EXERCISE 26A

1. For each equation given below; name the dependent and independent variables.

$$(i) y = \frac{4}{3}x - 7$$

$$(ii) x = 9y + 4$$

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

$$(iv) y = \frac{1}{7}(6x+5)$$

Solution:

(i)

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

y is the dependent variable
x is the independent variable

(ii) x = 9y + 4
x is the dependent variable
y is the independent variable

(iii)

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

x is the dependent variable
y is the independent variable

(iv)

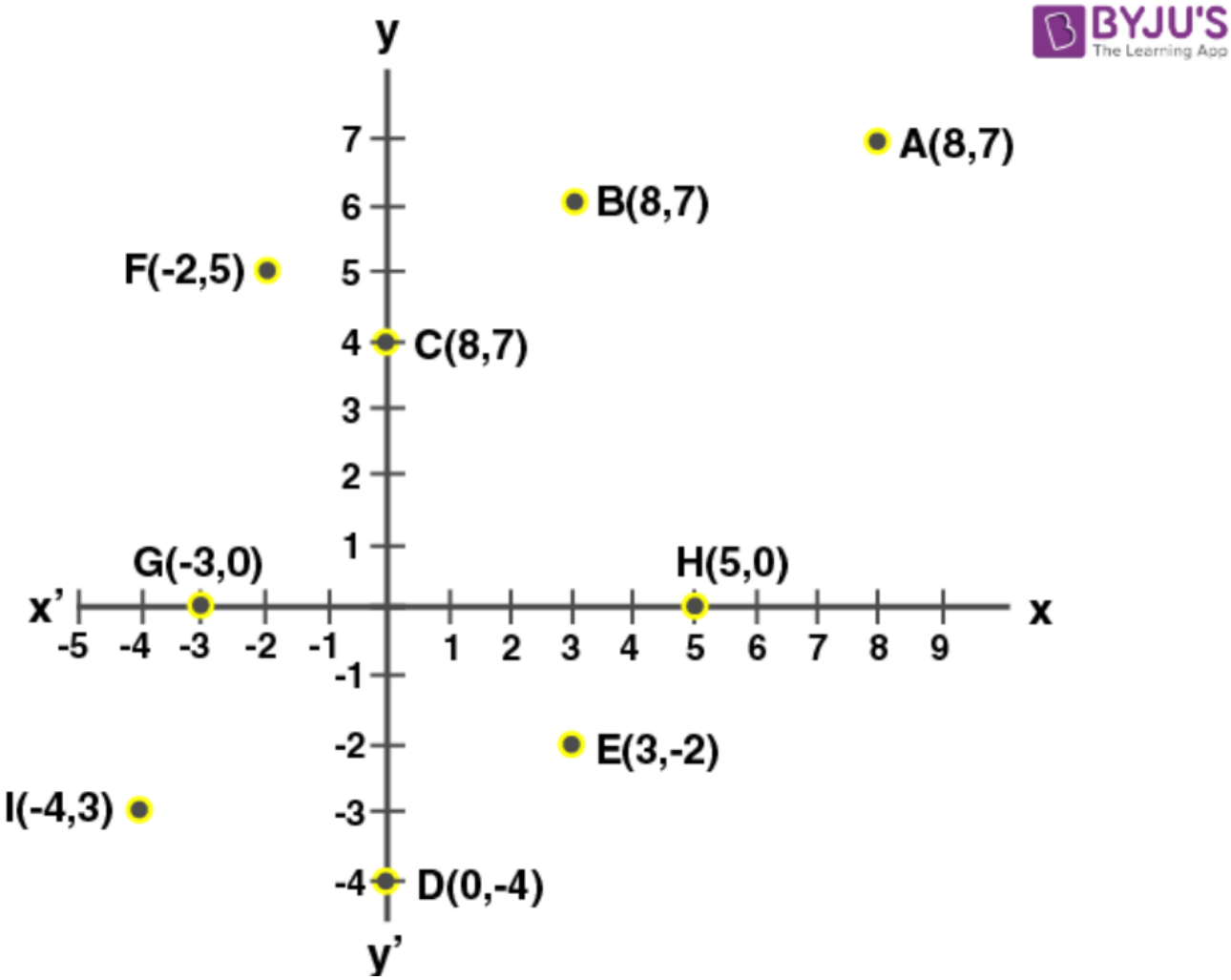
$$y = \frac{1}{7}(6x+5)$$

y is the dependent variable
x is the independent variable

2. Plot the following points on the same graph paper:
(i) (8, 7)
(ii) (3, 6)
(iii) (0, 4)
(iv) (0, -4)
(v) (3, -2)
(vi) (-2, 5)
(vii) (-3, 0)
(viii) (5, 0)
(ix) (-4, -3)

Solution:

Consider the points as
(i) (8, 7) = A
(ii) (3, 6) = B
(iii) (0, 4) = C
(iv) (0, -4) = D
(v) (3, -2) = E
(vi) (-2, 5) = F
(vii) (-3, 0) = G
(viii) (5, 0) = H
(ix) (-4, -3) = I



3. Find the values of x and y if:
(i) (x – 1, y + 3) = (4, 4)
(ii) (3x + 1, 2y – 7) = (9, -9)
(iii) (5x – 3y, y – 3x) = (4, -4)
Solution:

We know that two ordered pairs are equal.

(i) $(x – 1, y + 3) = (4, 4)$
It can be written as
$x – 1 = 4$ and $y + 3 = 4$
$x = 5$ and $y = 1$

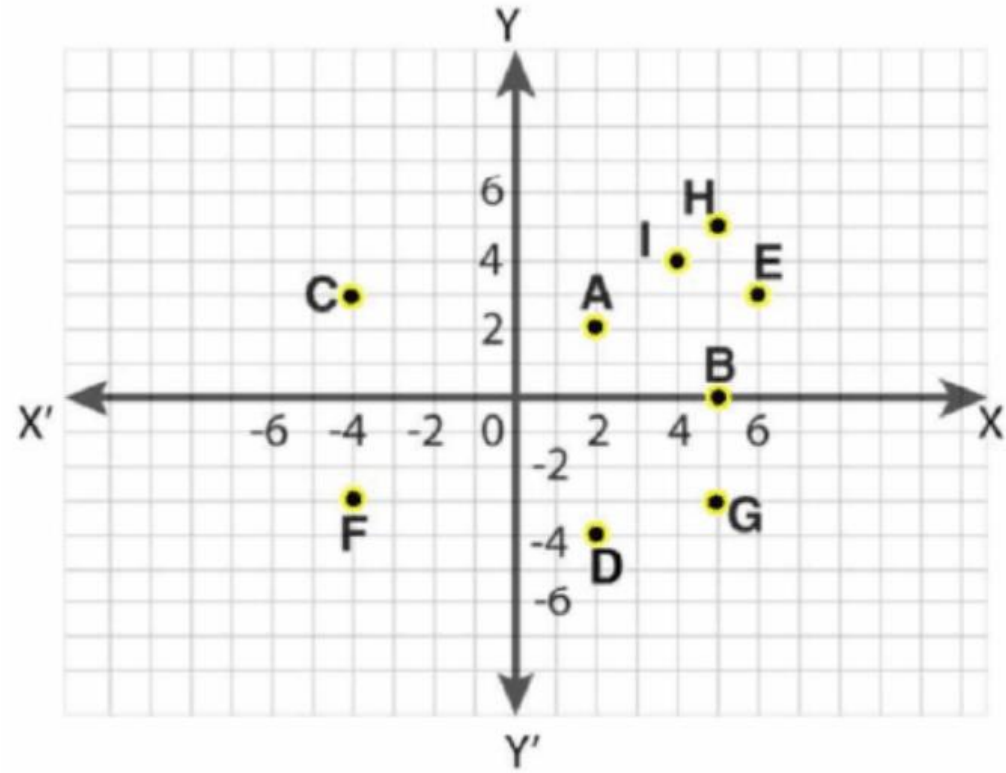
(ii) $(3x + 1, 2y – 7) = (9, -9)$
It can be written as
$3x + 1 = 9$ and $2y – 7 = -9$
$3x = 8$ and $2y = -2$
$x = 8/3$ and $y = -1$

(iii) $(5x – 3y, y – 3x) = (4, -4)$
It can be written as
$5x – 3y = 4$ ….. (1)
$y – 3x = -4$ ….. (2)
By multiplying equation (2) by 3
$3y – 9x = - 12$ …… (3)
Now add equations (1) and (3)
$(5x – 3y) + (3y – 9x) = 4 + (-12)$
$- 4x = -8$
$x = 2$

Substituting the value of x in equation (2)
$y – 3x = -4$
$y = 3x – 4$
$y = 3 (2) – 4$
$y = 2$

Therefore, $x = 2$ and $y = 2$.

4. Use the graph given alongside, to find the coordinates of point (s) satisfying the given condition:
(i) The abscissa is 2.
(ii) The ordinate is 0.
(iii) The ordinate is 3.
(iv) The ordinate is -4.
(v) The abscissa is 5.
(vi) The abscissa is equal to the ordinate.
(vii) The ordinate is half of the abscissa.



Solution:

(i) The abscissa is 2.
Based on the graph,
The co-ordinate of the point A is given by (2, 2).

(ii) The ordinate is 0.
Based on the graph,
The co-ordinate of the point B is given by (5, 0).

(iii) The ordinate is 3.
Based on the graph,
The co-ordinates of the points C and E are given by (-4, 3) and (6, 3).

(iv) The ordinate is -4.
Based on the graph,
The co-ordinate of the point D is given by (2, -4).

(v) The abscissa is 5.
Based on the graph,
The co-ordinates of the points H, B and G are given by (5, 5), (5, 0) and (5, -3).

(vi) The abscissa is equal to the ordinate.
Based on the graph,
The co-ordinates of the points I, A and H are given by (4, 4), (2, 2) and (5, 5).

(vii) The ordinate is half of the abscissa.

Based on the graph,
The co-ordinate of the point E is given by (6, 3).

5. State true or false:
(i) The ordinate of a point is its x co-ordinate.
(ii) The origin is in the first quadrant.
(iii) The y-axis is the vertical number line.
(iv) Every point is located in one of the four quadrants.
(v) If the ordinate of a point is equal to its abscissa; the point lies either in the first quadrant or in the second quadrant.
(vi) The origin (0, 0) lies on the x-axis.
(vii) The point (a, b) lies on the y-axis if b = 0.
Solution:

(i) False
(ii) False
(iii) True
(iv) True
(v) False
(vi) True
(vii) False

6. In each of the following, find the co-ordinates of the point whose abscissa is the solution of the first equation and ordinate is the solution of the second equation:

$$(i) 3 - 2x = 7; 2y + 1 = 10 - 2\frac{1}{2}y$$

$$(ii) \frac{2a}{3} - 1 = \frac{a}{2}; \frac{15 - 4b}{7} = \frac{2b - 1}{3}$$

$$(iii) 5x - (5 - x) = \frac{1}{2}(3 - x); 4 - 3y = \frac{4 + y}{3}$$

Solution:

(i)

$$3 - 2x = 7; 2y + 1 = 10 - 2\frac{1}{2}y$$

We know that
3 – 2x = 7
3 – 7 = 2x
- 4 = 2x
x = - 2

Similarly
2y + 1 – 10 – 2 ½ y
2y + 1 = 10 – 5/2 y
By cross multiplication
4y + 2 = 20 – 5y
4y + 5y = 20 – 2

9y = 18
y = 2

Hence, the co-ordinates of the point are (-2, 2).

(ii)

$$\frac{2a}{3} - 1 = \frac{a}{2}; \frac{15 - 4b}{7} = \frac{2b - 1}{3}$$

We know that
2a/3 – 1 = a/2
2a/3 – a/2 = 1
Taking LCM
(4a – 3a)/ 6 = 1
a = 6
Similarly

$$\frac{15 - 4b}{7} = \frac{2b - 1}{3}$$

By taking LCM
45 – 12b = 14b – 7
45 + 7 = 14b + 12b
52 = 26b
b = 2

Hence, the co-ordinates of the point are (6, 2)

(iii)

$$5x - (5 - x) = \frac{1}{2}(3 - x); 4 - 3y = \frac{4 + y}{3}$$

We know that
5x – (5 – x) = ½ (3 – x)
It can be written as
(5x + x) – 5 = ½ (3 – x)
By cross multiplication
12x – 10 = 3 – x
12x + x = 3 + 10
13x = 13
x = 1

Similarly

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

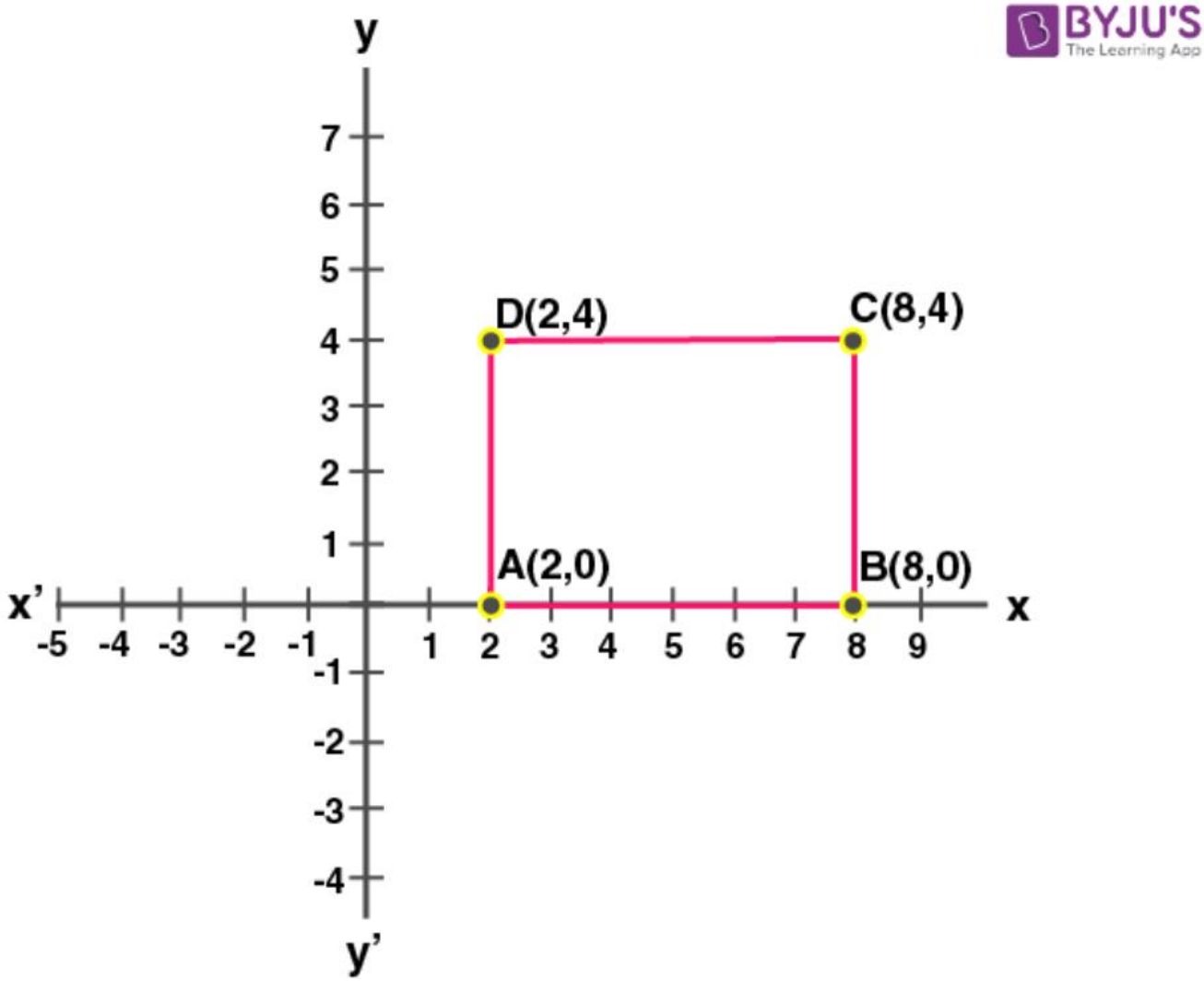
By cross multiplication
12 – 9y = 4 + y
12 – 4 = y + 9y
8 = 10y
y = 8/10

y = 4/5

Hence, the co-ordinates of the point are (1, 4/5).

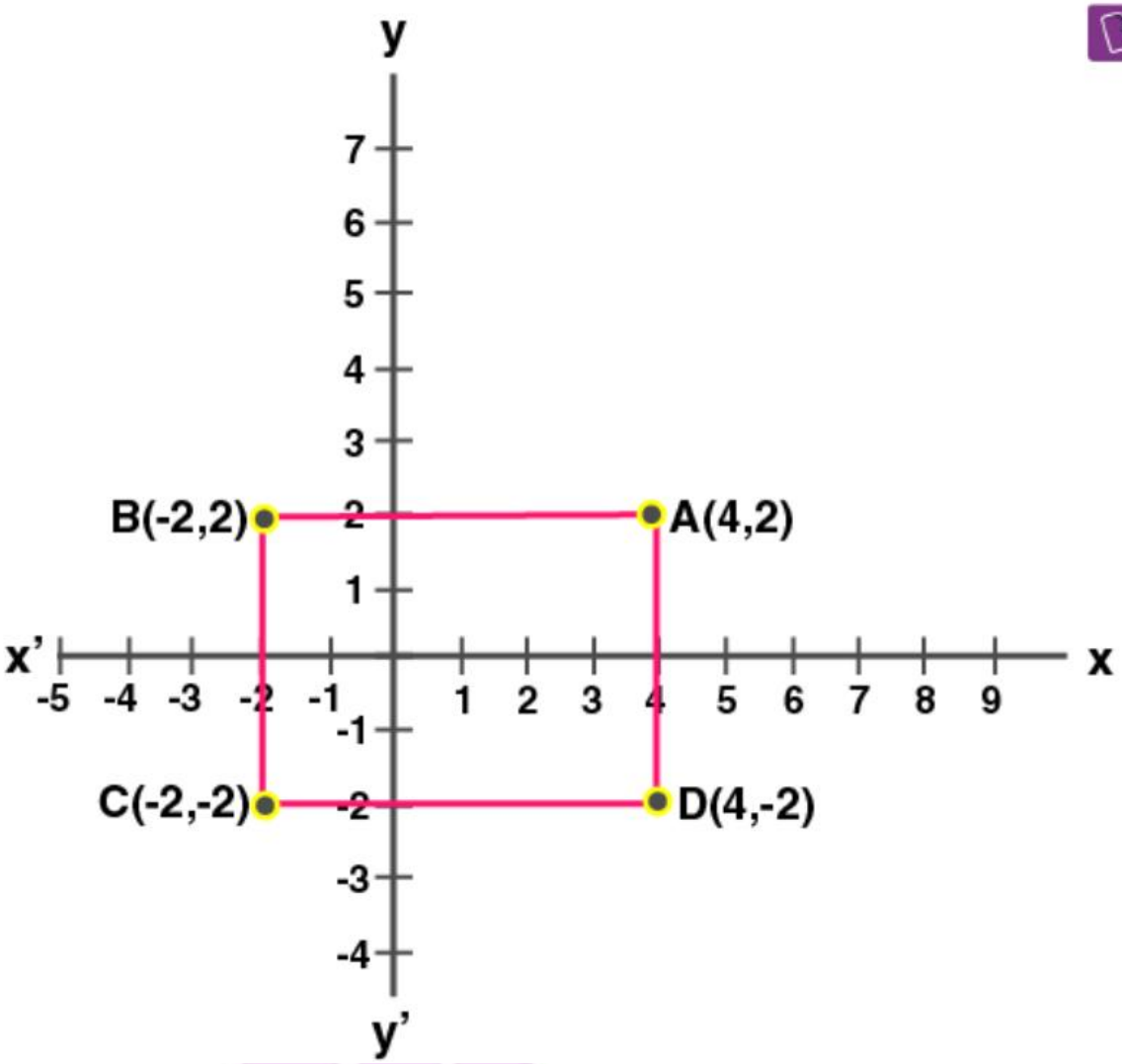
7. In each of the following, the co-ordinates of the three vertices of a rectangle ABCD are given. By plotting the given points; find, in each case, the co-ordinates of the fourth vertex:
(i) A (2, 0), B (8, 0) and C (8, 4).
(ii) A (4, 2), B (-2, 2) and D (4, -2).
(iii) A (-4,-6), C (6, 0) and D (-4, 0).
(iv) B (10, 4), C (0, 4) and D (0, -2).
Solution:

