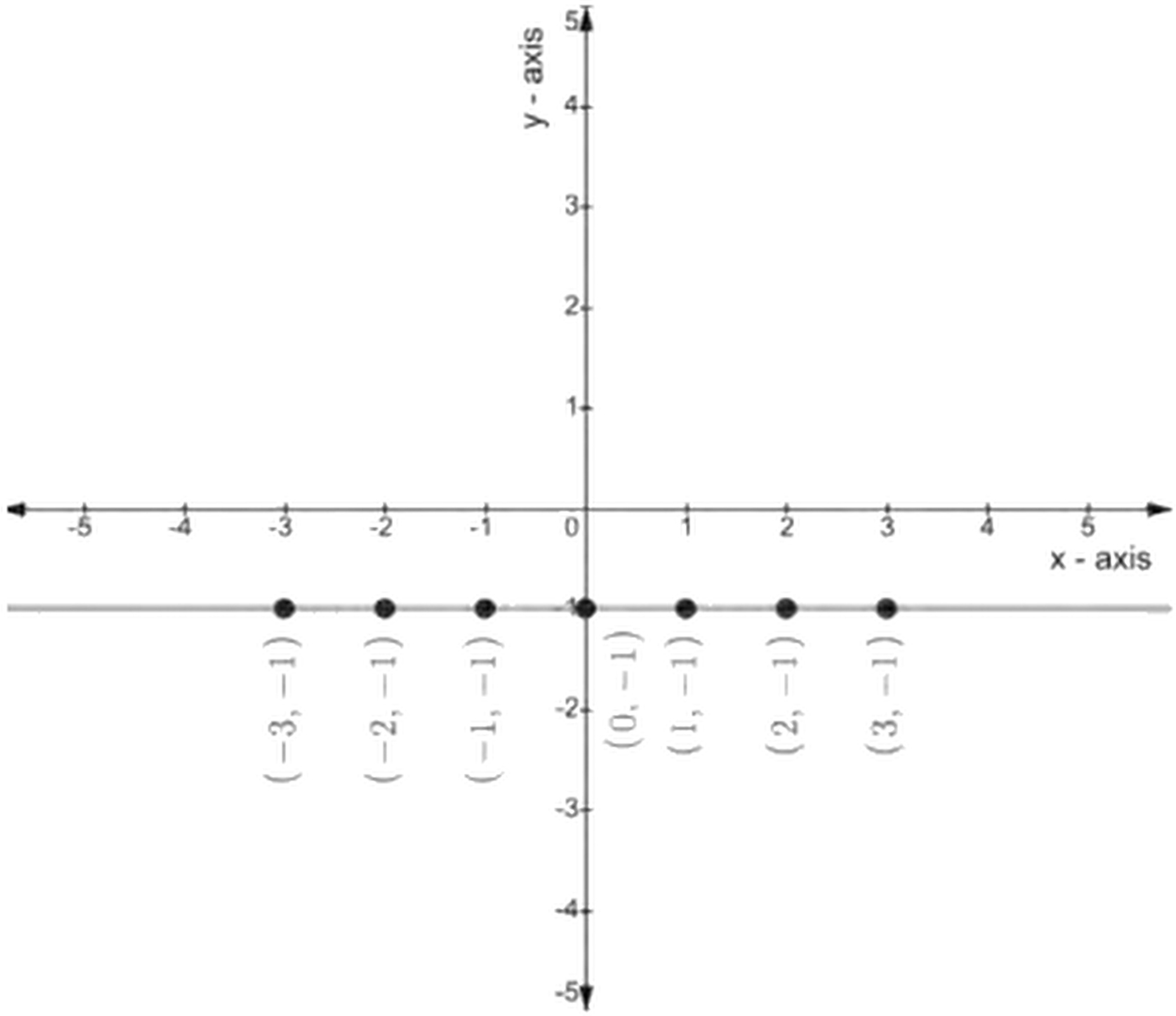
(iii) **y = -1**

Solution:

Table for the points of the equation y = -1 is as under:

X	-	-2	-1	0	1	2	-
Y	-1	-1	-1	-1	-1	-1	-1

Plotting these points and joined them we get the graph of y = -1 as under:



(iv) y = 3

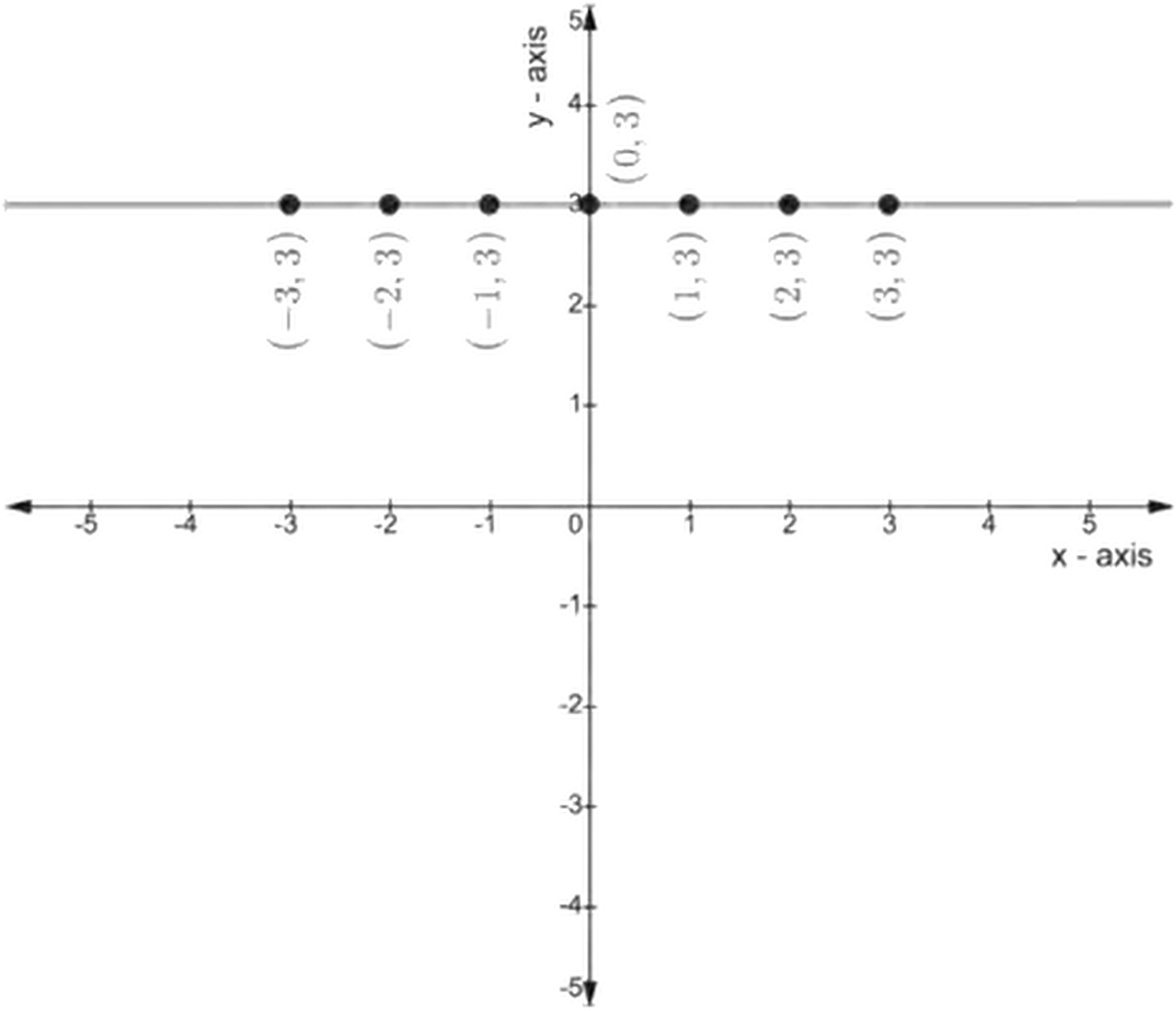
Solution:

Table for the points of the equation y = 3 is as under:

X	-	-2	-1	0	1	2	-

Y	3	3	3	3	3	3	3

Plotting these points and joined them we get the graph of y = 3 as under:



(v) y = 0

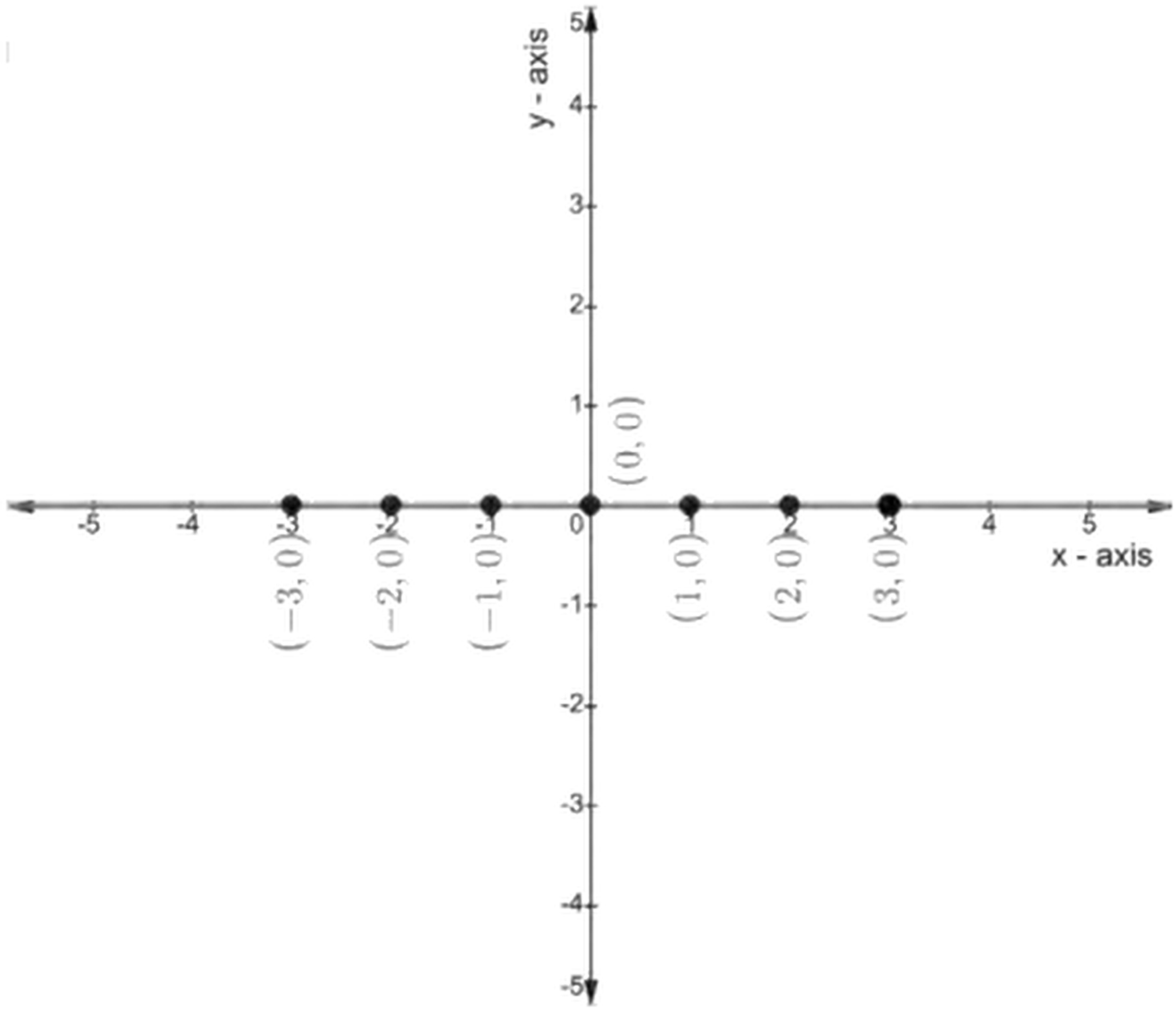
Solution:

Table for the points of the equation y = 0 is as under:

X	-	-2	-1	0	1	2	-

Y	0	0	0	0	0	0	0

Plotting these points, we see that all the points are on x-axis. So, the graph of the equation y = 0 is x-axis as shown below.