(i) A (2, 0), B (8, 0) and C (8, 4)



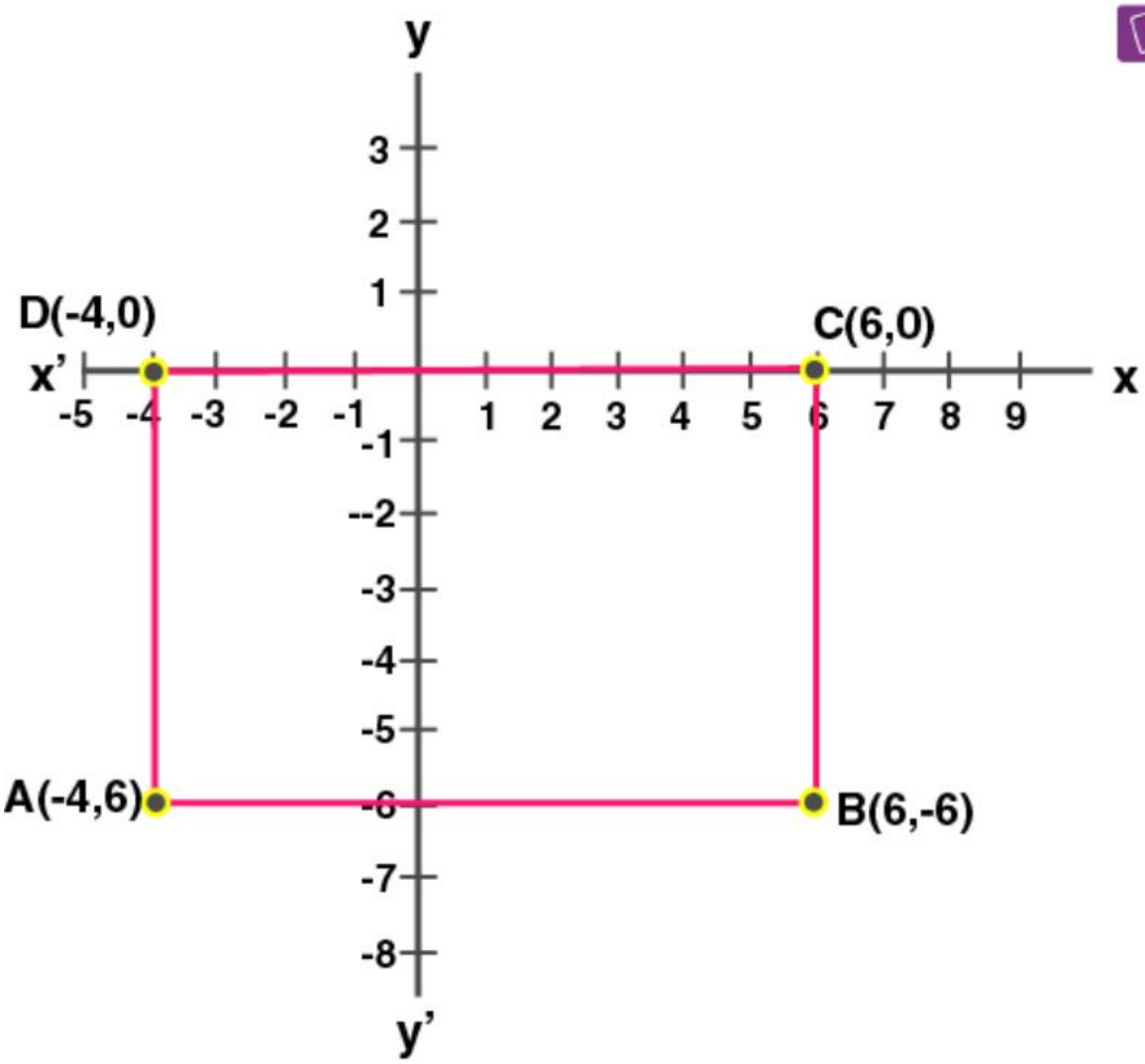
From the graph the co-ordinates of the fourth vertex is D (2, 4).

(ii) A (4, 2), B (-2, 2) and D (4, -2).



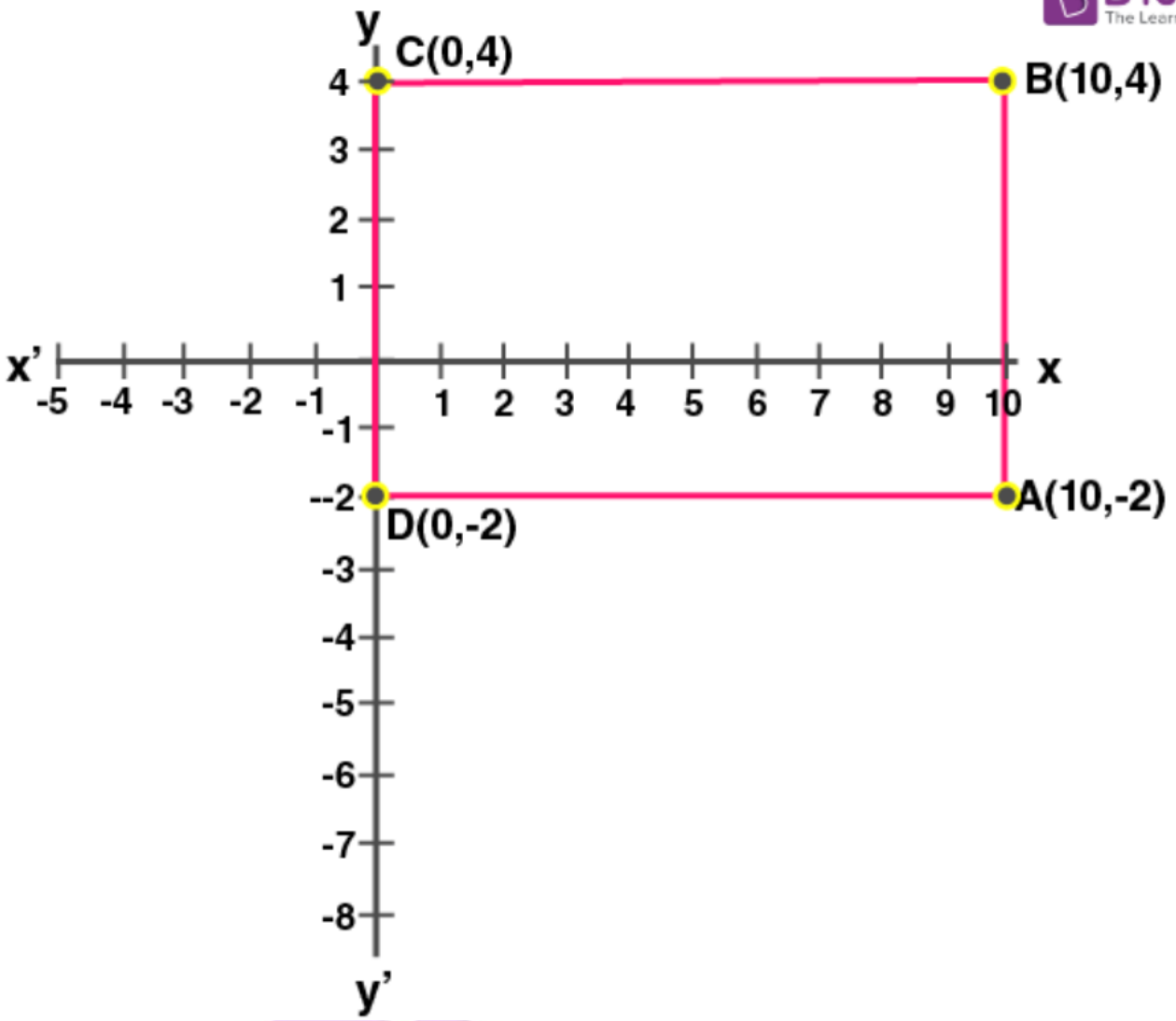
From the graph the co-ordinates of the fourth vertex is C (-2, 2).

(iii) A (-4,-6), C (6, 0) and D (-4, 0).



From the graph the co-ordinates of the fourth vertex is B (6, -6).

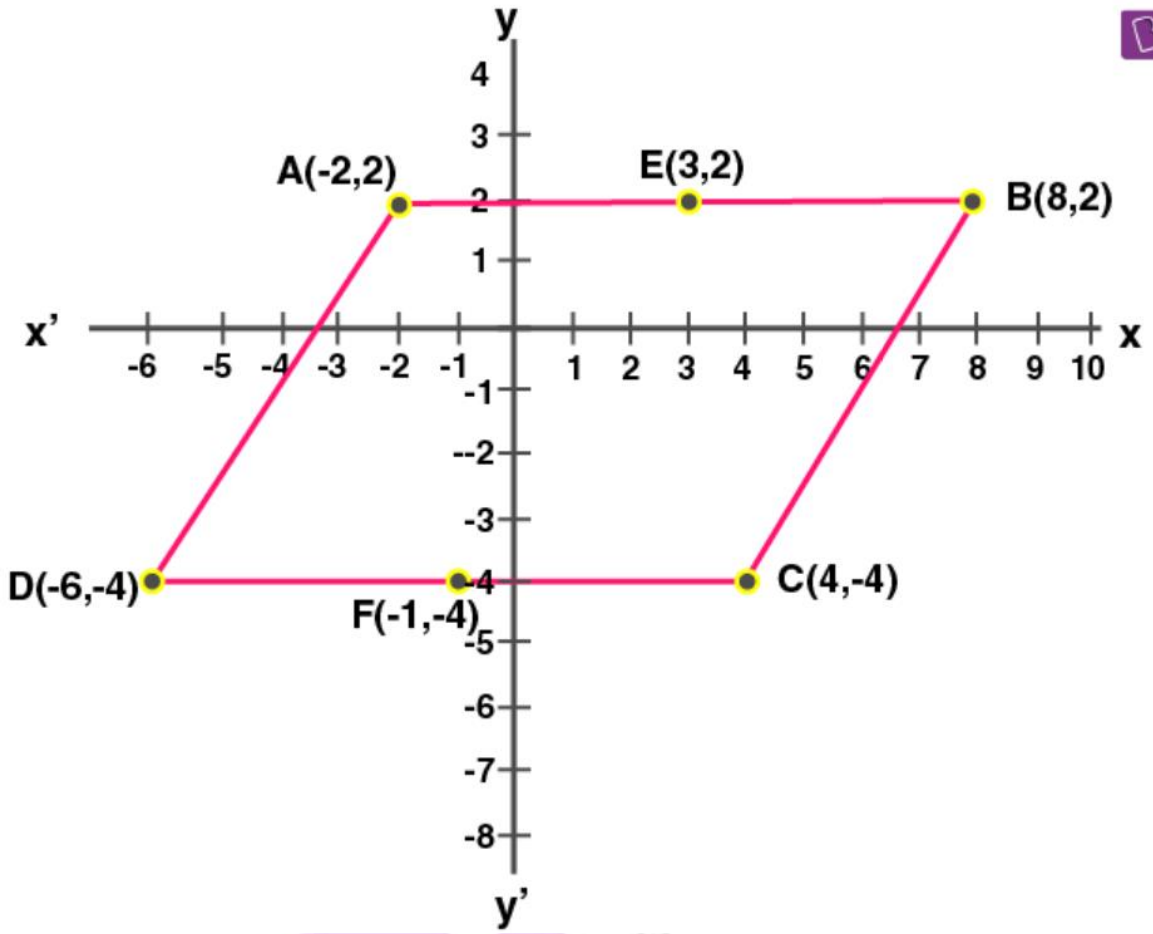
(iv) B (10, 4), C (0, 4) and D (0, -2)



From the graph the co-ordinates of the fourth vertex is A (10, -2).

8. A (-2, 2), B (8, 2) and C (4, -4) are the vertices of a parallelogram ABCD. By plotting the given points on a graph paper; find the co-ordinates of the fourth vertex D.
Also, form the same graph, state the co-ordinates of the mid-points of the sides AB and CD.
Solution:

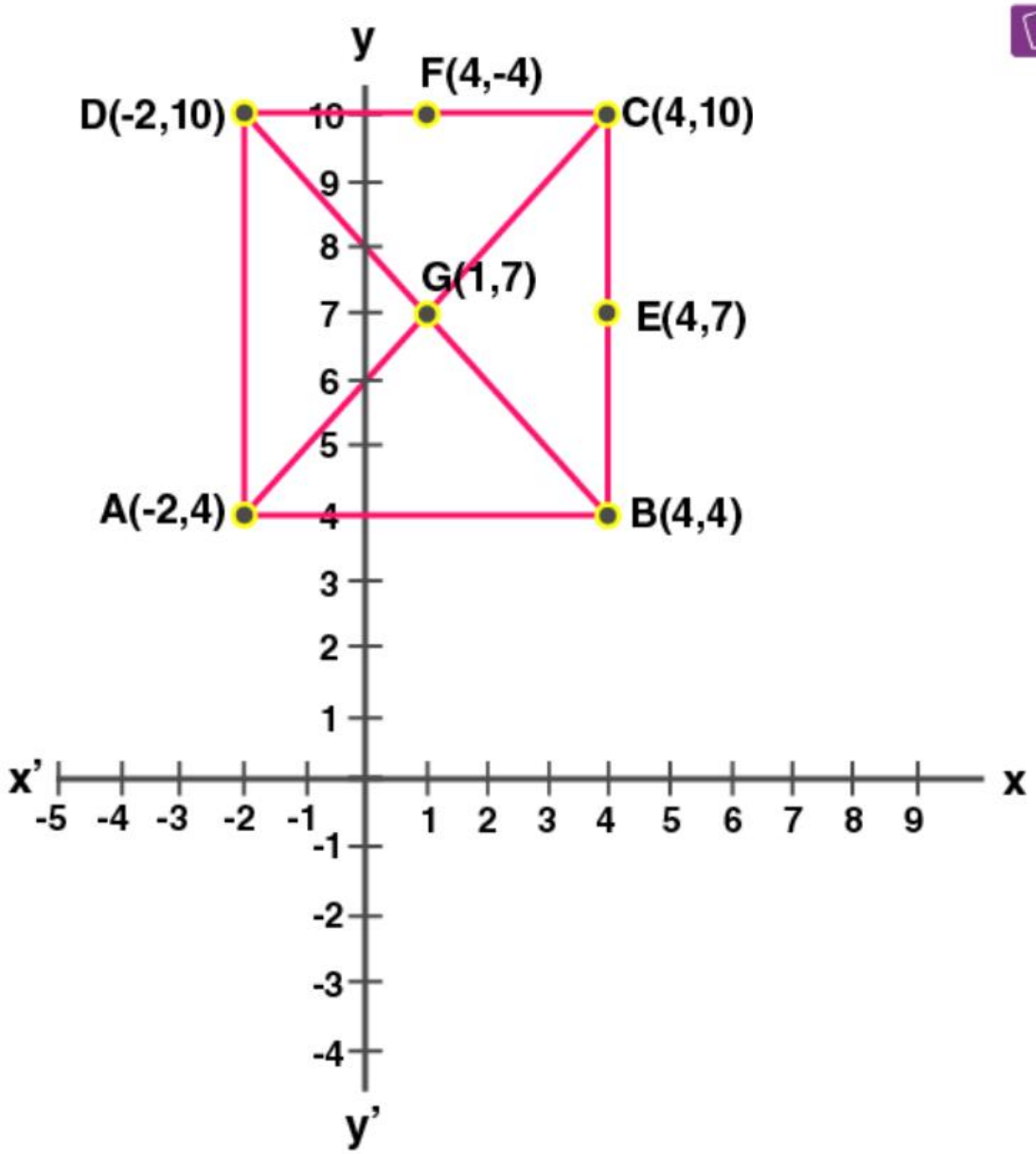
It is given that
A (2, -2), B (8, 2) and C (4, -4) are the vertices of the parallelogram ABCD



By joining A, B, C and D we get the parallelogram ABCD.
From the graph, we get D (-6, 4)
Using the graph,
The co-ordinates of the mid-point of AB is E (3, 2)
The co-ordinates of the mid-point of CD is F (-1, -4)

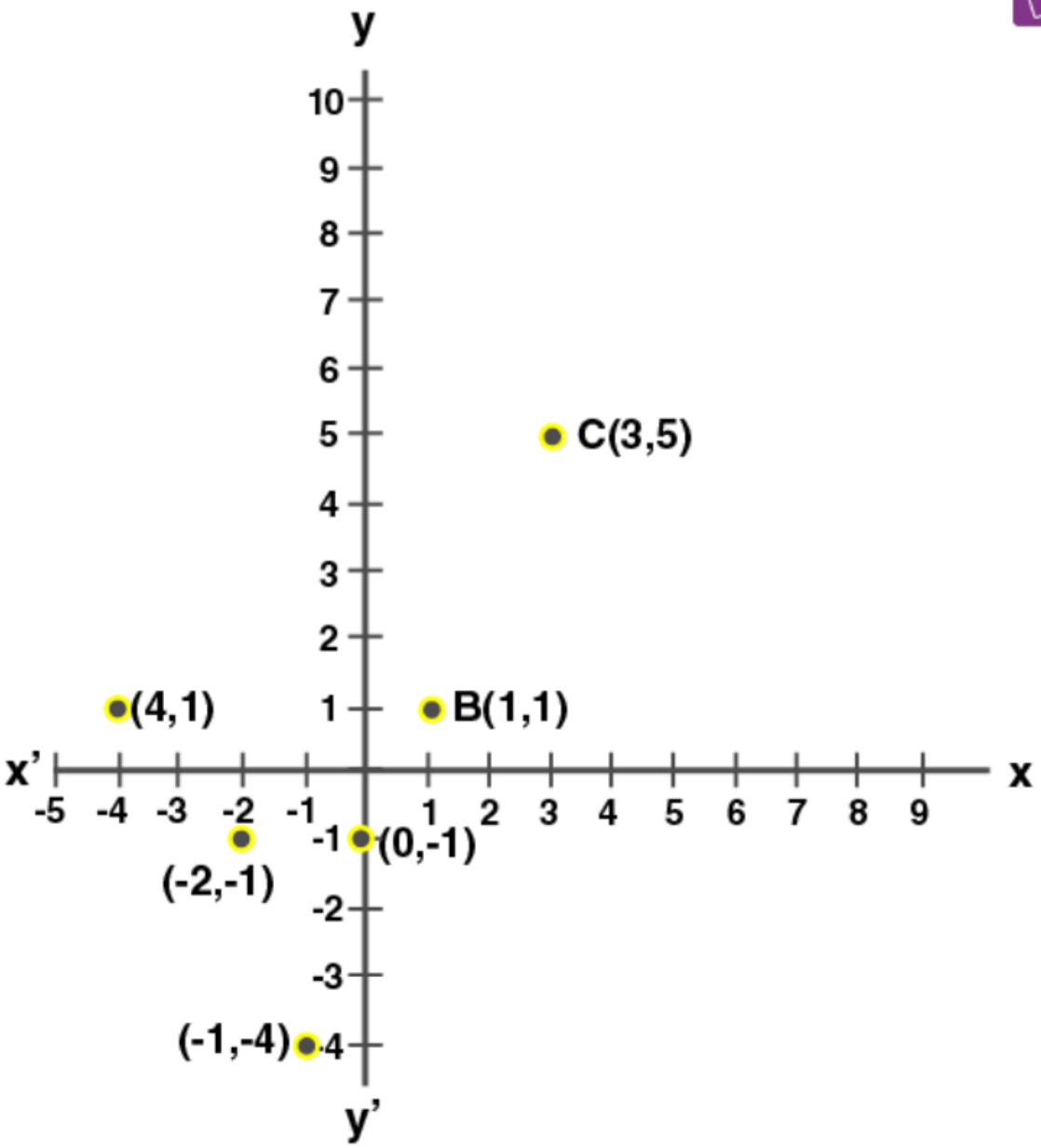
9. A (-2, 4), C (4, 10) and D (-2, 10) are the vertices of a square ABCD. Use the graphical method to find the co-ordinates of the fourth vertex B. Also, find:
(i) The co-ordinates of the mid-point of BC;
(ii) The co-ordinates of the mid-point of CD and
(iii) The co-ordinates of the point of intersection of the diagonals of the square ABCD.
Solution:

It is given that
A (-2, 4), C (4, 10) and D (-2, 10) are the vertices of a square ABCD.



From the graph, we get B (4, 4)
Using the graph,
The co-ordinates of the mid-point of BC is E (4, 7)
The co-ordinates of the mid-point of CD is F (1, 10)
The co-ordinates of the diagonals of the square is G (1, 7)

10. By plotting the following points on the same graph paper. Check whether they are collinear or not:
(i) (3, 5), (1, 1) and (0, -1)
(ii) (-2, -1), (-1, -4) and (-4, 1)
Solution:



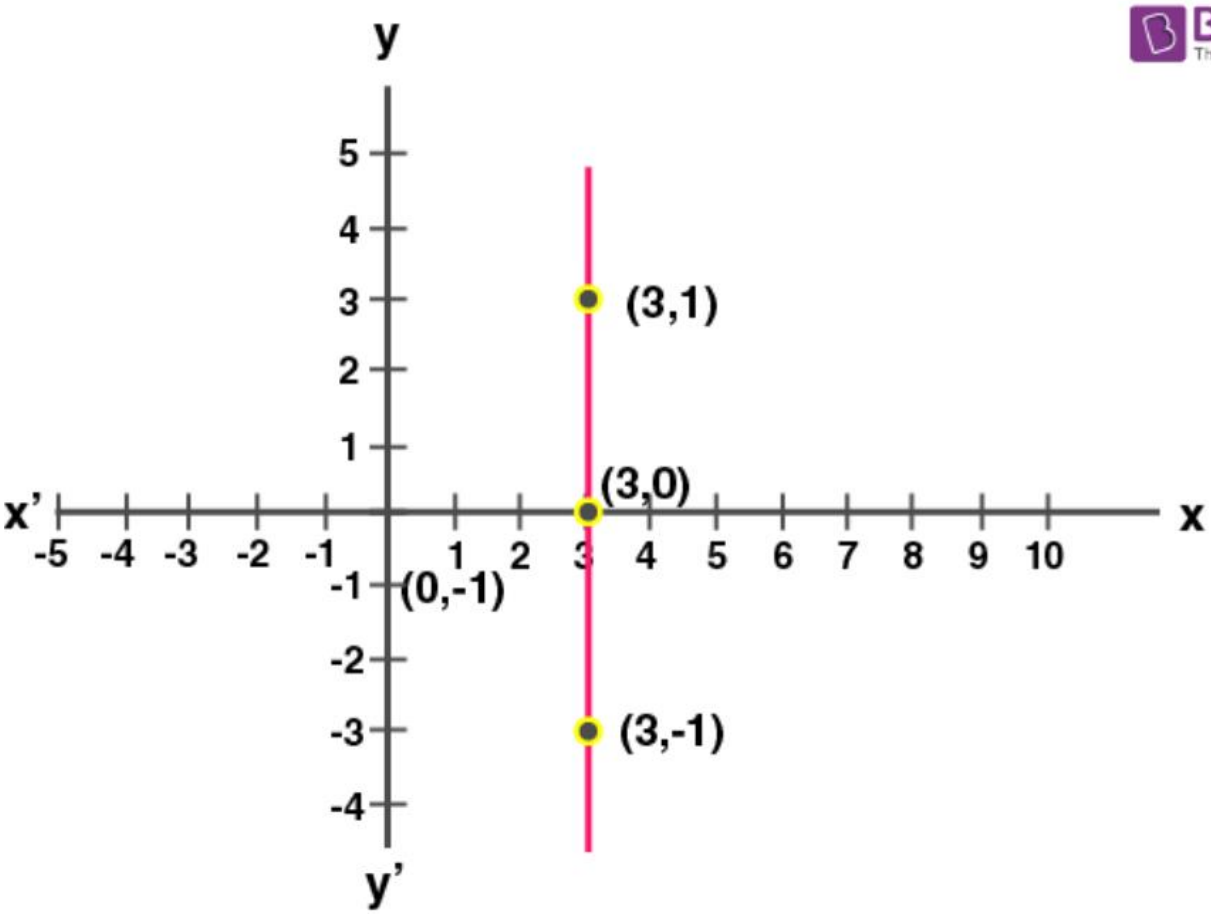
After plotting the points, we clearly see from the graph that
(i) A (3, 5), B (1, 1) and C (0, -1) are collinear
(ii) P (-2, -1), Q (-1, -4) and R (-4, 1) are non-collinear.

EXERCISE 26B

1. Draw the graph for each linear equation given below:
(i) x = 3
(ii) x + 3 = 0
(iii) x – 5 = 0
(iv) 2x – 7 = 0
(v) y = 4
(vi) y + 6 = 0
(vii) y – 2 = 0
(viii) 3y + 5 = 0
(ix) 2y – 5 = 0
(x) y = 0
(xi) x = 0
Solution:

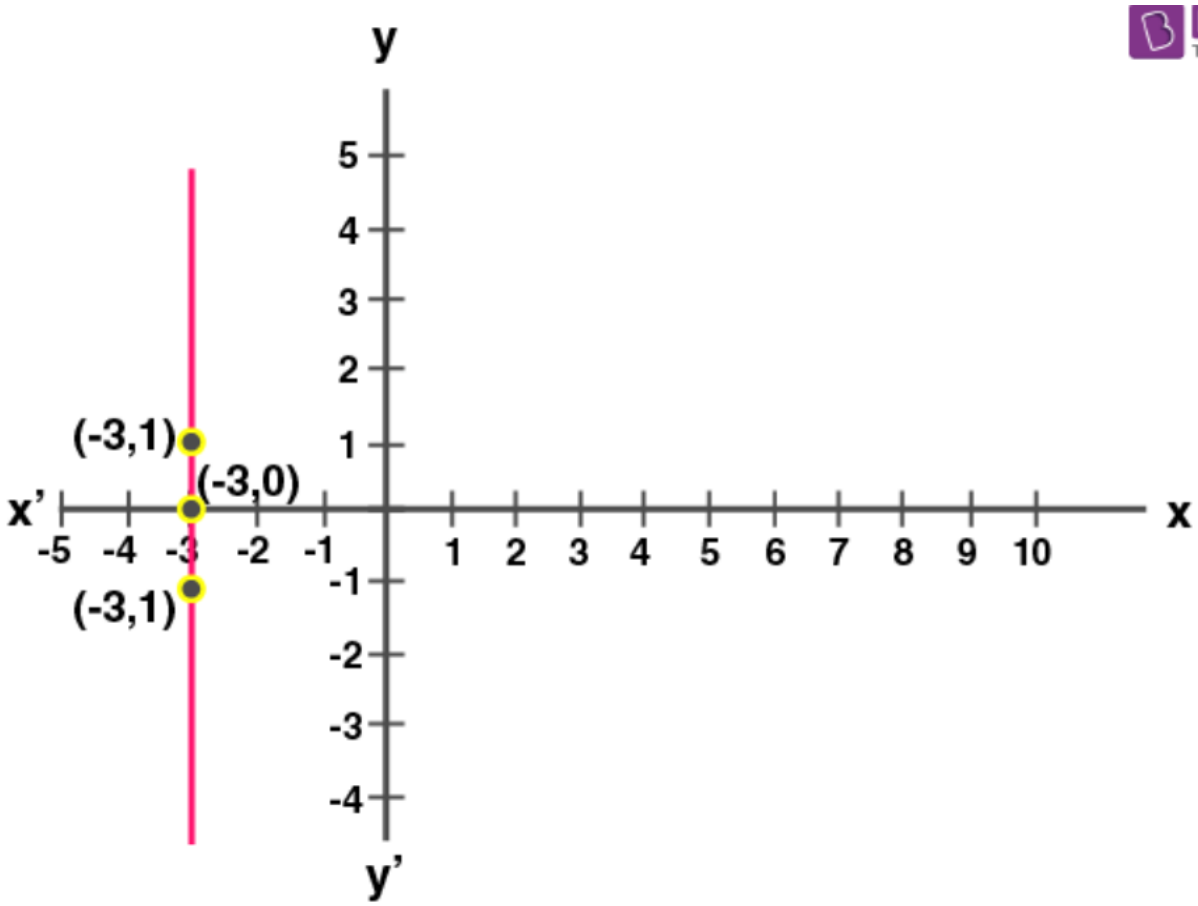
(i)

x	3	3	3
y	-1	0	1



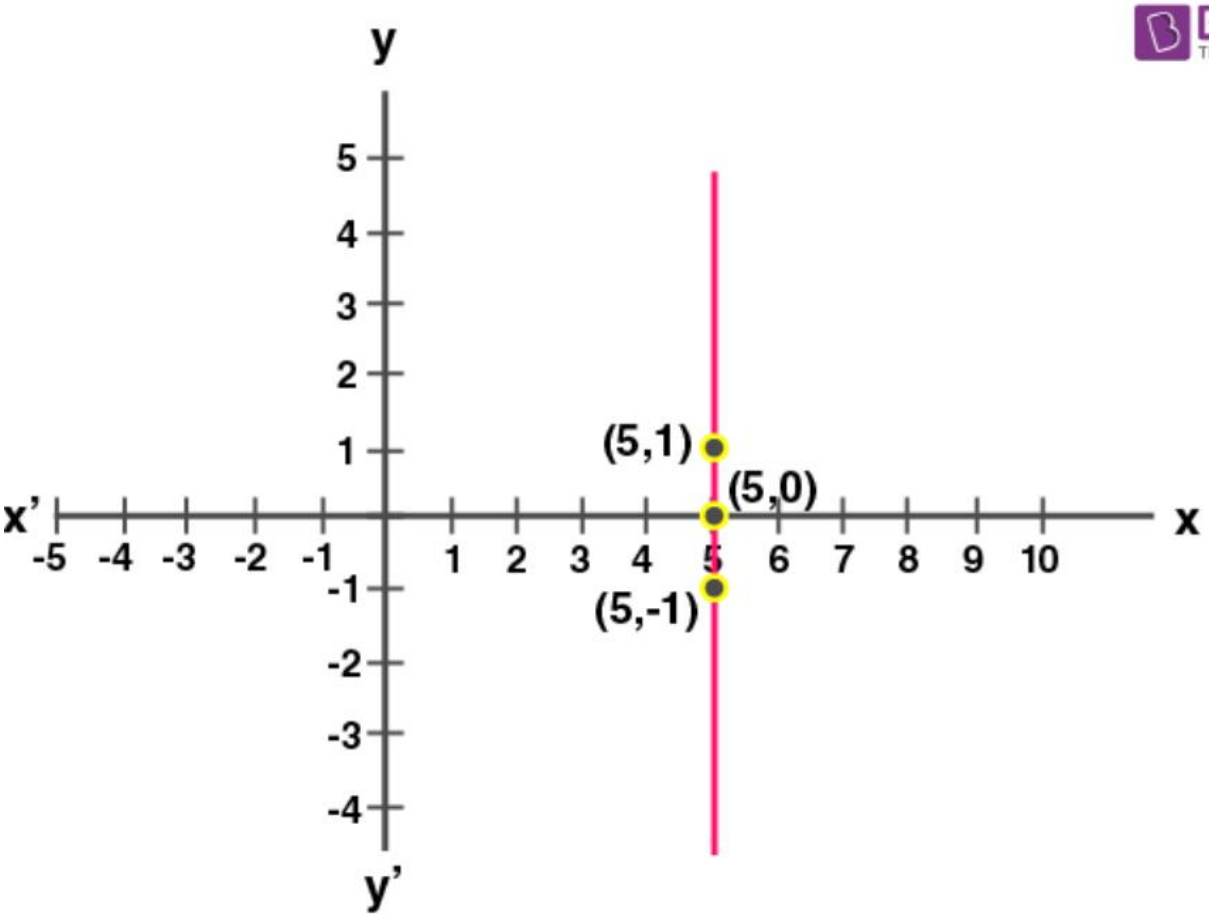
(ii)

x	-3	-3	-3
y	-1	0	1



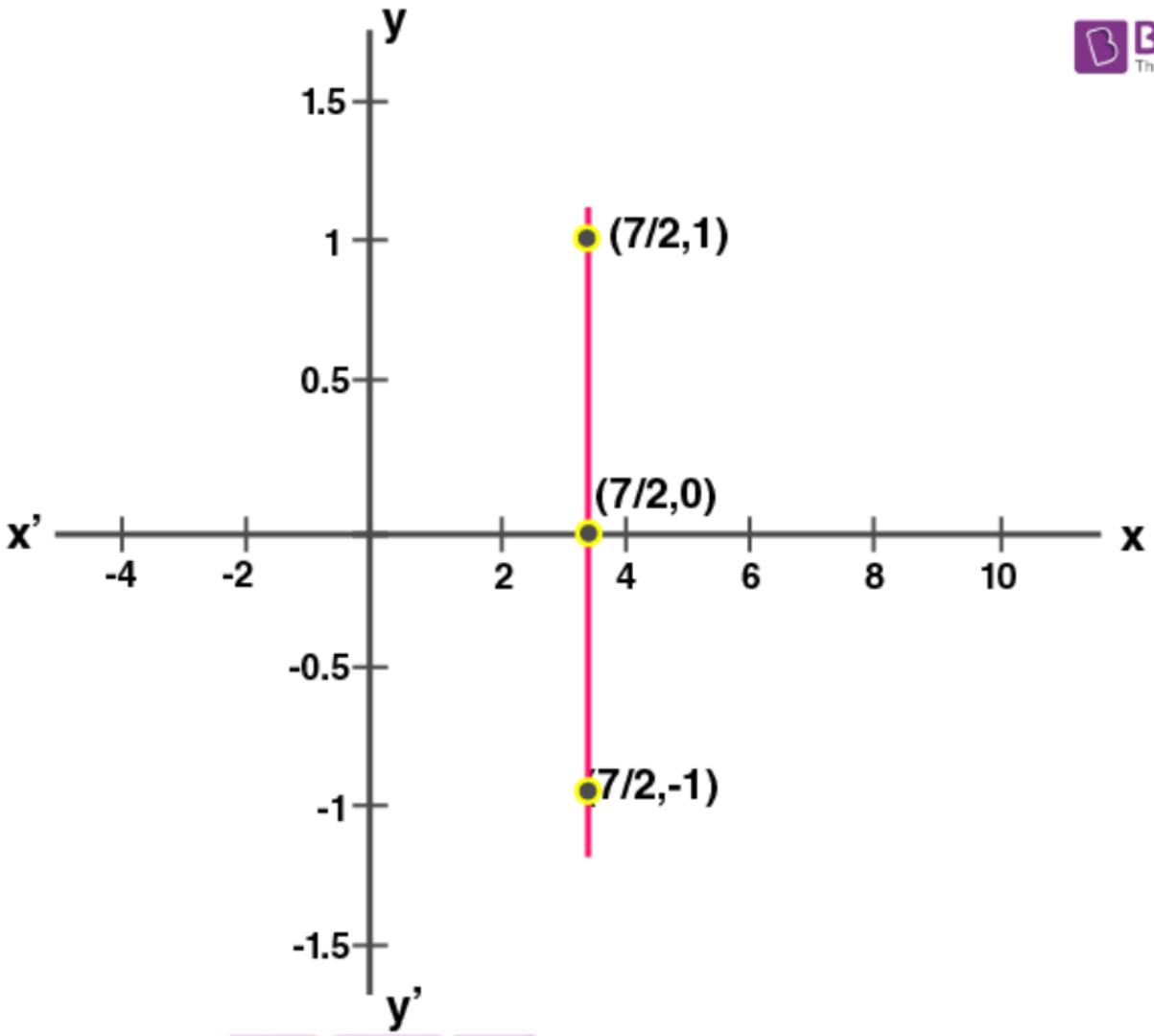
(iii)

x	5	5	5
y	-1	0	1



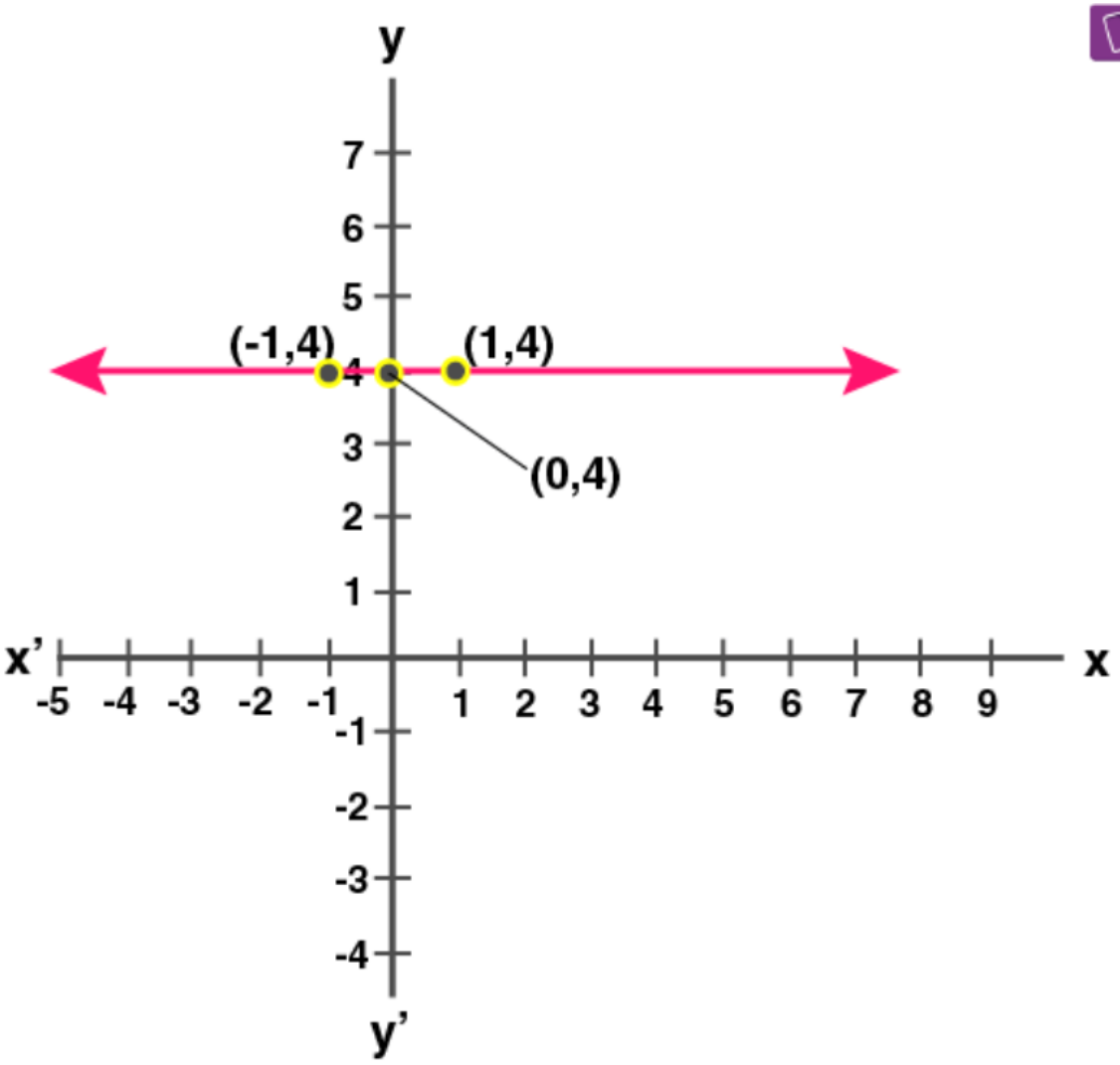
(iv)