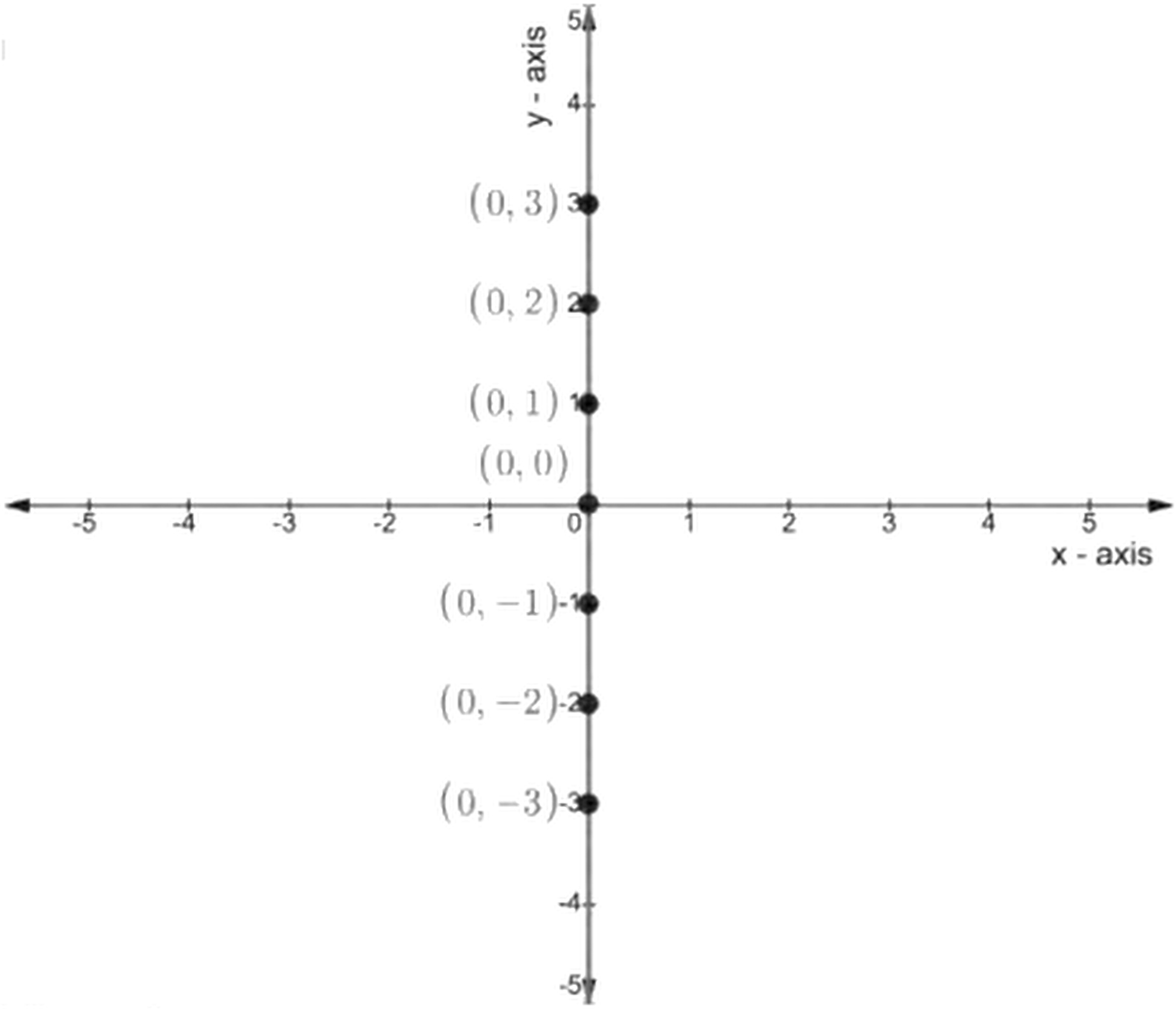
(vi) x = 0

Solution:

Table for the points of the equation x = 0 is as under:

X	0	0	0	0	0	0	0
Y	-	-2	-1	0	1	2	-

Plotting these points, we see that all the points are on y-axis. So the graph of the equation x = 0 is y-axis as shown below.



(vii) **y = 3x**

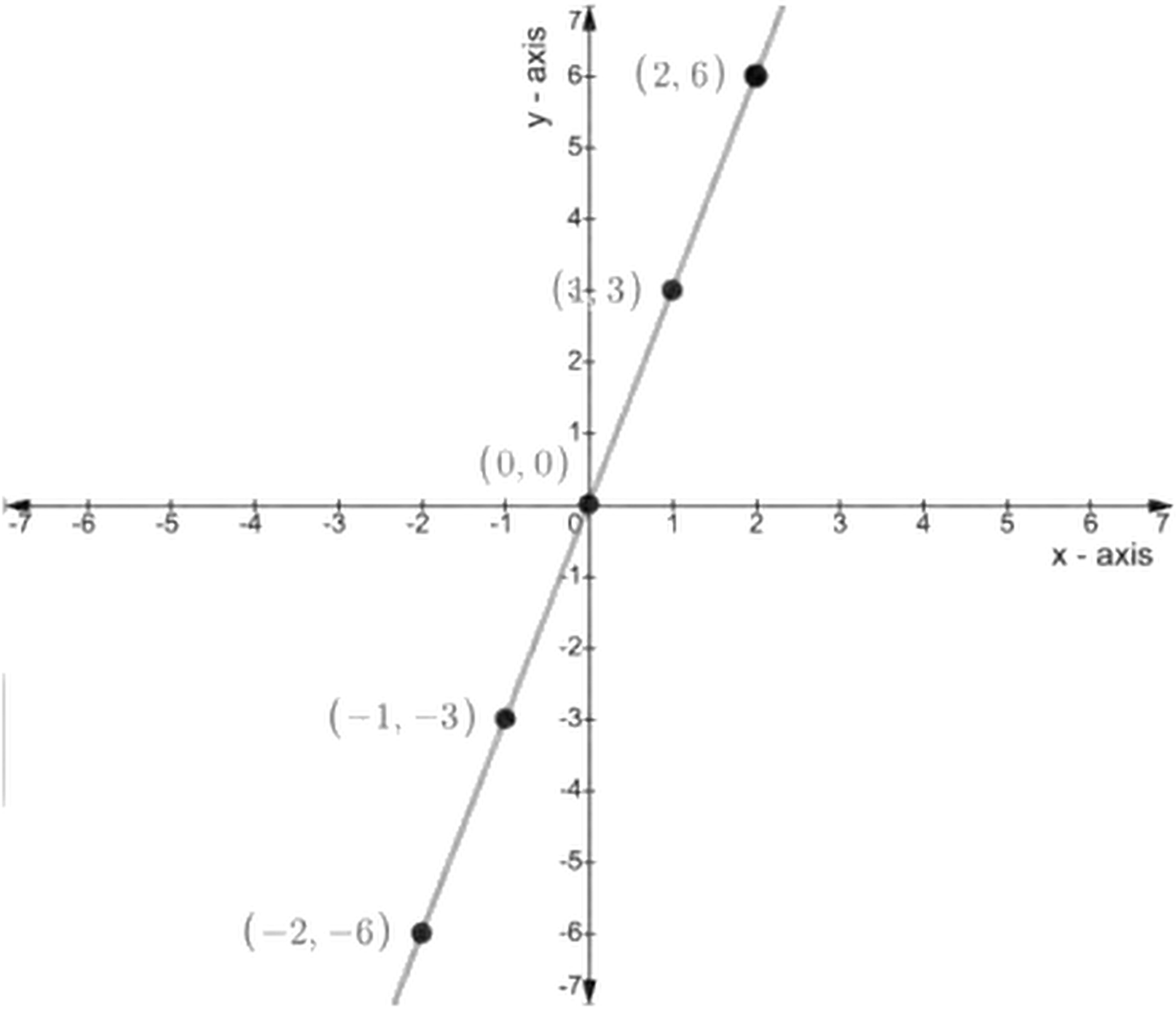
Solution:

Table for the points of the equation y = 3x is as under:

X	-2	-1	0	1	2
Y	-6	-3	0	3	6

The points (x,y) are plotted in the plane as shown below:

Joining them, we get the graph of the line y = 3x as under:



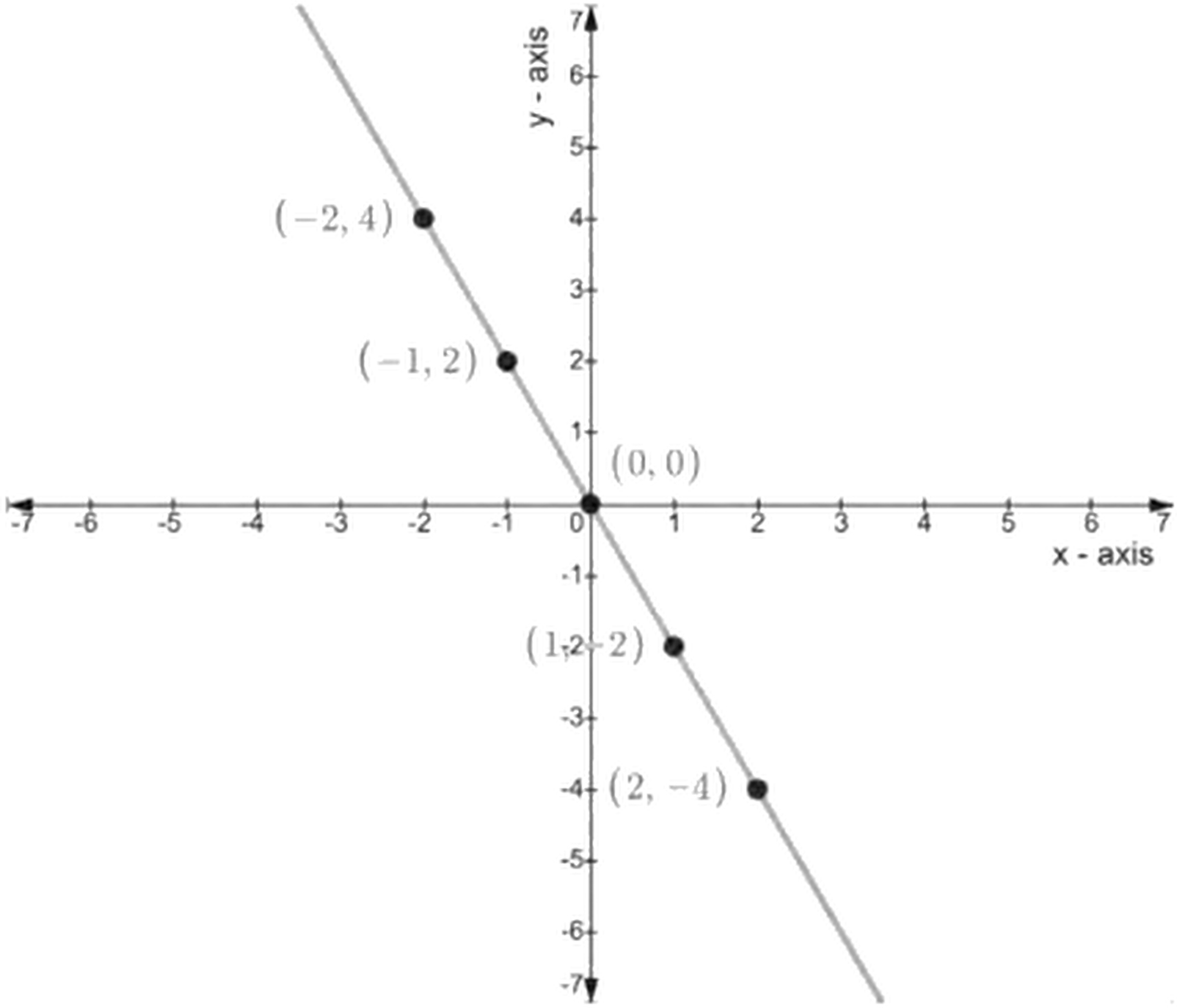
(viii) -y = 2x or y = -2x

Solution:

Table for the points of the equation y = -2x or -y = 2x is as under:

X	-2	-1	0	1	2
Y	4	2	0	-2	-4

The points are plotted in the plane as under. By Joining the potted points, we get the graph of the equation -y = 2x as under:



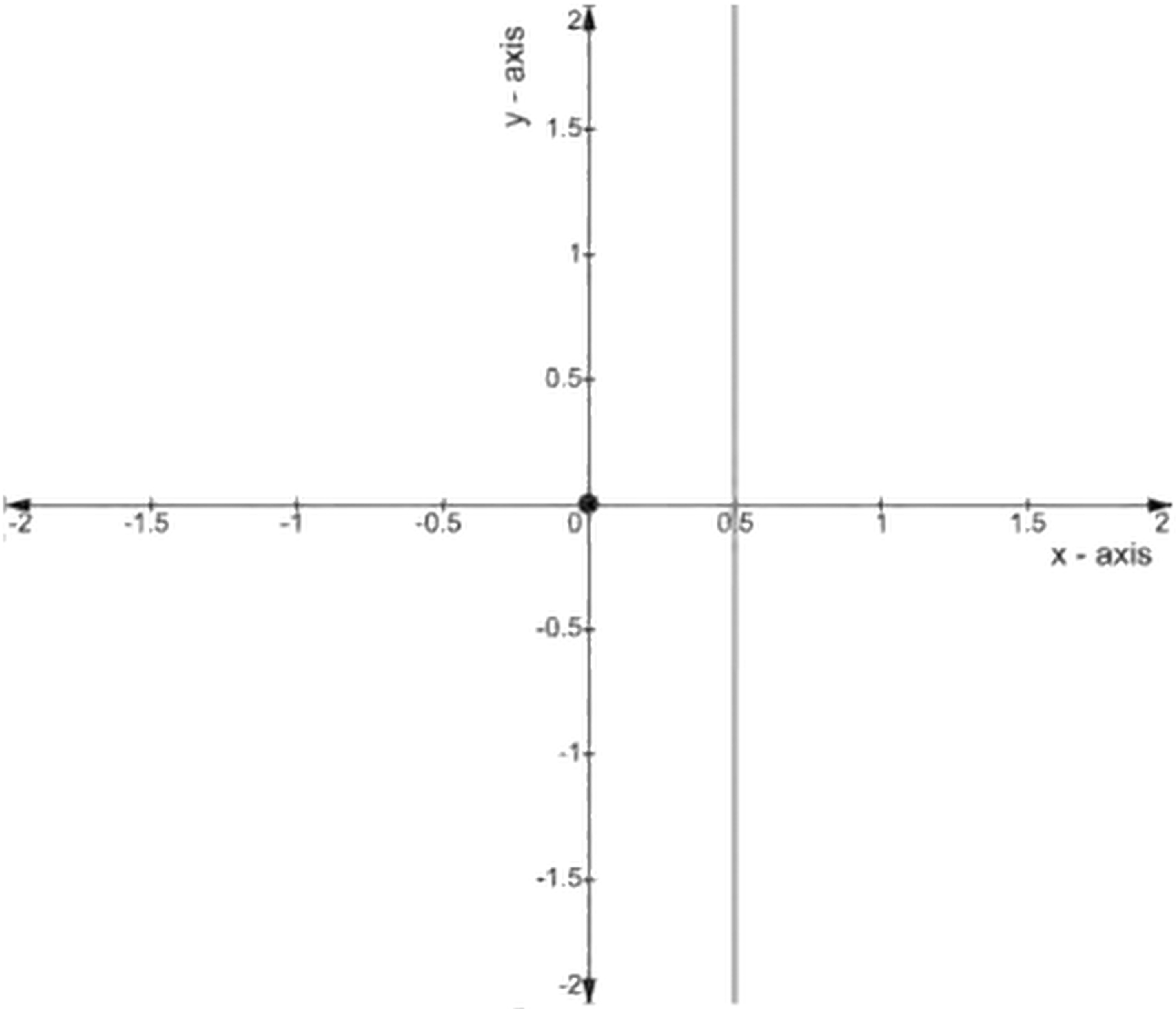
(ix) $\frac{1}{2}$ **= x** **or** **x = 0.5**

Solution:

Table for the points of the equation $x = \frac{1}{2} = 0.5$ is as under:

X	-0.5	-0.5	-0.5	-0.5	-0.5
Y	-2	-1	0	1	2

The points are plotted in the plane as below. By Joining the potted points, we get the graph of the equation $x = \frac{1}{2}$ as under:



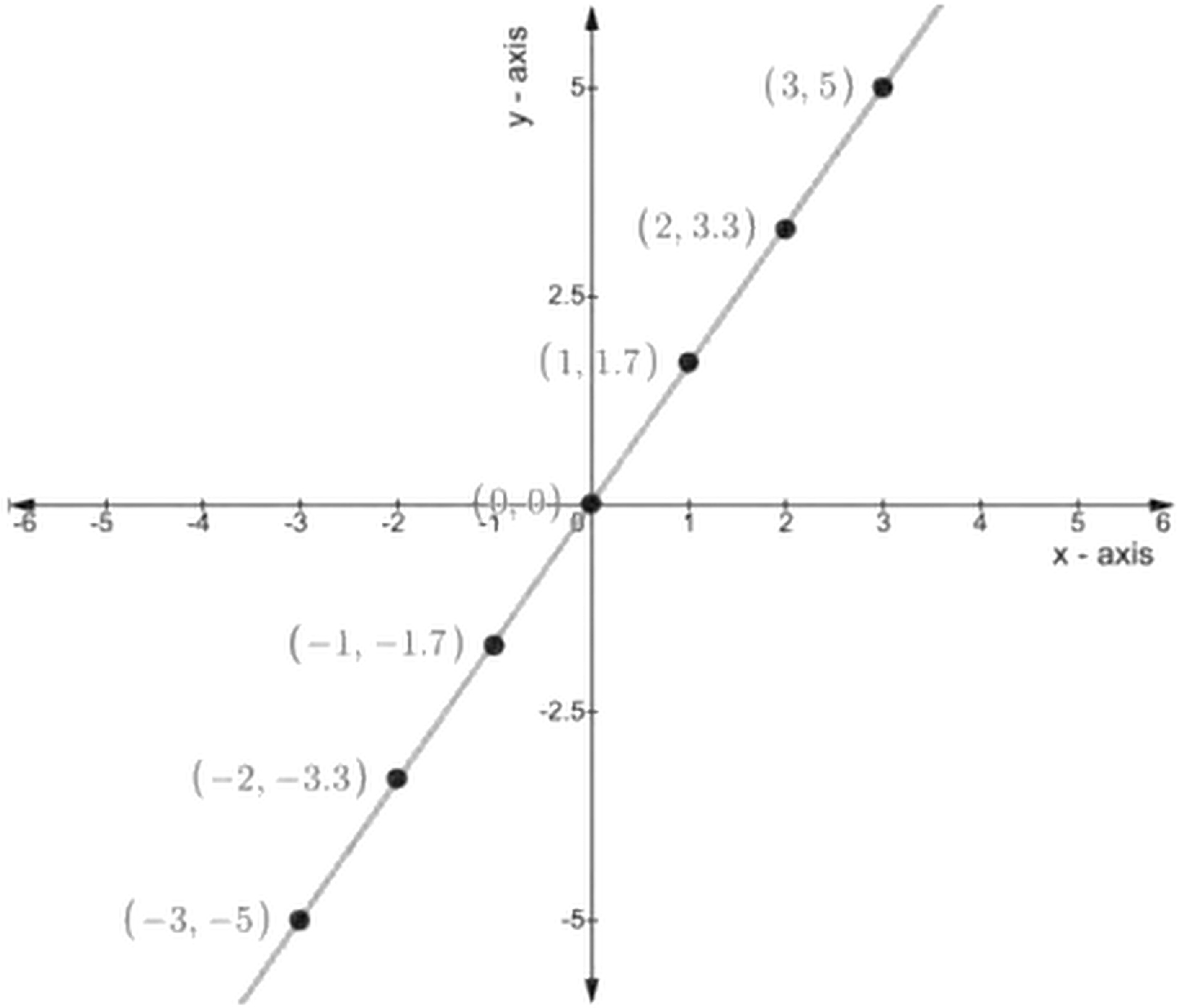
(x) **3y = 5x** **or** $y = \frac{5}{3}x$

Solution:

Table for the points of the equation 3y = 5x or y = $\frac{5}{3}x$ is as under:

X	-3	-2	-1	0	1	2	3
Y	-5	-3.3	-1.7	0	1.7	3.3	5

The points are plotted in the plane as below. By Joining the potted points, we get the graph of the equation 3y=5x as under:



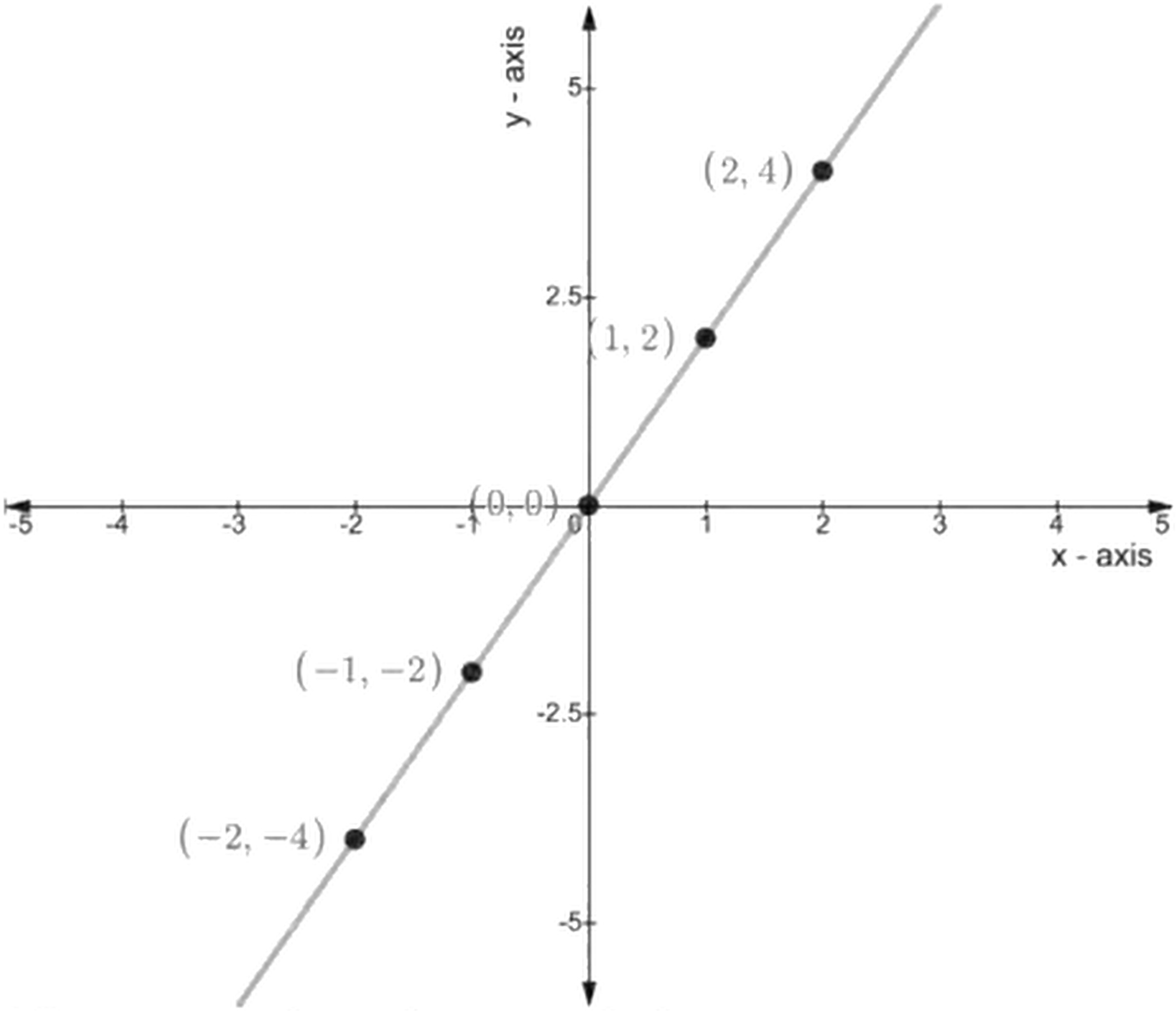
(xi) 2x -y =0 or y = 2x

Solution:

Table for the points is as under:

X	-2	-1	0	1	2
Y	-4	-2	0	2	4

The points are plotted in the plane as under. By Joining the potted points, we get the graph of the equation as under:



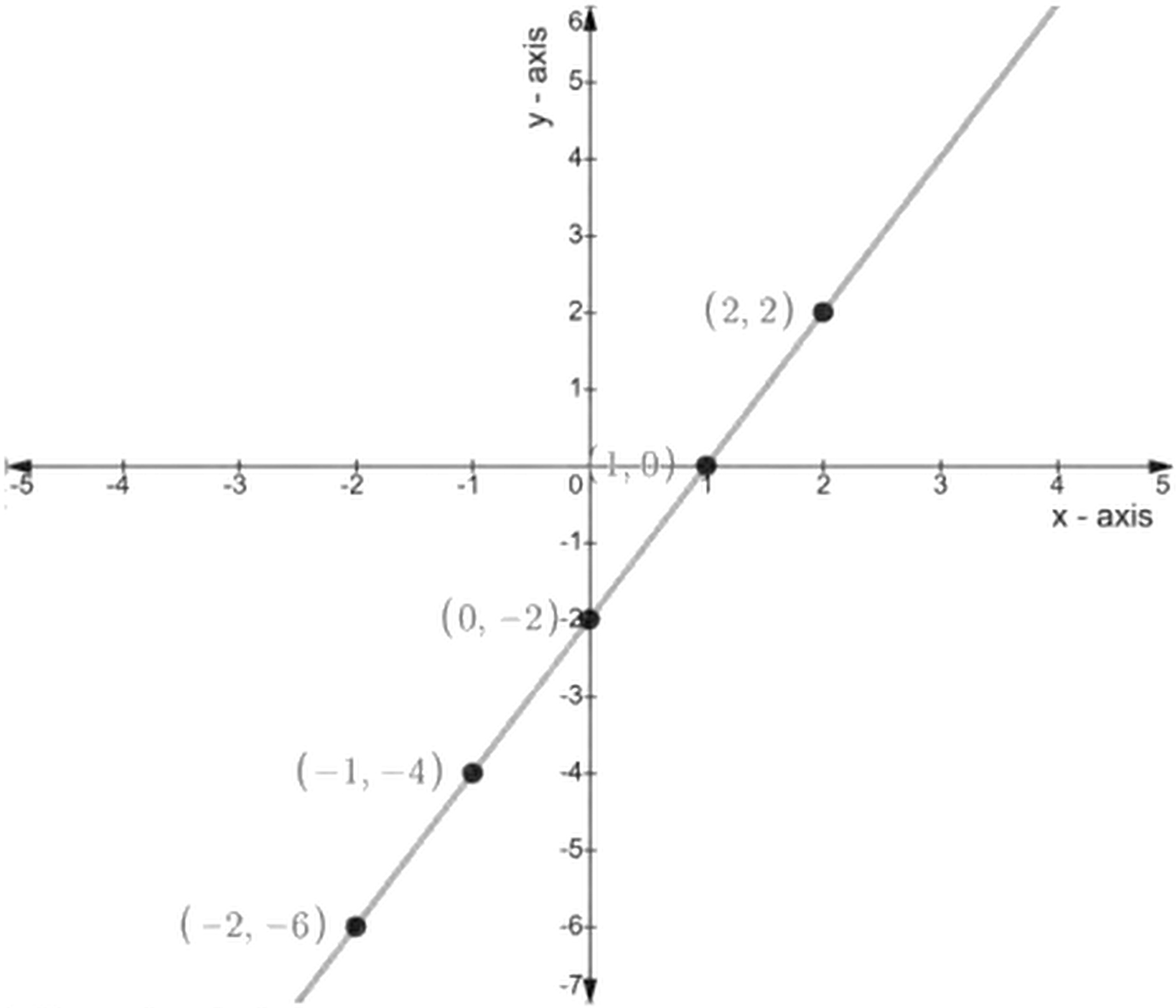
(xii) **$2x - y = 2$ or $y = 2x - 2$**

Solution:

Table for the points of the equation is as under:

X	-2	-1	0	1	2
Y	-6	-4	-2	0	2

The points are plotted in the plane as under. By Joining the potted points, we get the graph of the equation as under:



(xiii) x – 3y + 1 =0

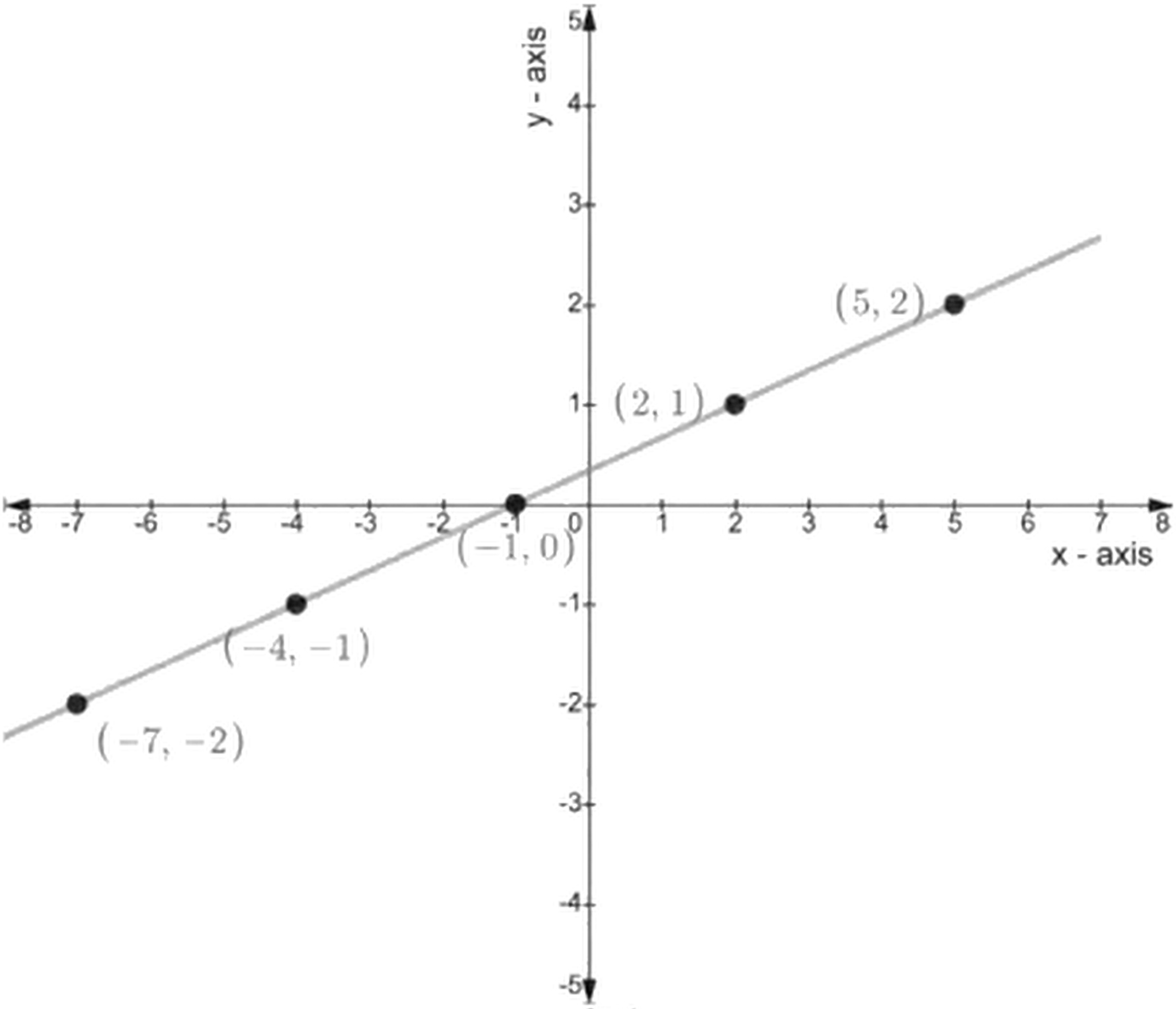
Solution:

x = 3y -1 or $y = \frac{x+1}{3}$

Table for the points of the equation is as under:

X	-7	-4	-1	2	5
Y	-2	-1	0	1	2

The points are plotted in the plane as under. By Joining the potted points, we get the graph of the equation as under:



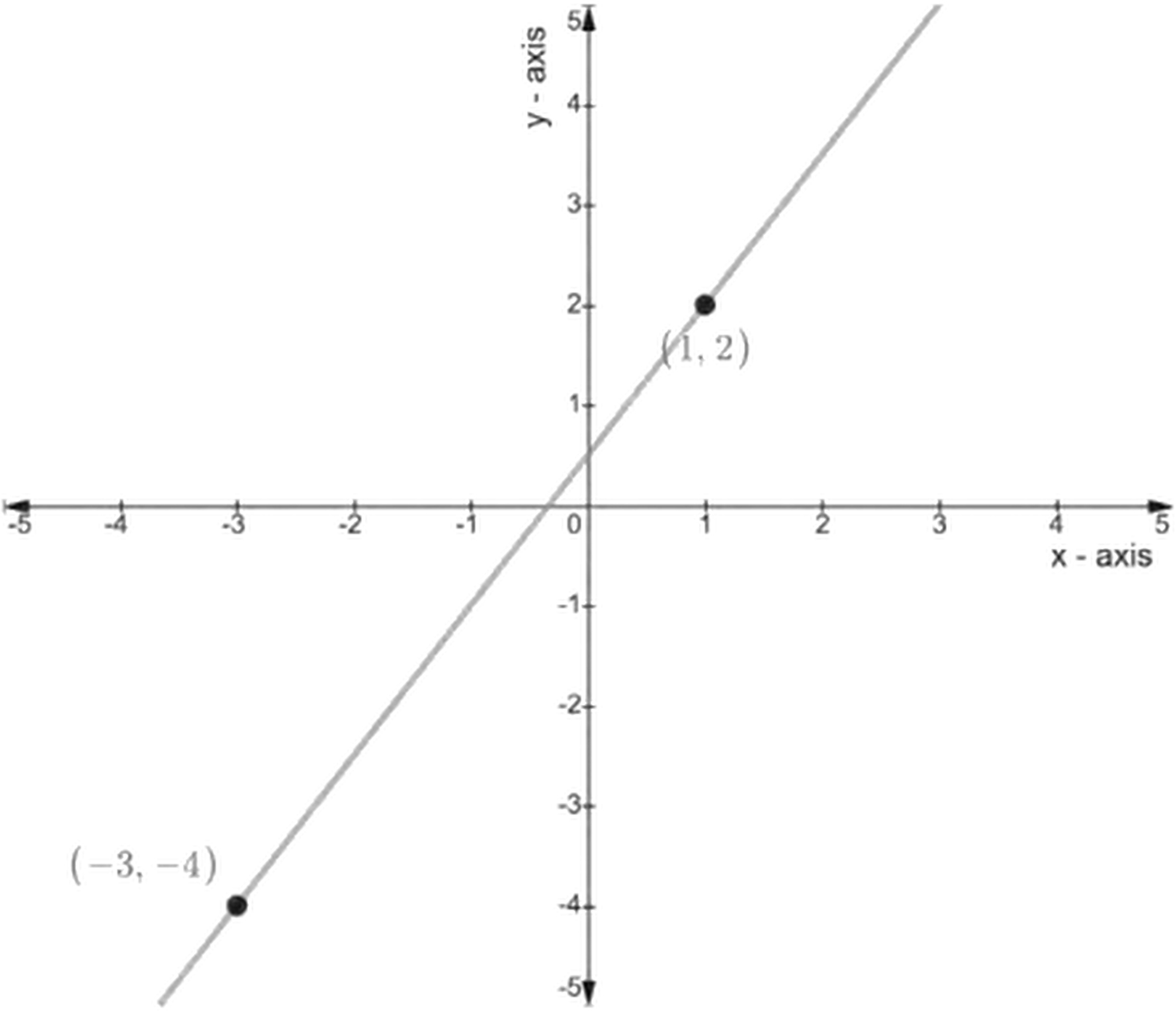
(xiv) 3x – 2y + 1 = 0 **or** $y = \frac{3x+1}{2}$

Solution:

Table for the points of the equation is as under:

X	-3	-2	-1	0	1
Y	-4	$-\frac{5}{2}$	-1	5	2

The points are plotted in the plane as under. By Joining the potted points, we get the graph of the equation as under:



3. Are the following lines (i) parallel to x-axis (ii) parallel to y-axis?

(i) 2x - 1 = 3

(ii) $x + 2 = -1$

(iii) $2y + 3 = 2$

(iv) $x + y = 0$

(v) $2x - 2y = 0$

(i) $2x - 1 = 3$

Solution:

$2x = 3 + 1 = 4$ or $x = 2$

is a line parallel to y-axis.

(ii) $x + 2 = -1$

Solution:

$x = -1 - 2$ or $x = -3$

is a line parallel to y-axis.

(iii) $2y + 3 = 2$

Solution:

$2y = 2 - 3 = -1$ or $y = -\frac{1}{2}$

is a line parallel to x-axis.

(iv) $x + y = 0$

Solution:

$x = -y$

neither parallel to x-axis nor y-axis.

(v) 2x - 2y = 0

Solution:

2x = 2y or x = y

neither parallel to x-axis nor y-axis.

4. Find the value of m and c of the following lines by expressing them in the form y = mx + c.

(a) 2x + 3y - 1 = 0 **(b) x - 2y = -2** **(c) 3x + y - 1 = 0**

(d) 2x- y = 7 **(e) 3 - 2x + y = 0** **(f) 2x = y + 3**

(a) 2x + 3y - 1 = 0

Solution:

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

Since y = mx + c

So, $m = -\frac{2}{3}$ $c = \frac{1}{3}$

(b) x - 2y = -2

Solution:

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

Since y = mx + c

So, $m = \frac{1}{2}$ c = 1

(c) $3x + y - 1 = 0$

Solution:

$y = -3x + 1$

Since $y = mx + c$

So, $m = -3$ $c = 1$

(d) $2x - y = 7$

Solution:

$-y = -2x + 7$ or $y = 2x - 7$

Since $y = mx + c$

So, $m = 2$ $c = -7$

(e) $3 - 2x + y = 0$

Solution:

$y = 2x - 3$

Since $y = mx + c$

So, $m = 2$ $c = -3$

(f) $2x = y + 3$

Solution:

$y = 2x - 3$

Since $y = mx + c$

5. Verify whether the following point lies on the line $2x - y + 1 = 0$ or not.

(i) (2, 3) **(ii) (0, 0)** **(iii) (-1, 1)** **(iv) (2, 5)**

(v) (5, 3)

(i) (2, 3)

Solution:

The line is $2x - y + 1 = 0$ for the point (2, 3)

$2(2) - 3 + 1 = 4 - 3 + 1 = 2 \neq 0$

$\therefore$ Point does not lie on the line

(ii) (0, 0)

Solution:

The line is $2x - y + 1 = 0$ for the point (0, 0)

$2(0) = - 0 + 1 = 0 - 0 = 1 \neq 0$

$\therefore$ Point does not lie on the line

(iii) (-1, 1)

Solution:

The line is $2x - y + 1 = 0$ for the point (-1, 1)

$2(-1) - 1 + 1 = -2 - 1 + 1 = -2 \neq 0$

$\therefore$ Point does not lie on the line

(iv) (2, 5)

Solution:

The line is $2x - y + 1 = 0$ for the point (-1, 1)

$2(2) - 5 + 1 = 4 - 5 + 1 = 0$

∴ Point lies on the line

(v) (5, 3)

Solution:

The line is $2x - y + 1 = 0$ for the point (5, 3)

$2(5) - 3 + 1 = 10 - 3 + 1 = 8 \neq 0$

∴ Point does not lie on the line