x	7/2	7/2	7/2
y	-1	0	1



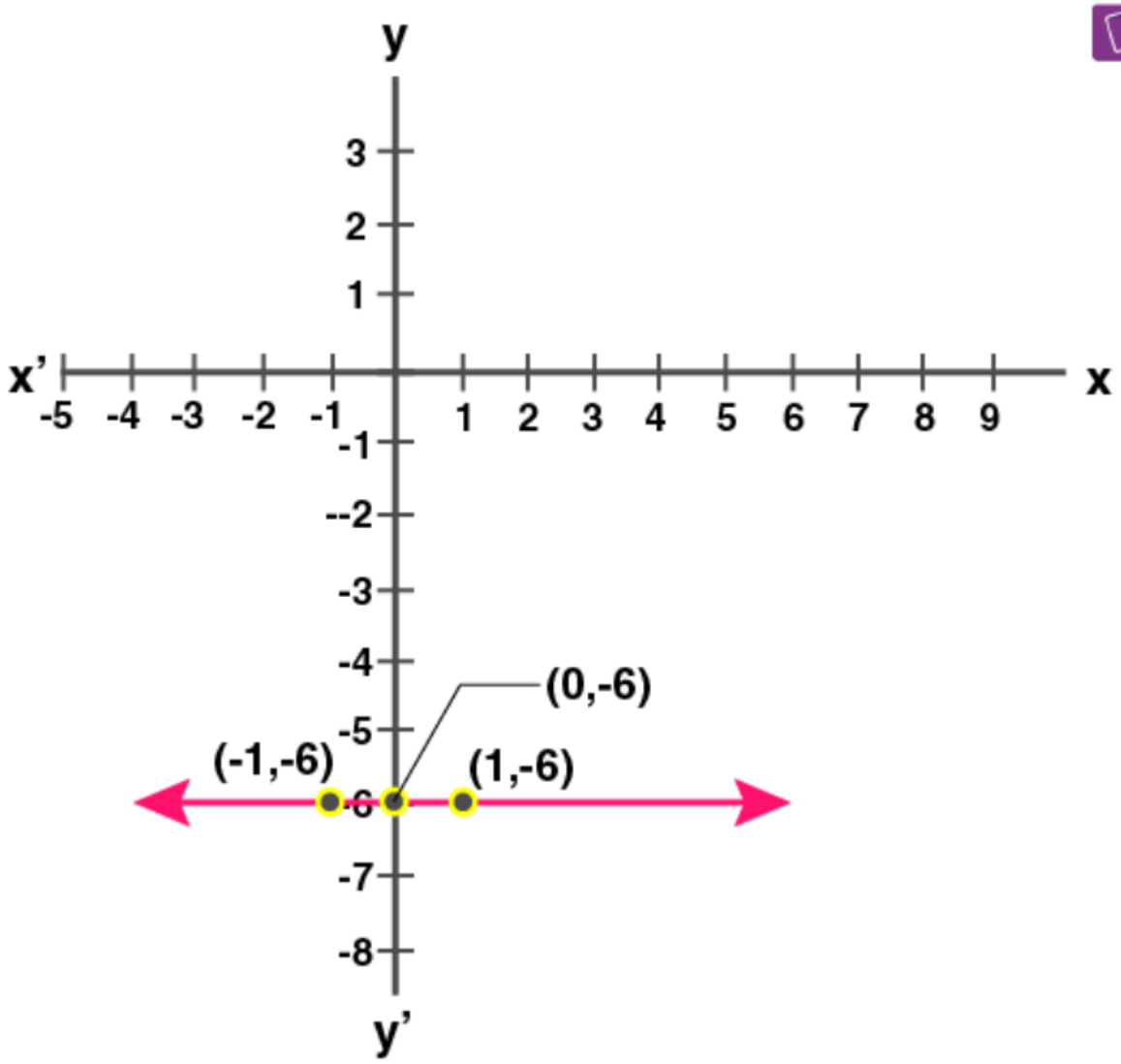
(v)

x	-1	0	-1
y	4	4	4



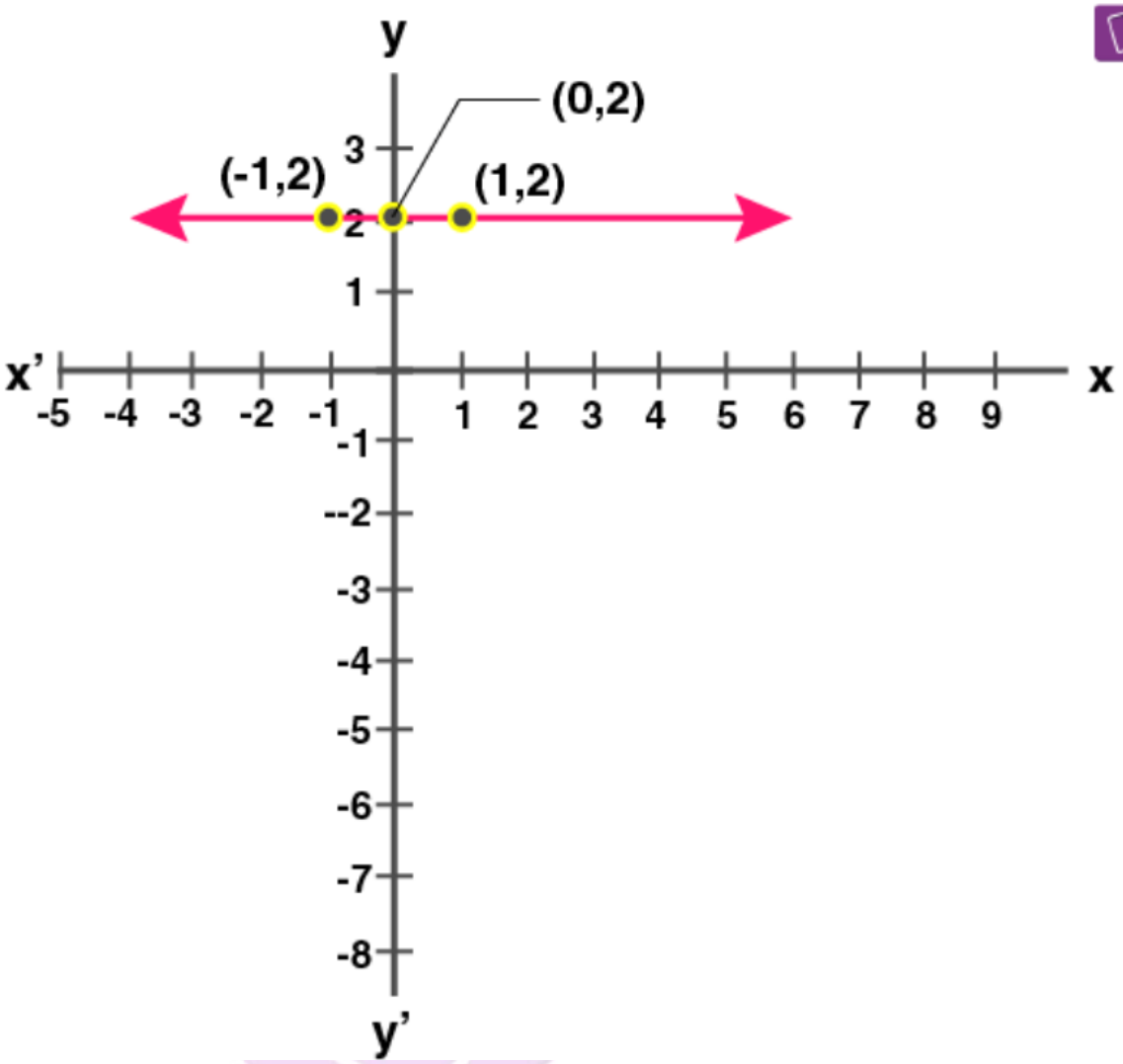
(vi)

x	-1	0	1
y	-6	-6	-6



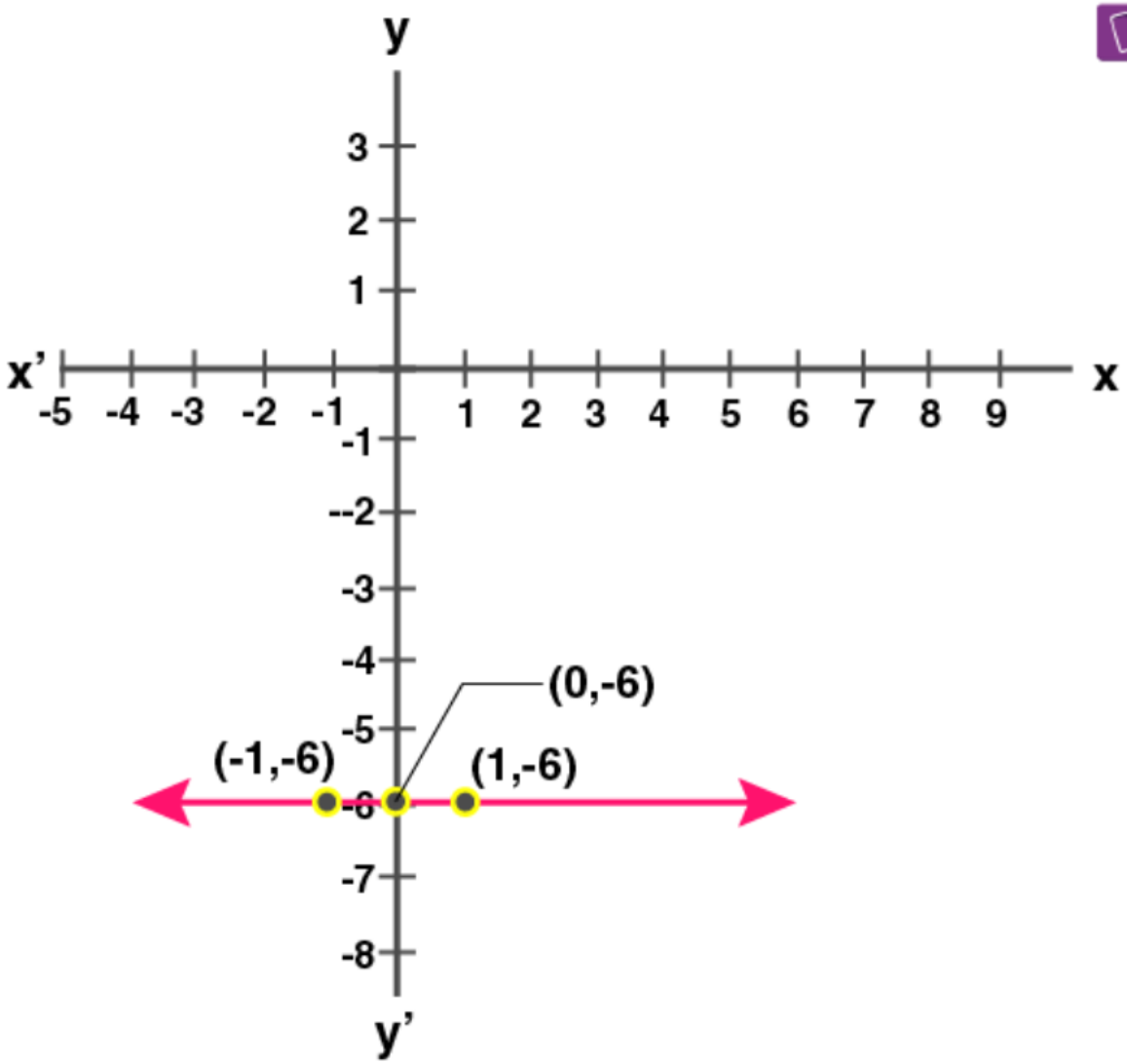
(vii)

x	-1	0	1
y	2	2	2



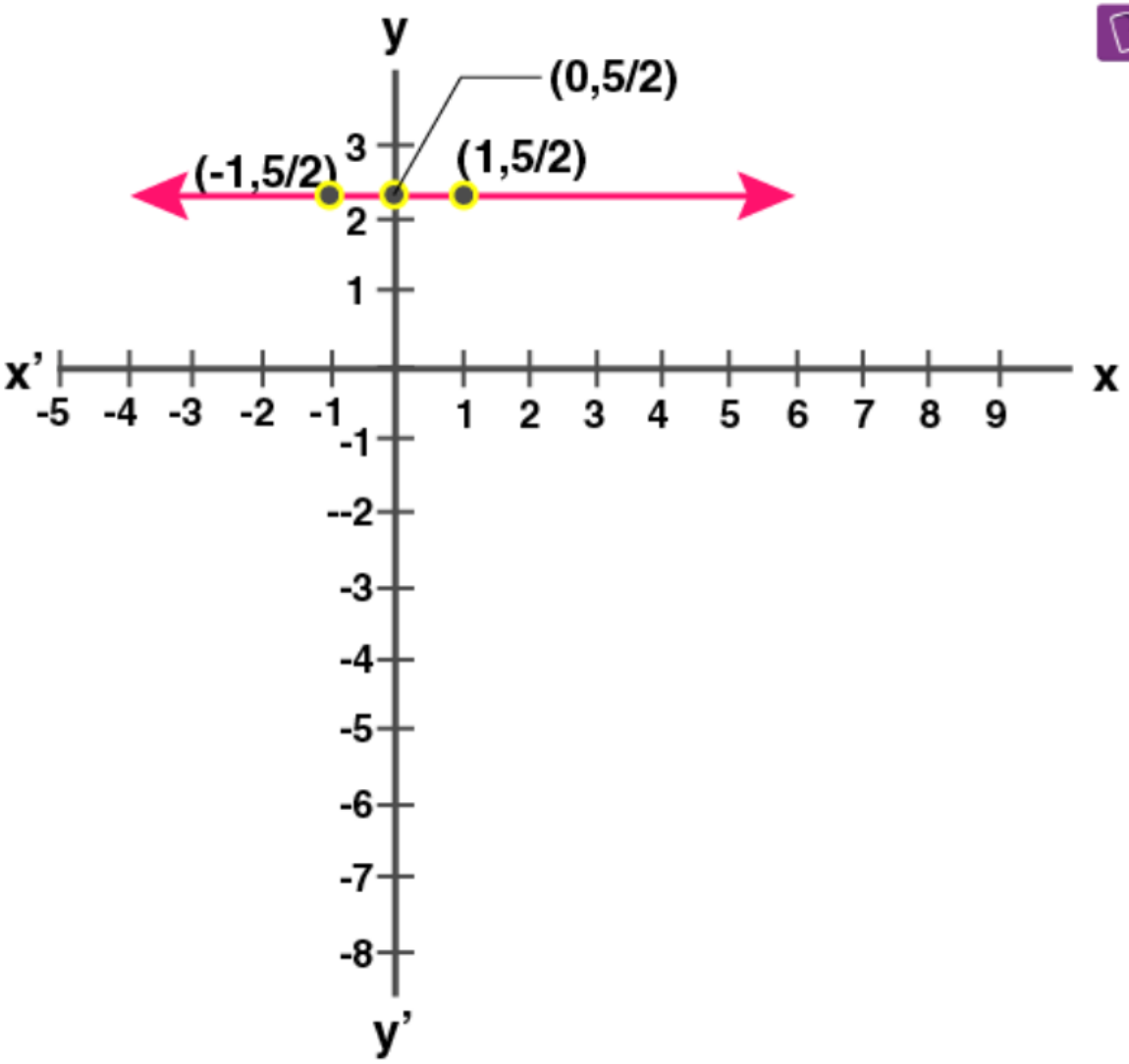
(viii)

x	-1	0	1
y	-6	-6	-6



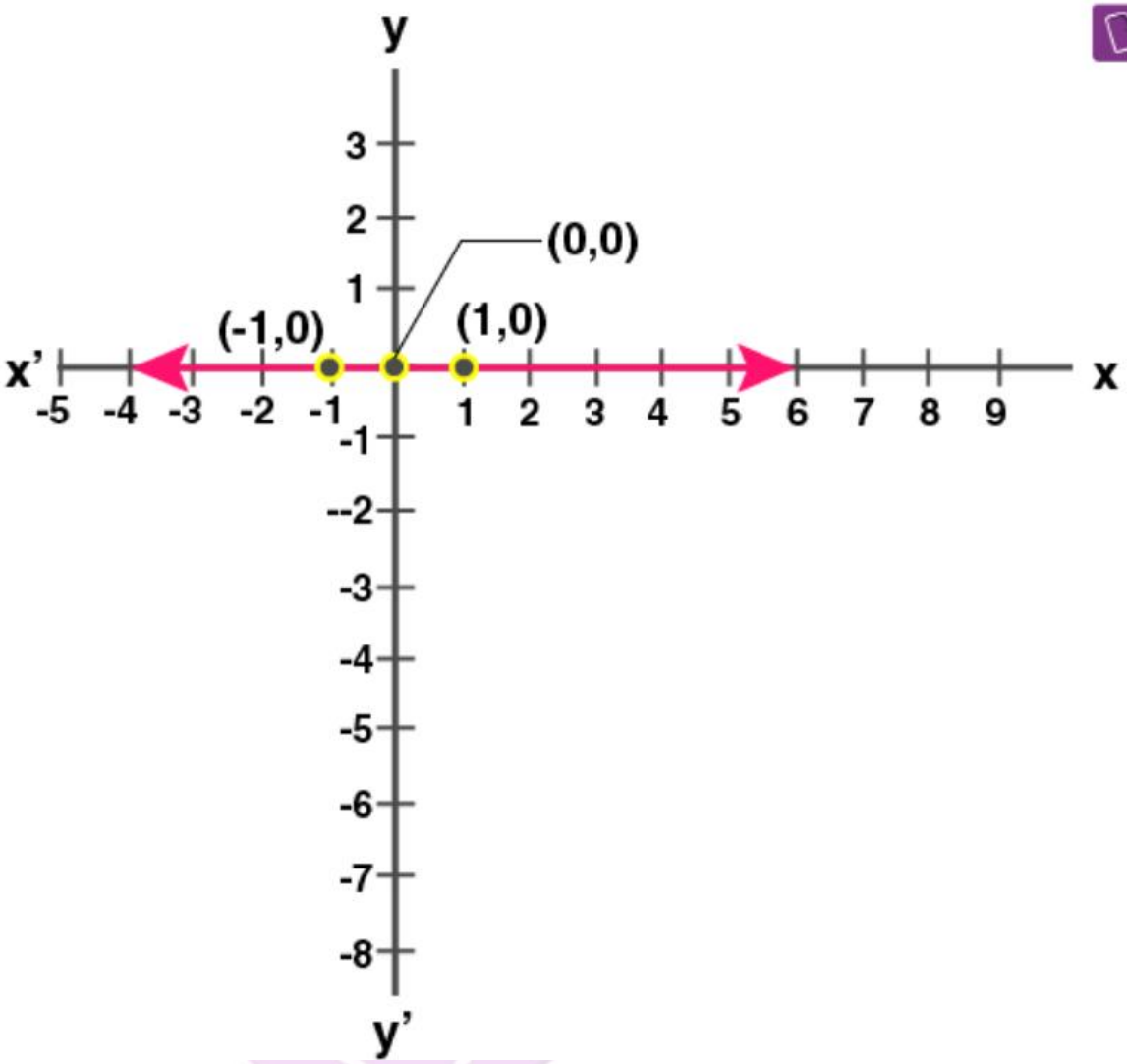
(ix)

x	-1	0	1
y	5/2	5/2	5/2



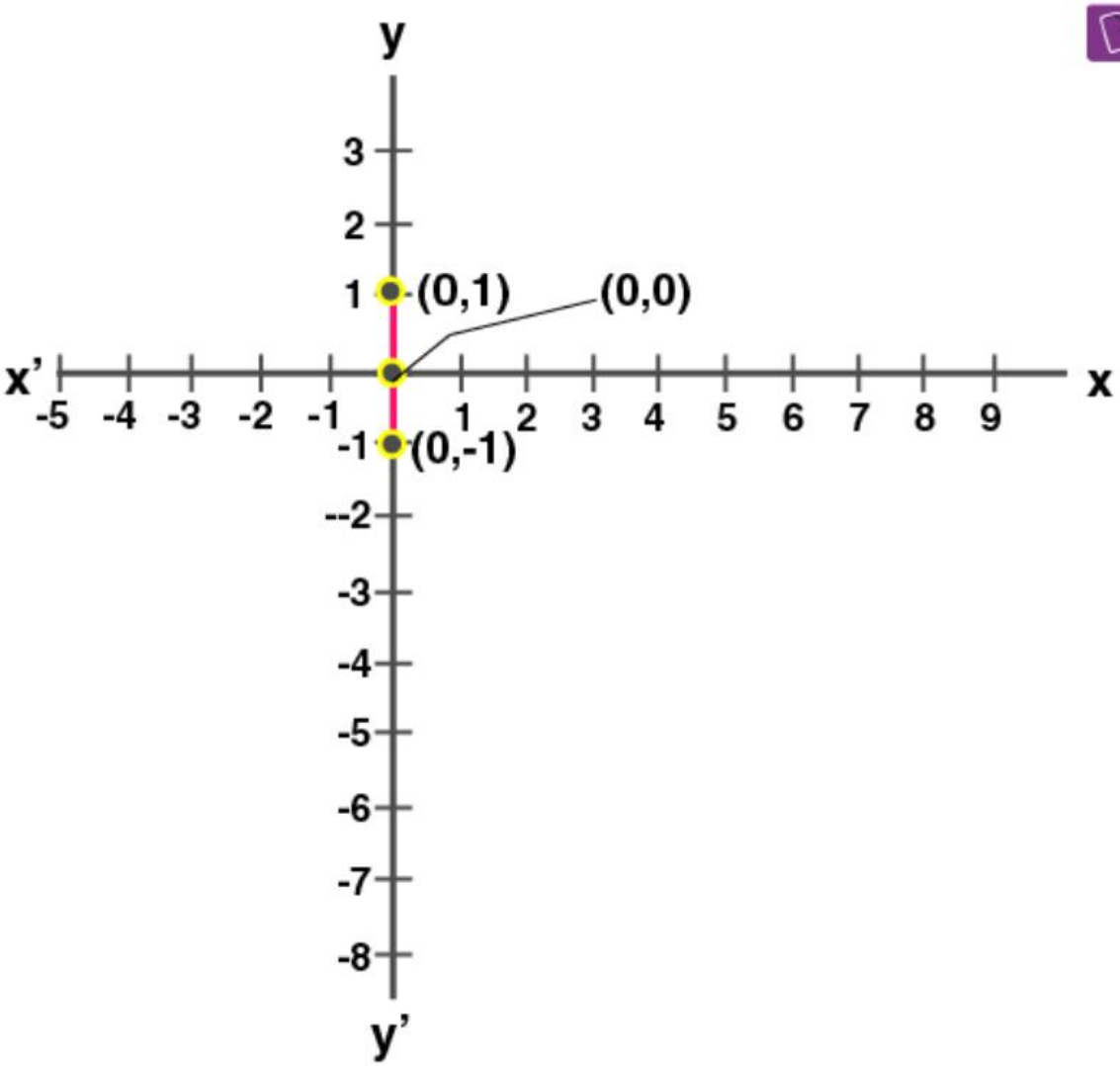
(x)

x	-1	0	1
y	0	0	0



(xi)

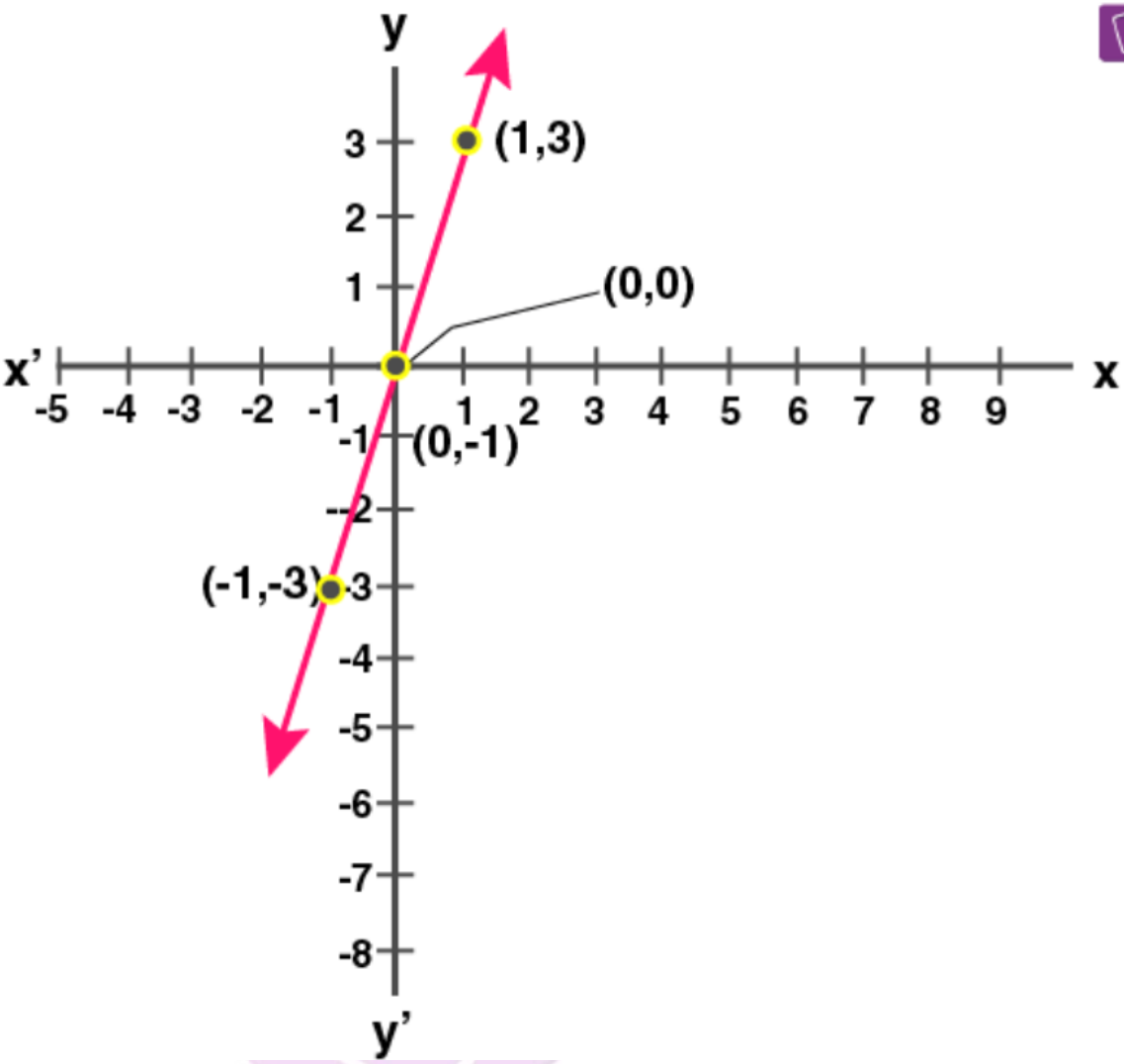
x	0	0	0
y	-1	0	1



2. Draw the graph for each linear equation given below:
(i) y = 3x
(ii) y = - x
(iii) y = - 2x
(iv) y = x
(v) 5x + y = 0
(vi) x + 2y = 0
(vii) 4x – y = 0
(viii) 3x + 2y = 0
(ix) x = -2y
Solution:

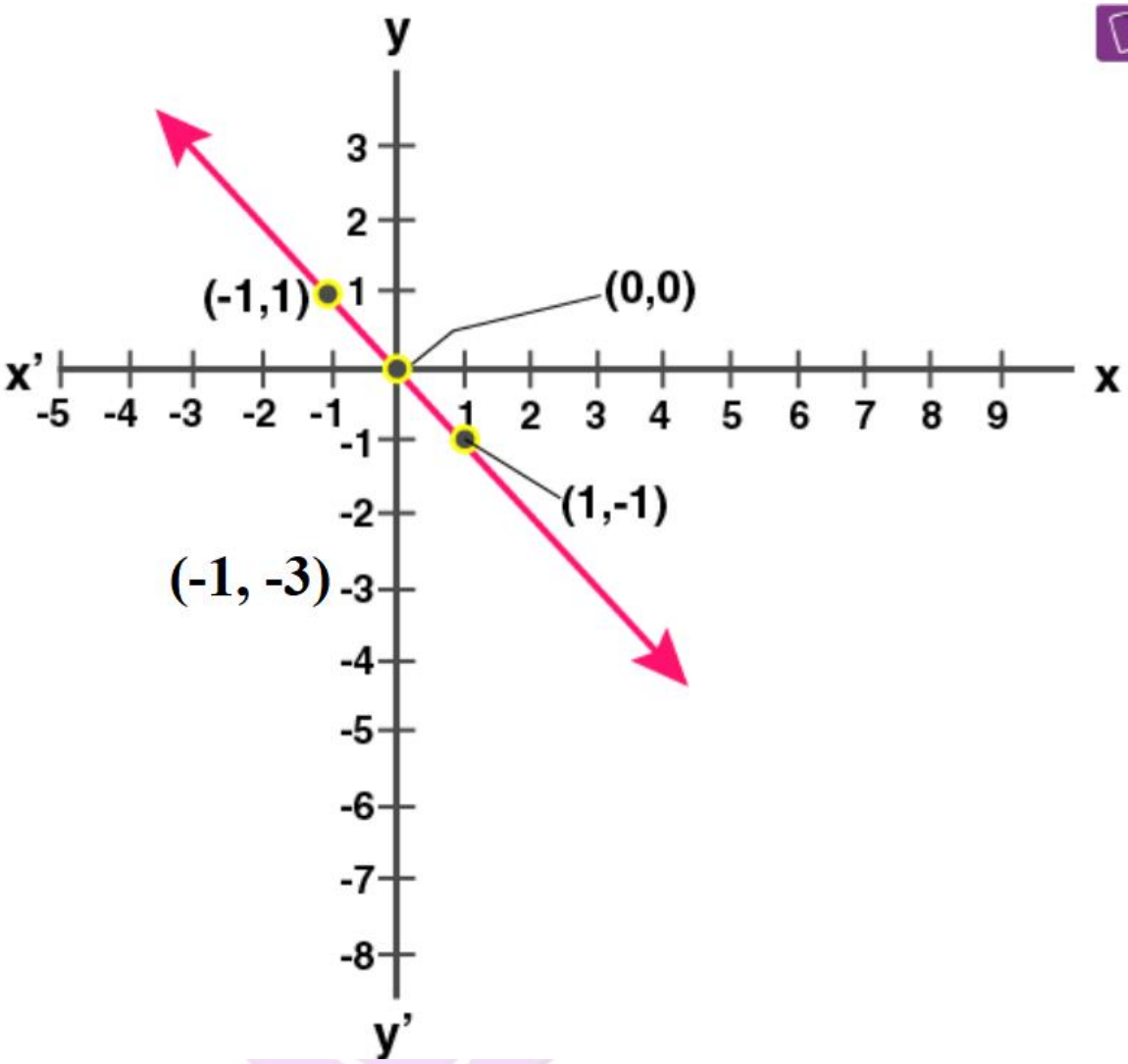
(i)

x	-1	0	1
y	-3	0	3



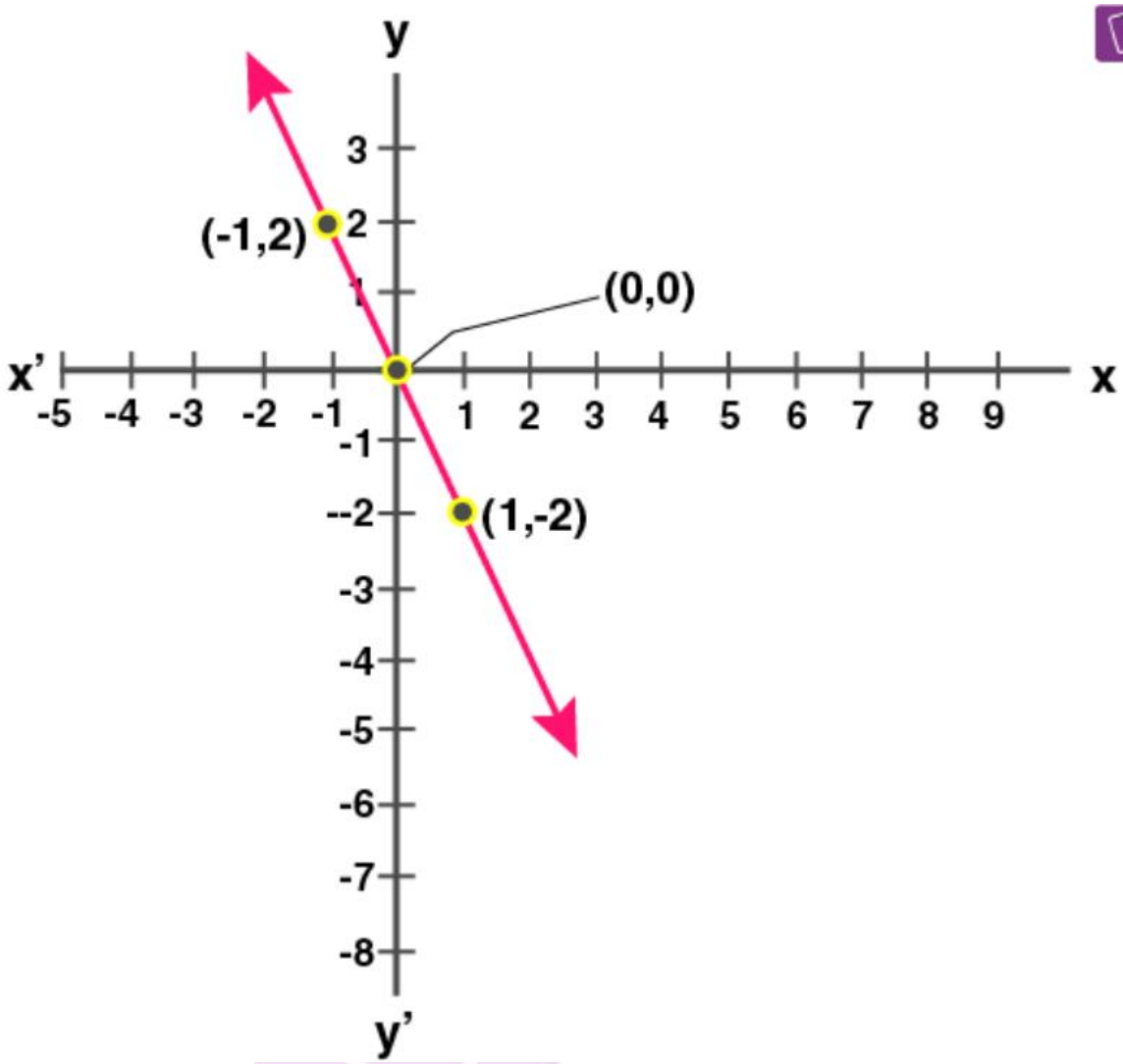
(ii)

x	-1	0	1
y	1	0	-1



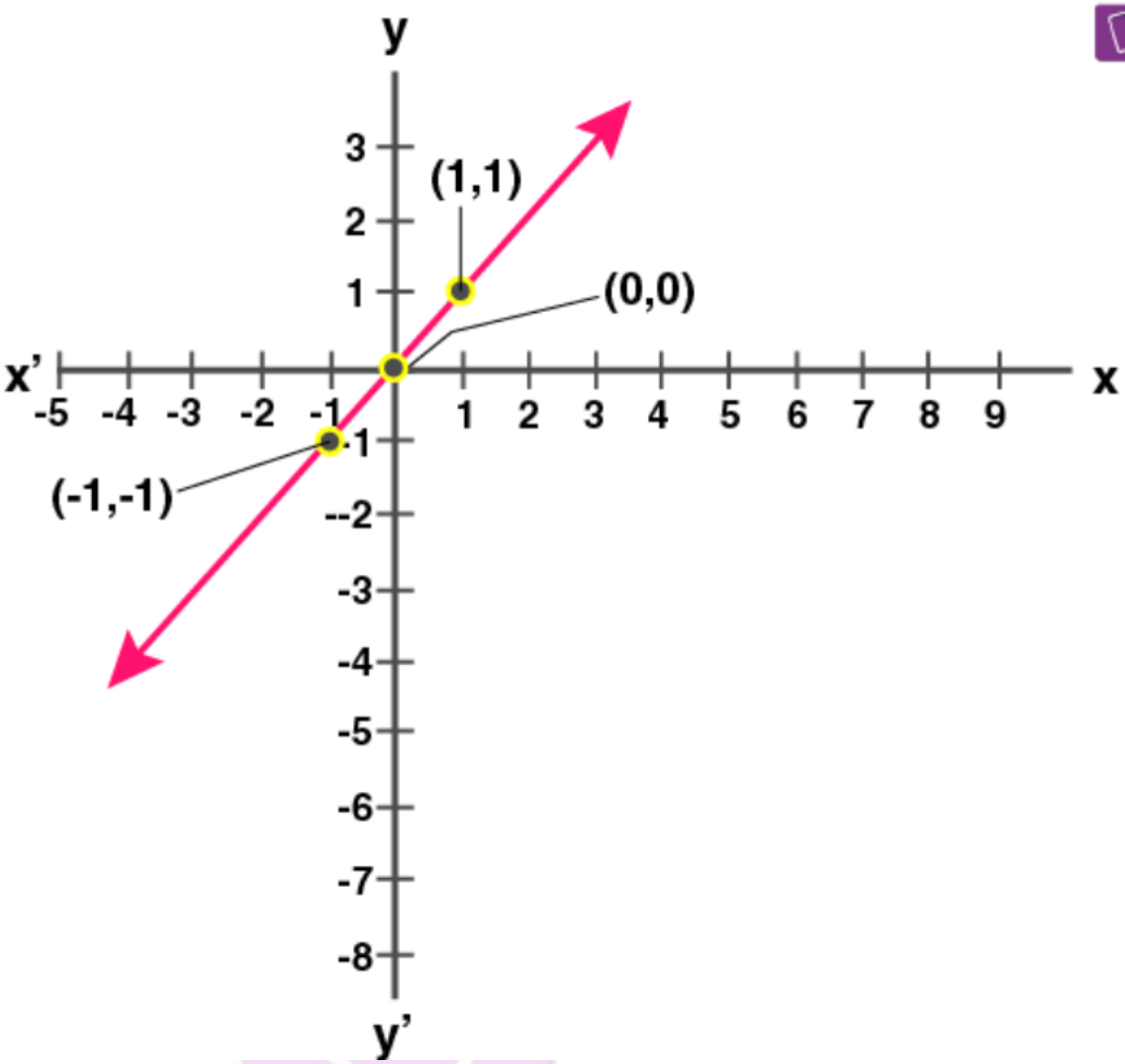
(iii)

x	-1	0	1
y	2	0	-2



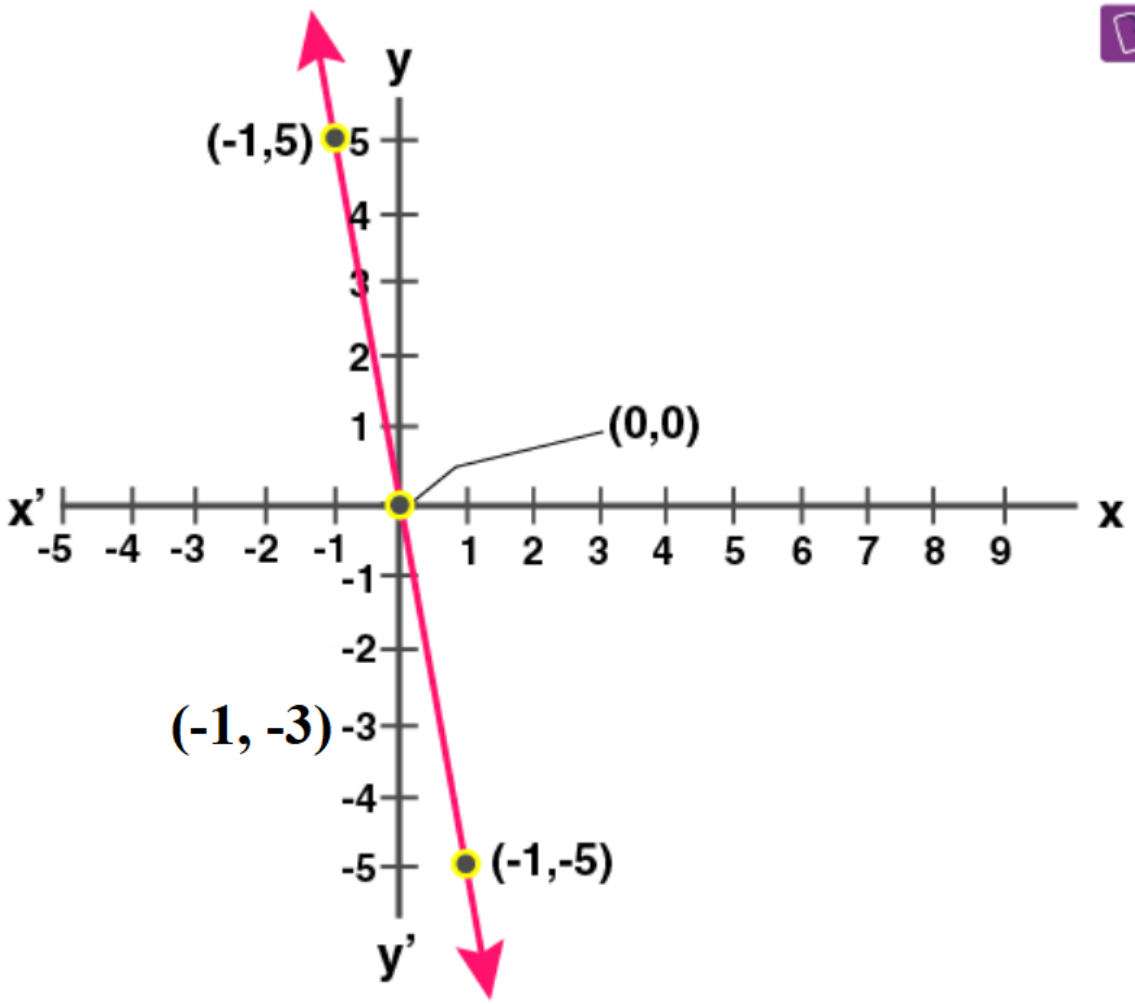
(iv)

x	-1	0	1
y	-1	0	1



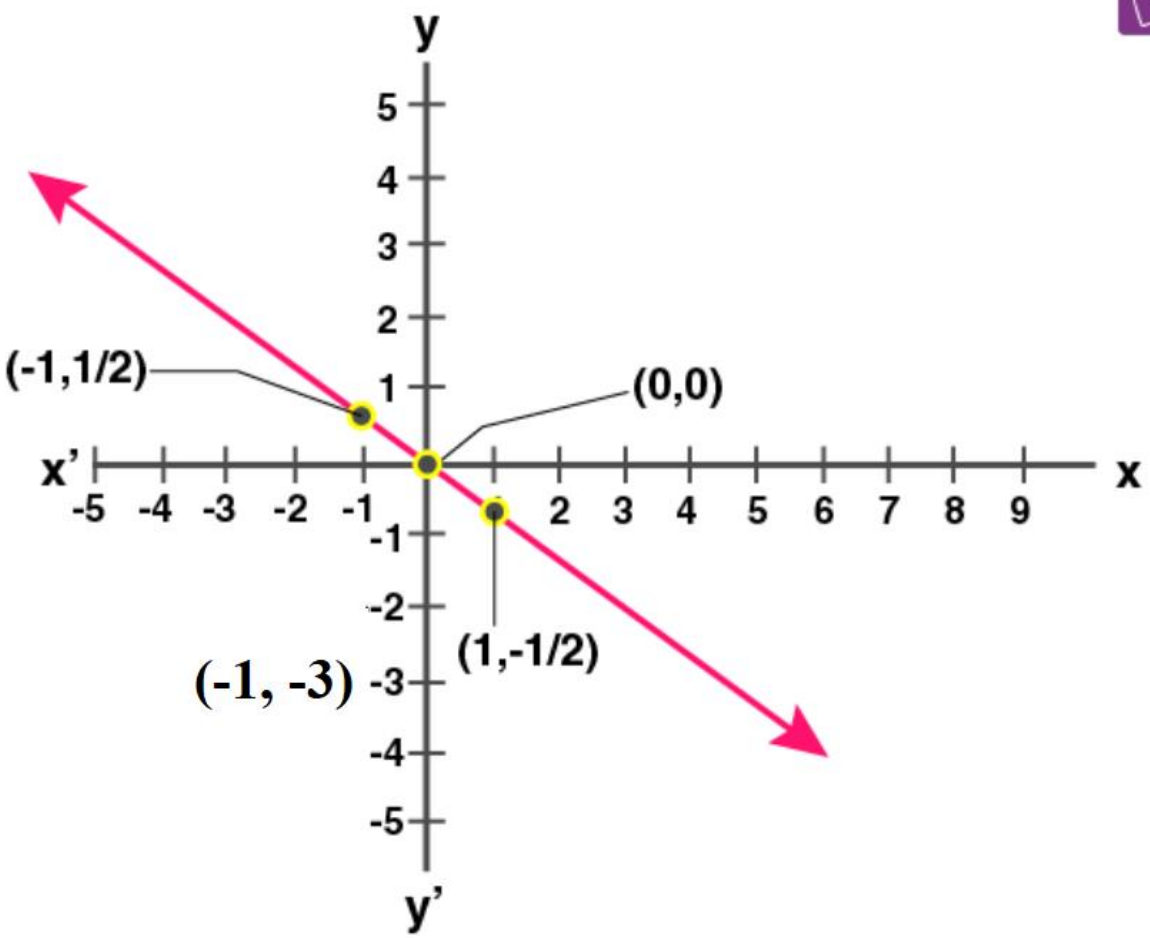
(v)

x	-1	0	1
y	5	0	-5



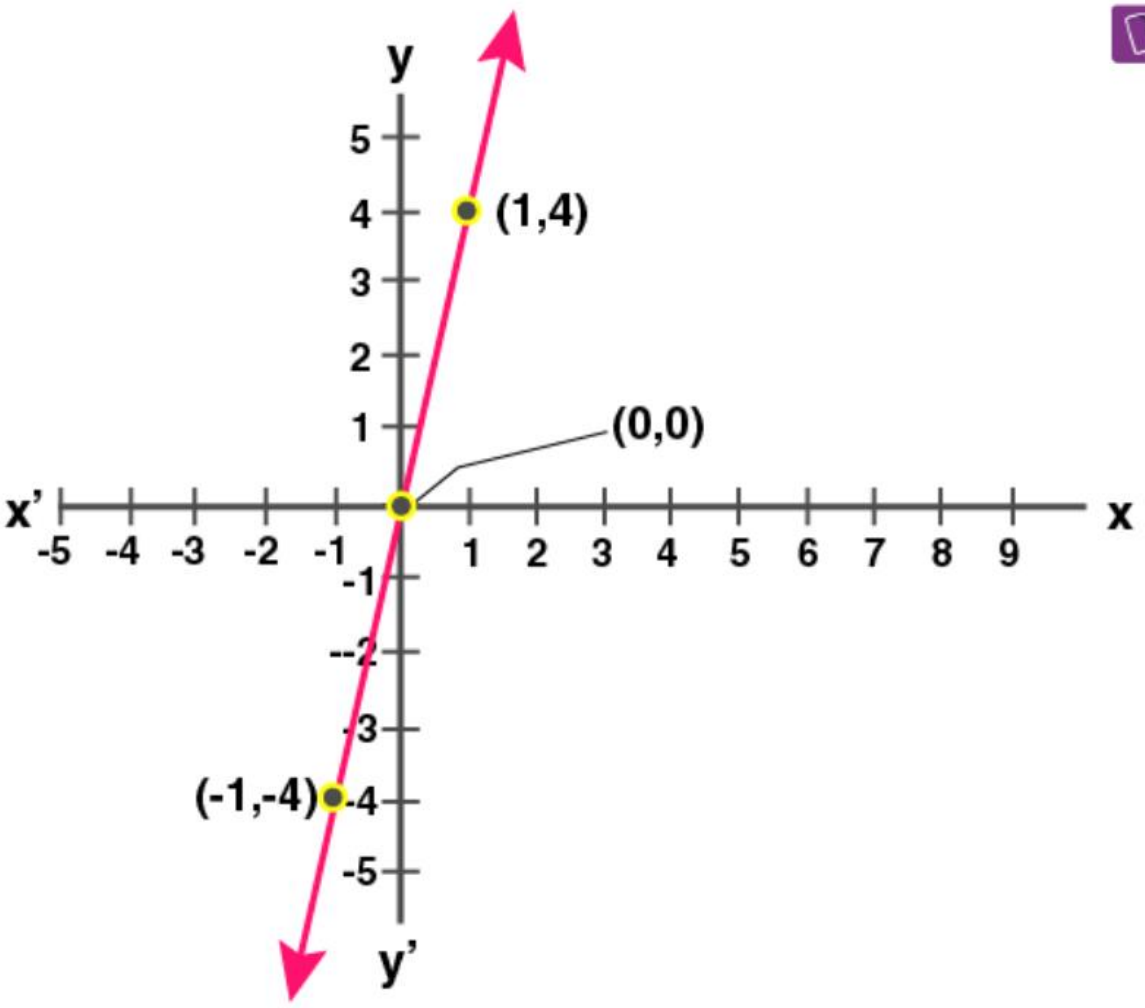
(vi)

x	-1	0	1
y	1/2	0	- ½



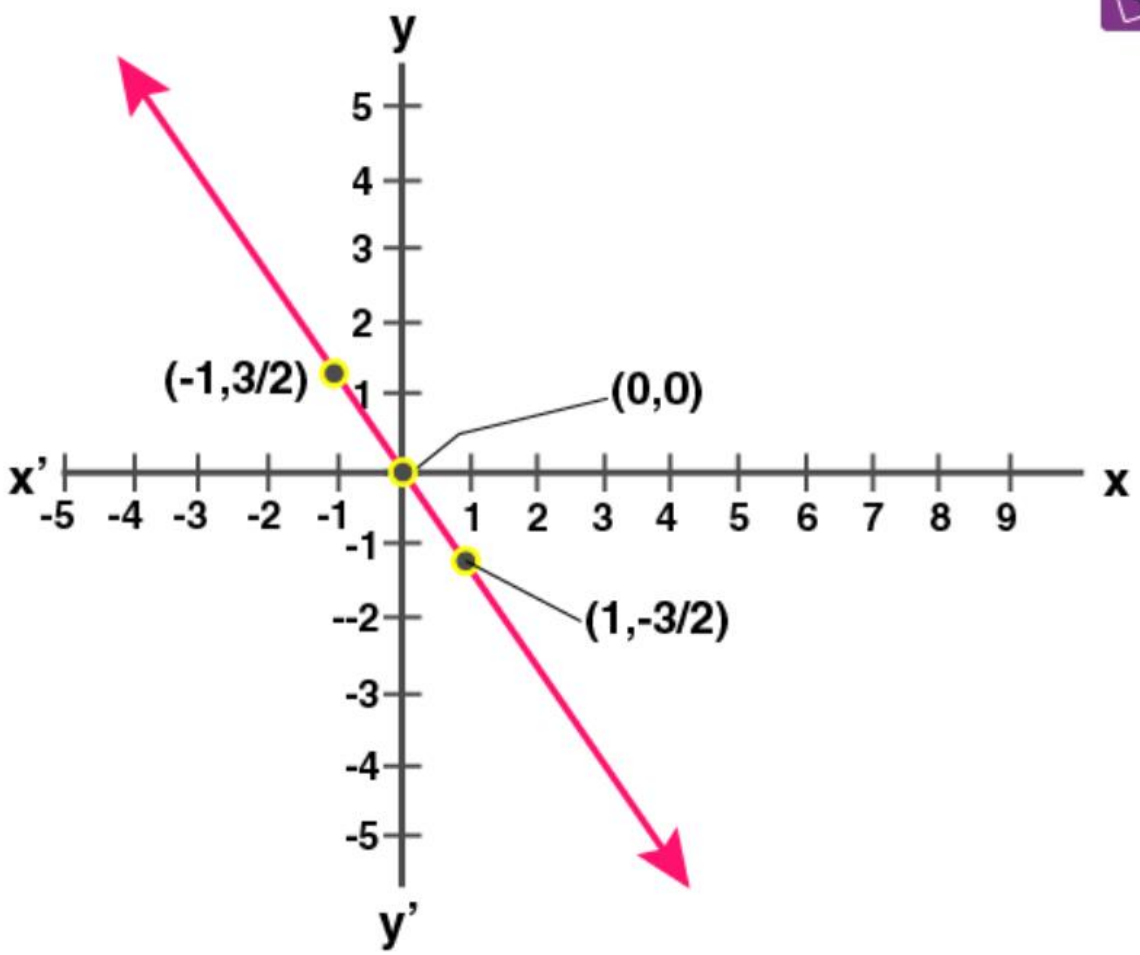
(v)

x	-1	0	1
y	-4	0	4



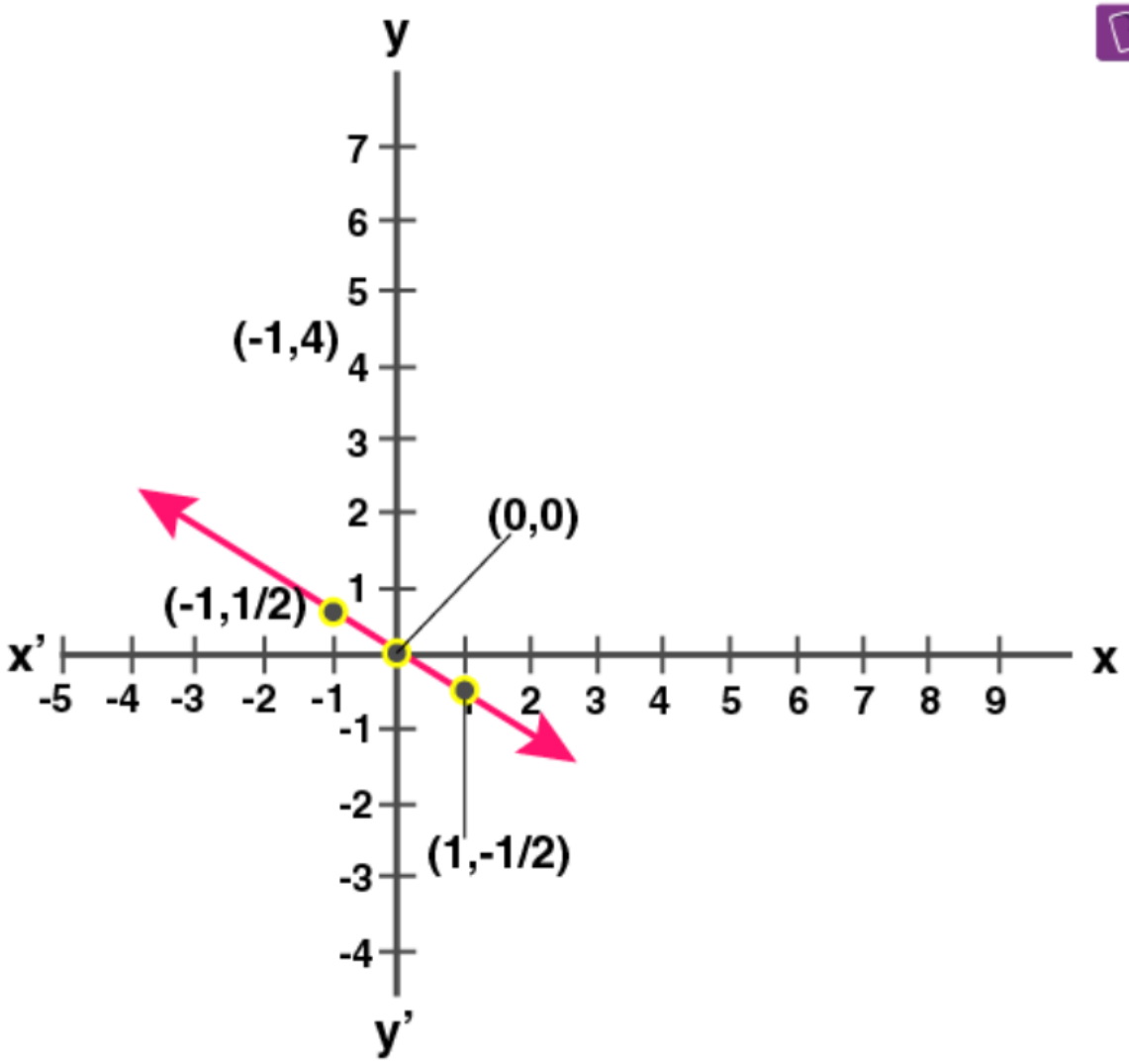
(viii)

x	-1	0	1
y	3/2	0	-3/2



(ix)

x	-1	0	1
y	½	0	- ½



3. Draw the graph for each linear equation given below:
(i) y = 2x + 3

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

$$(iii) y = -x + 4$$

$$(iv) y = 4x - \frac{5}{2}$$

$$(v) y = \frac{3x}{2} + \frac{2}{3}$$

$$(vi) 2x - 3y = 4$$

$$(vii) \frac{x-1}{3} - \frac{y+2}{2} = 0$$

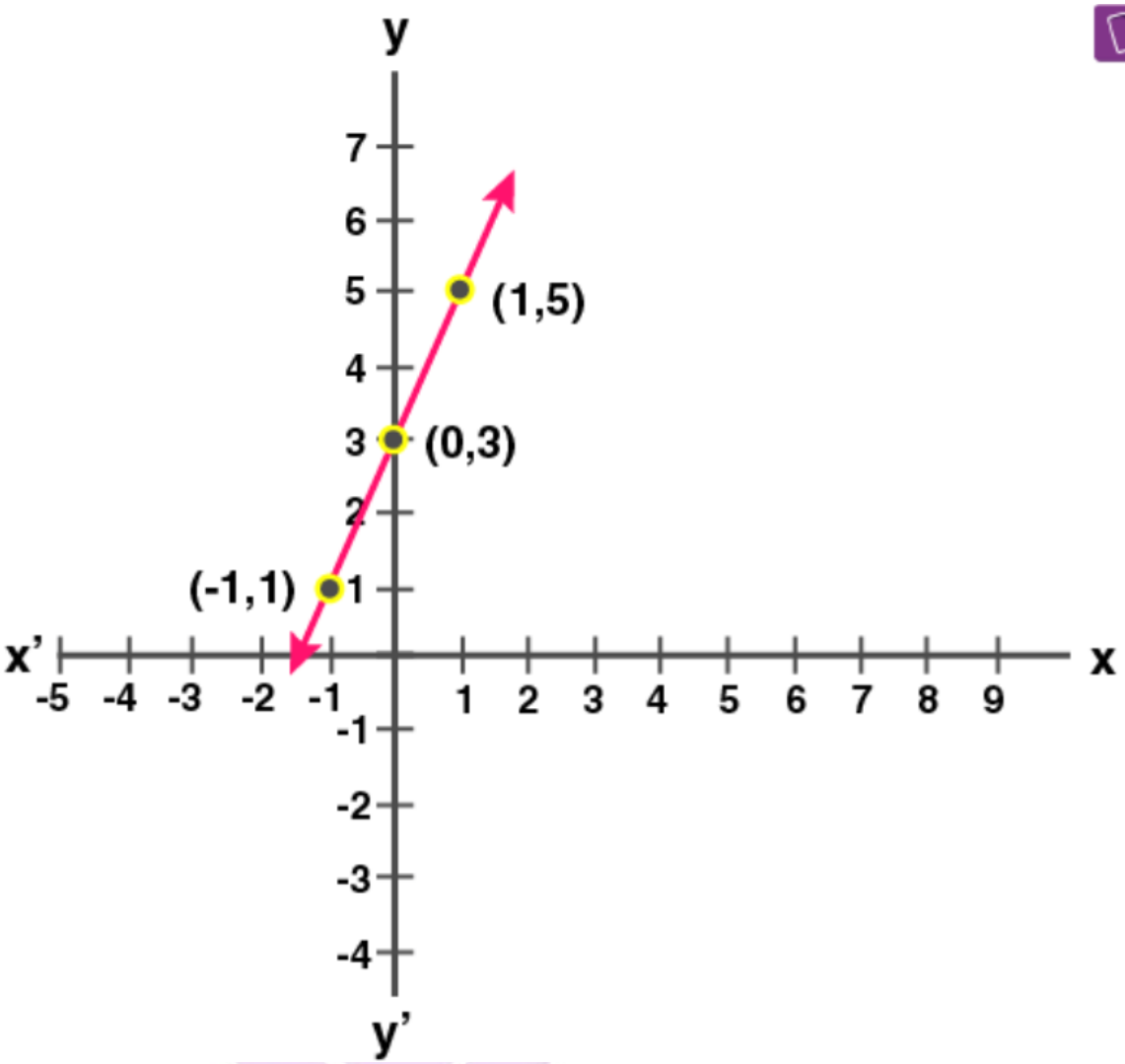
$$(viii) x - 3 = \frac{2}{5}(y+1)$$

$$(ix) x + 5y + 2 = 0$$

Solution:

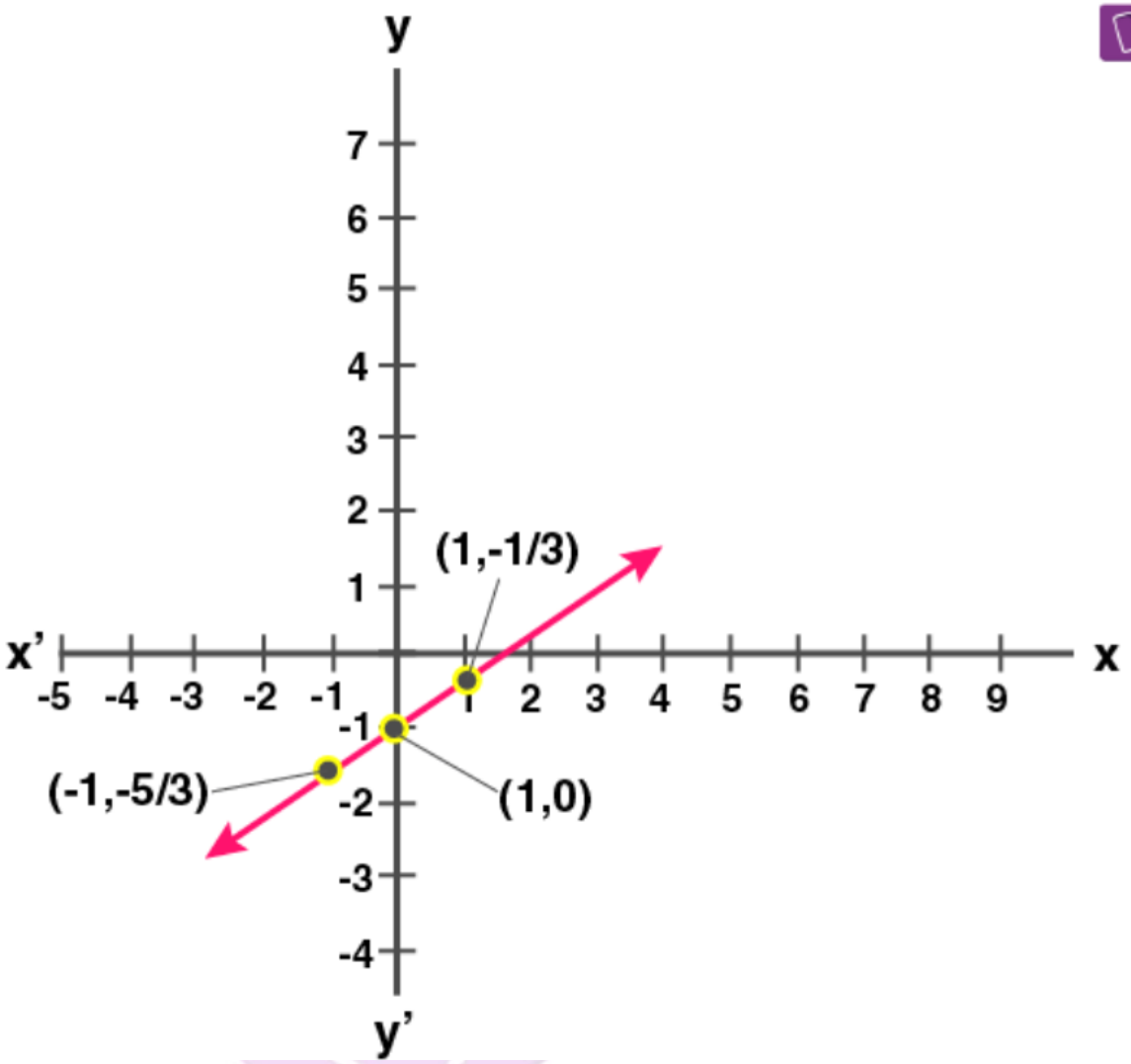
(i)

x	-1	0	1
y	-5/3	3	5



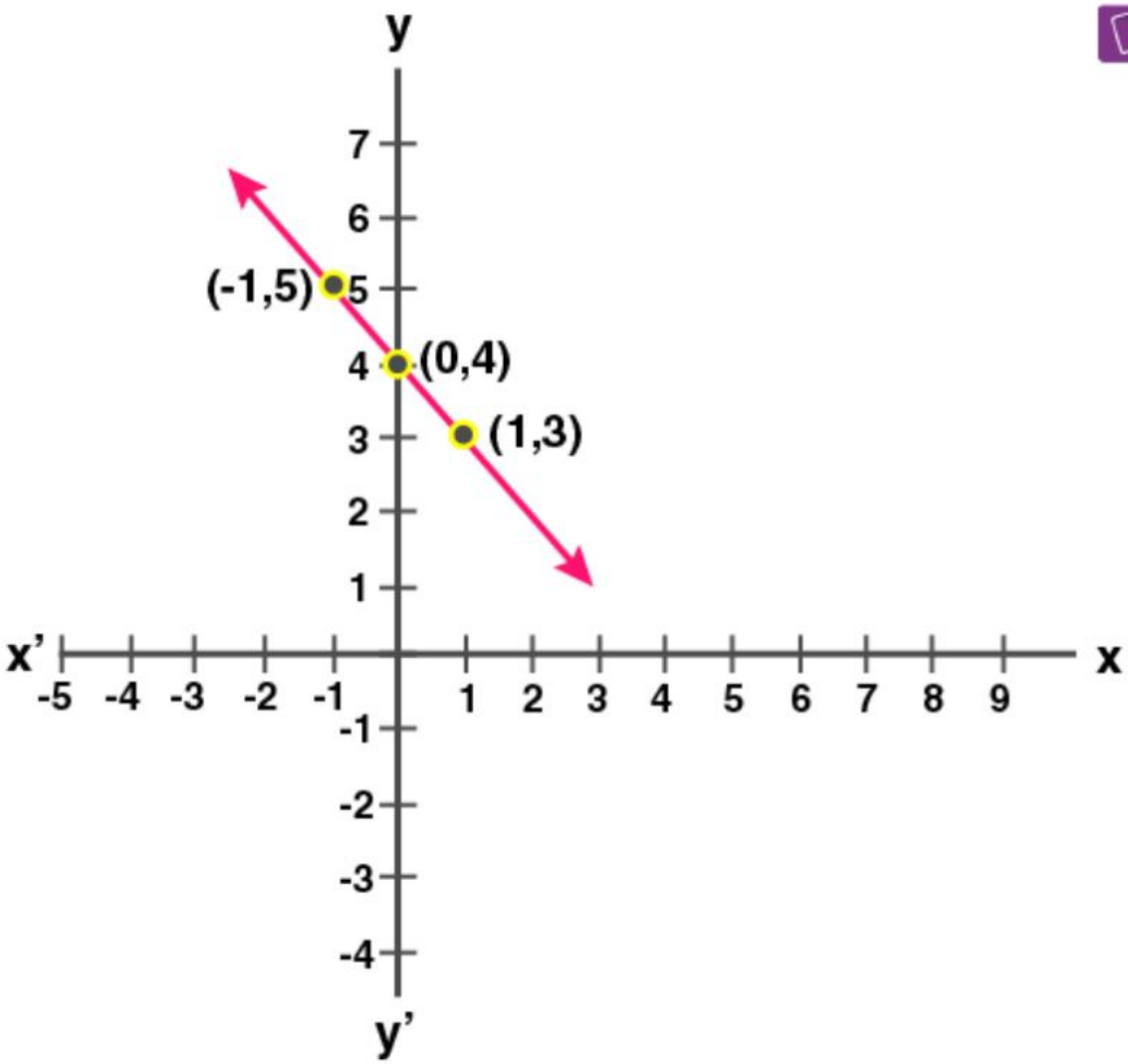
(ii)

x	-1	0	1
y	-5/3	-1	-1/3



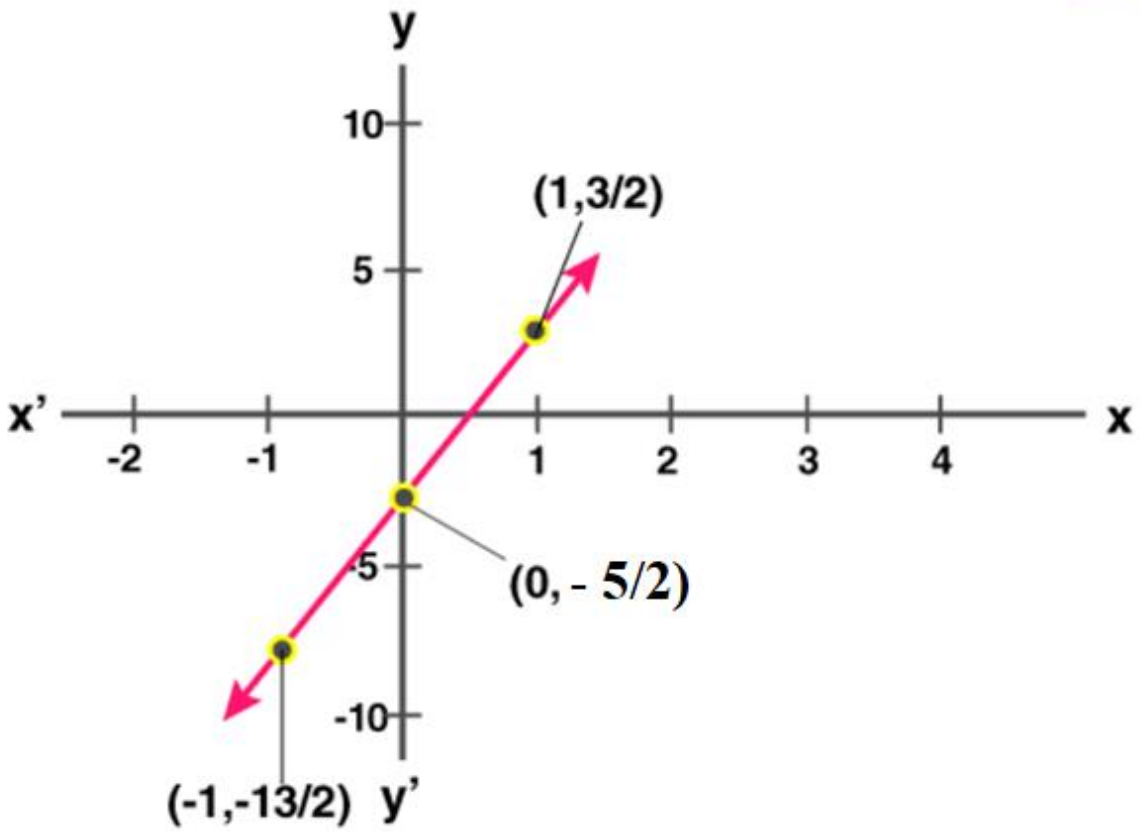
(iii)

x	-1	0	1
y	5	4	3



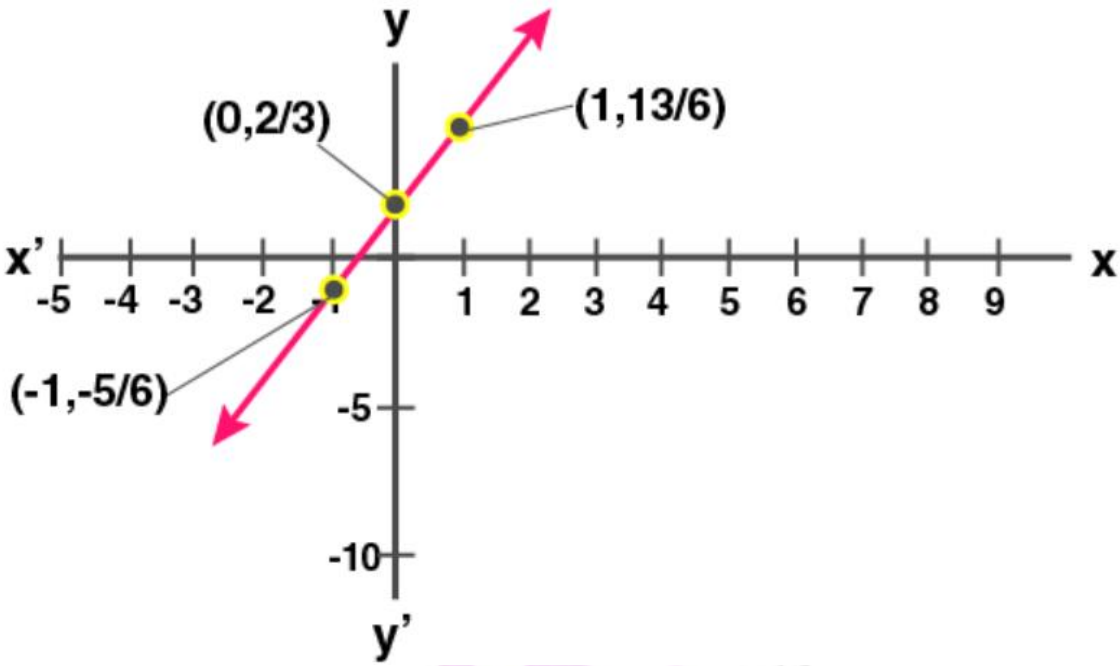
(iv)

x	-1	0	1
y	-13/2	-5/2	3/2



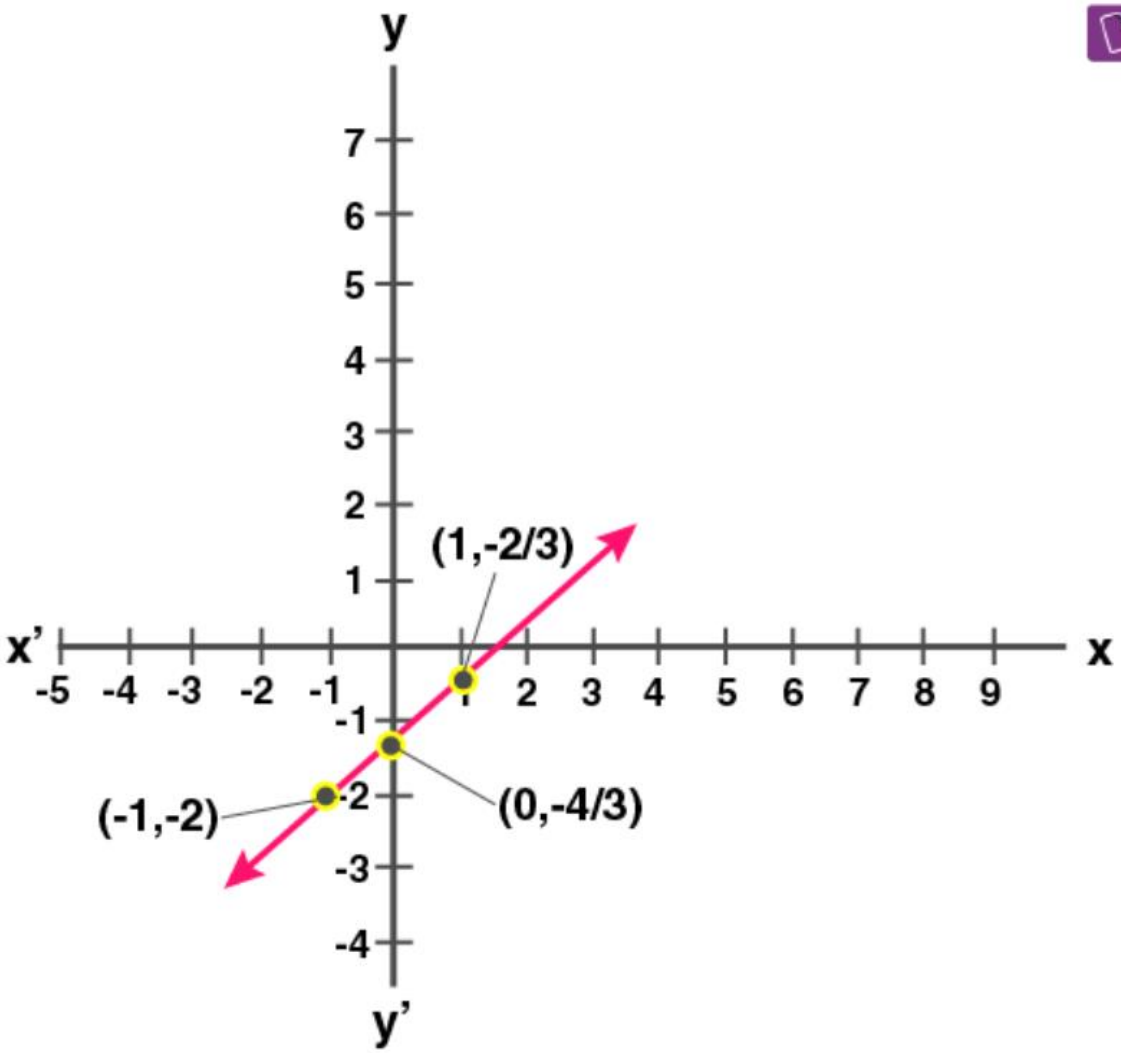
(v)

x	-1	0	1
y	-5/6	2/3	13/6



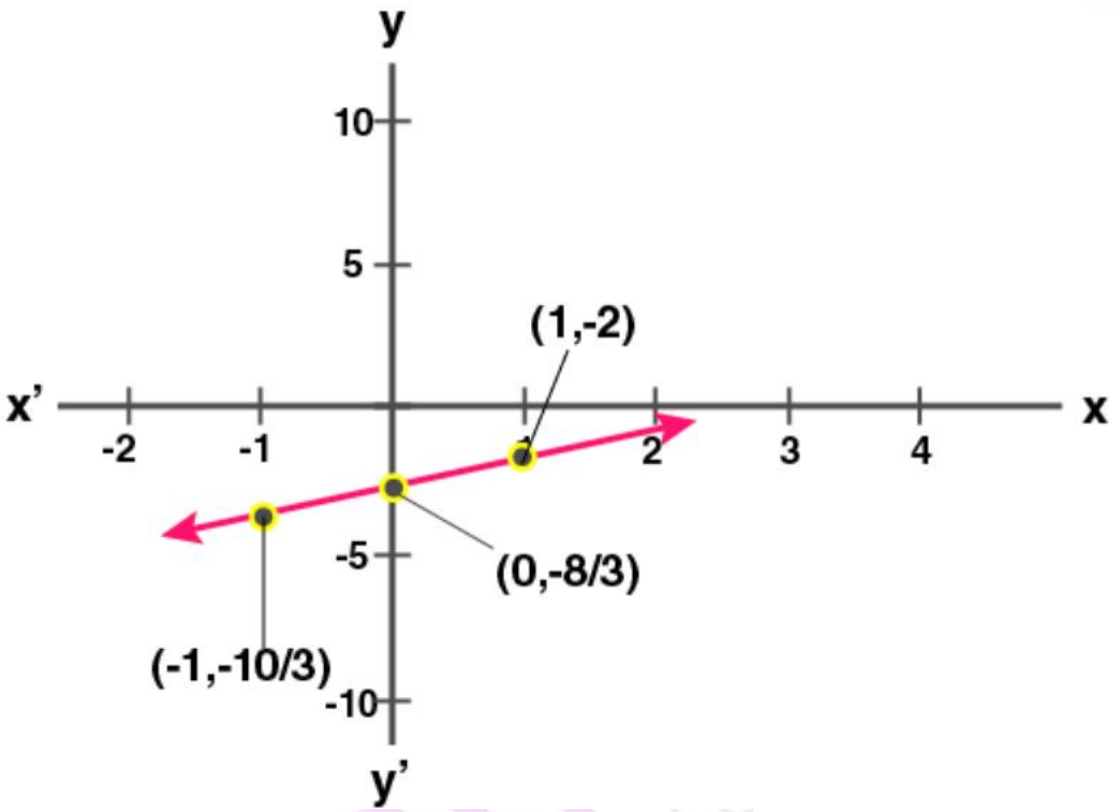
(vi)

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



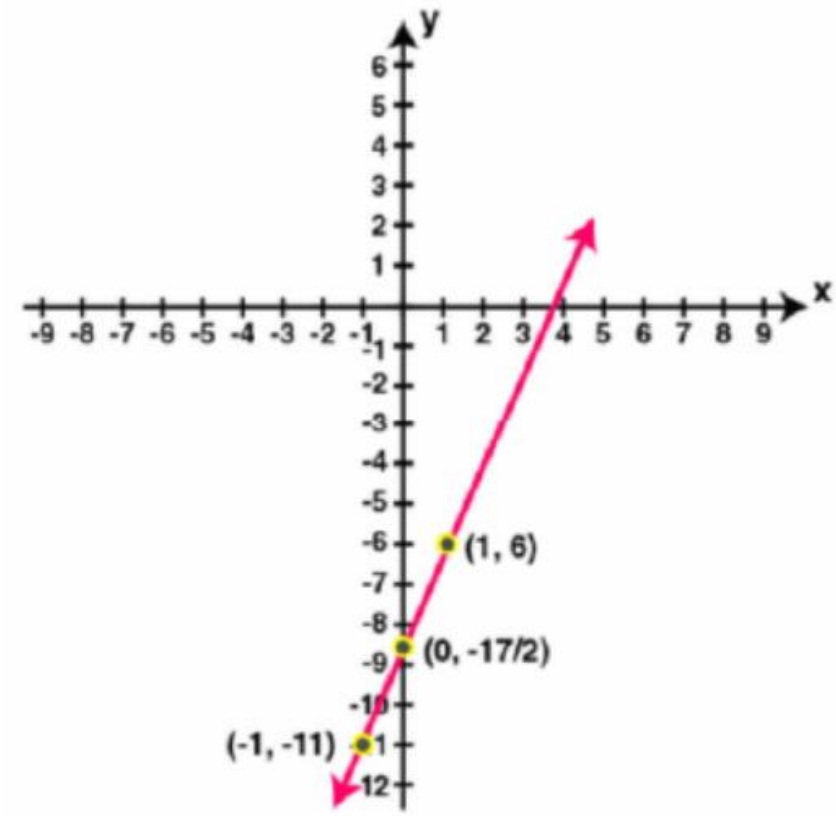
(vii) We can write the equation as
2x – 3y = 8

x	-1	0	1
y	-10/3	-8/3	-2



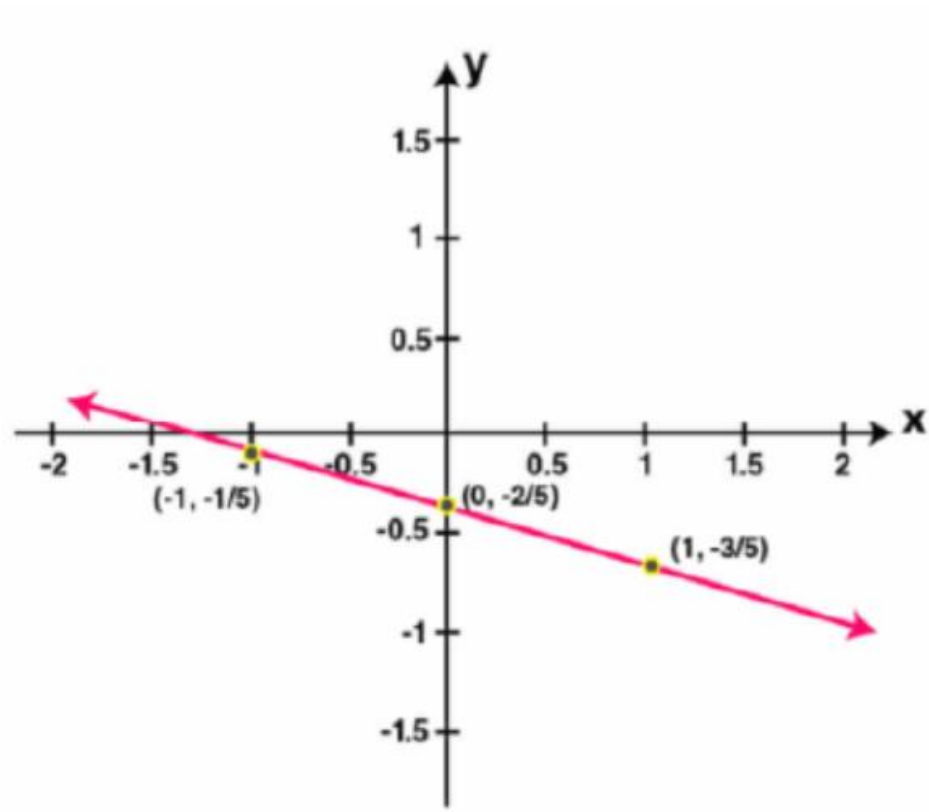
(viii) We can write the equation as
5x – 2y = 17

x	-1	0	1
y	-11	-17/2	-6



(ix)

x	-1	0	1
y	-1/5	-2/5	-3/5



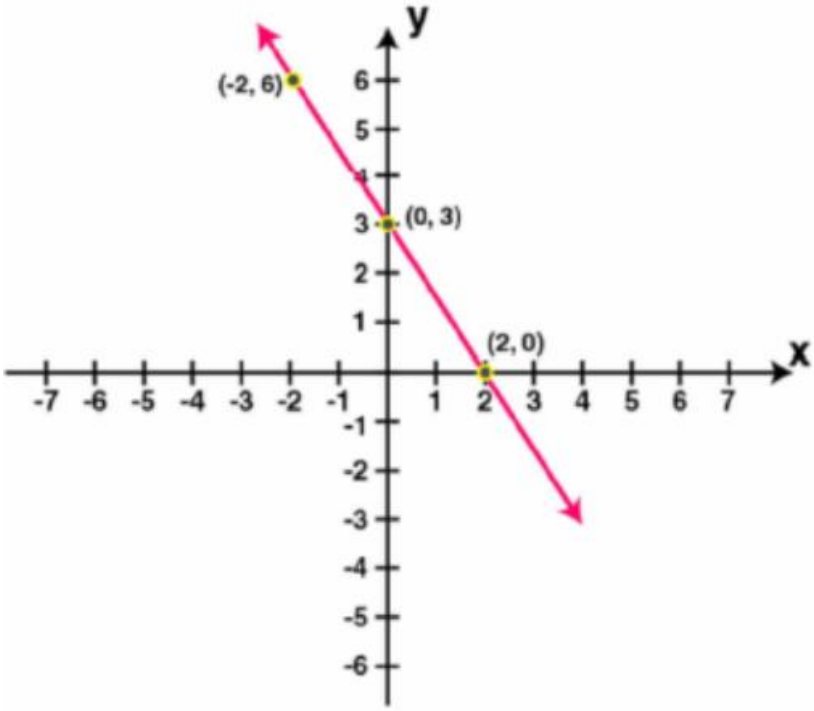
4. Draw the graph for each equation given below:
(i) 3x + 2y = 6
(ii) 2x – 5y = 10

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

$$(\text{iv})\frac{2x-1}{3} - \frac{y-2}{5} = 0$$

In each case, find the co-ordinates of the points where the graph (line) drawn meets the co-ordinates axes.
Solution:
(i)

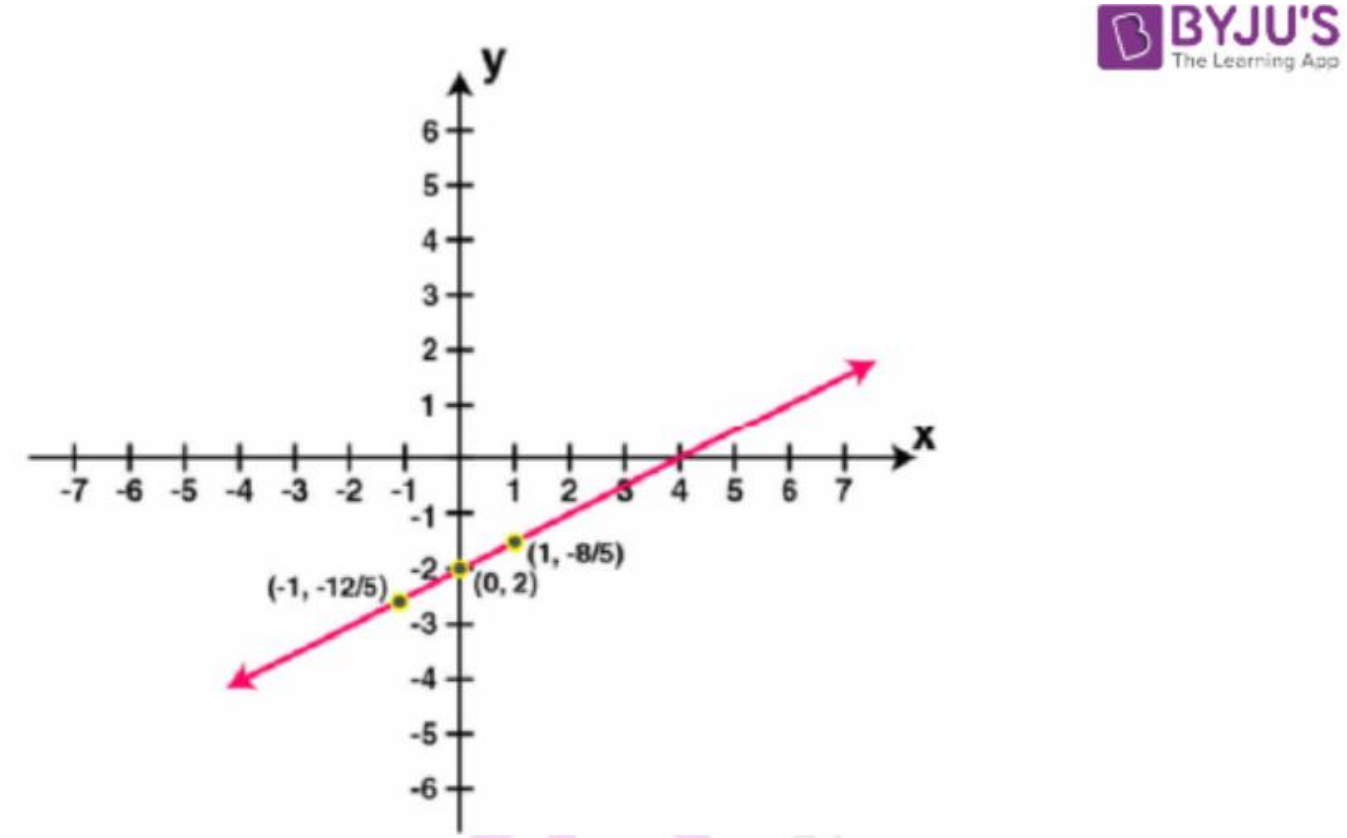
x	-2	0	2
y	6	3	0



From the graph, the line intersects x-axis at (2, 0) and y-axis at (0, 3).

(ii)

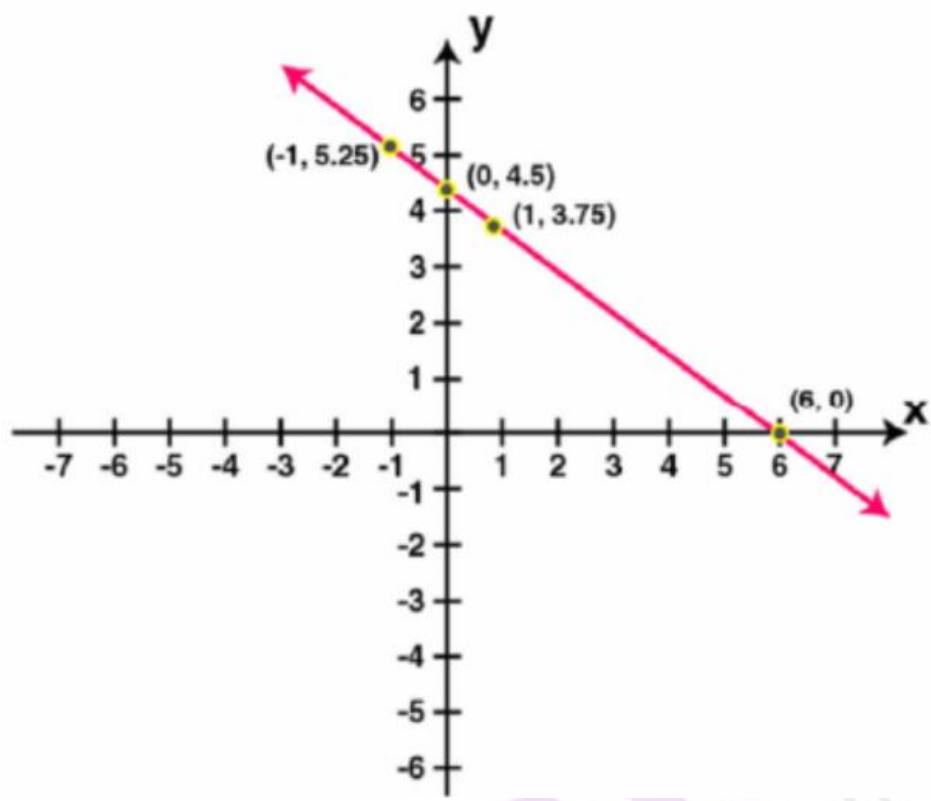
x	-1	0	1
y	-12/5	-2	-8/5



From the graph, the line intersects x-axis at (5, 0) and y-axis at (0, -2).

(iii)

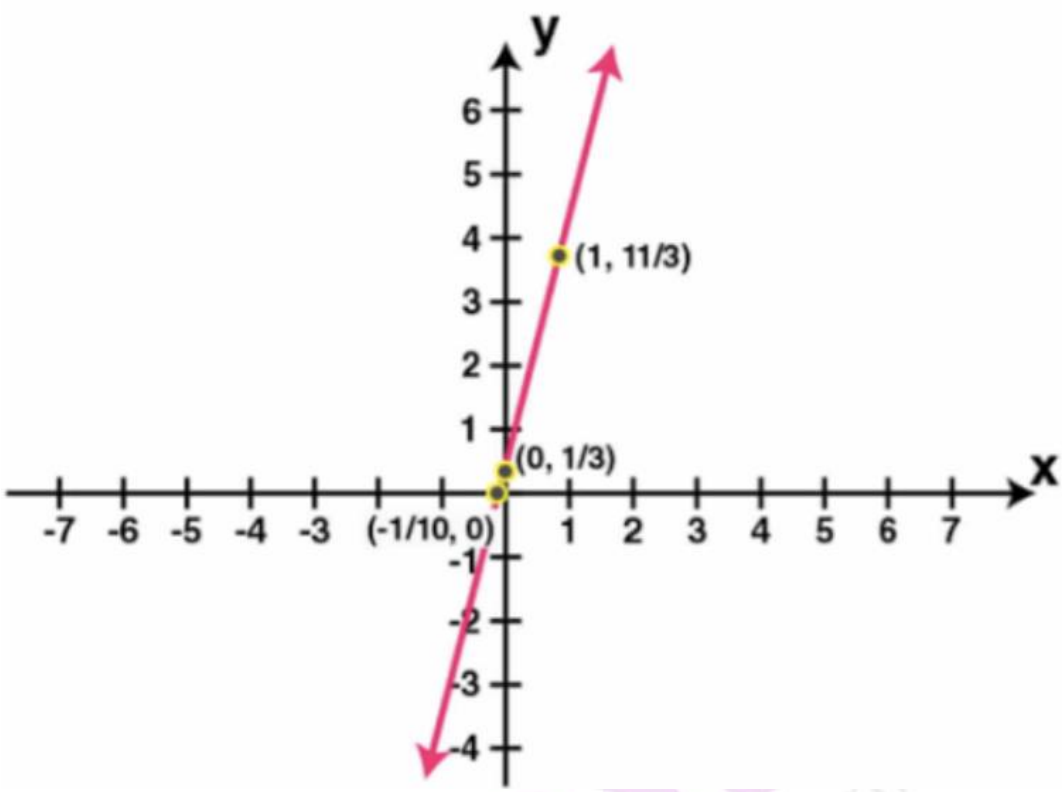
x	-1	0	1
y	5.25	4.5	3.75



From the graph, the line intersects x-axis at (10, 0) and y-axis at (0, 7.5).

(iv)

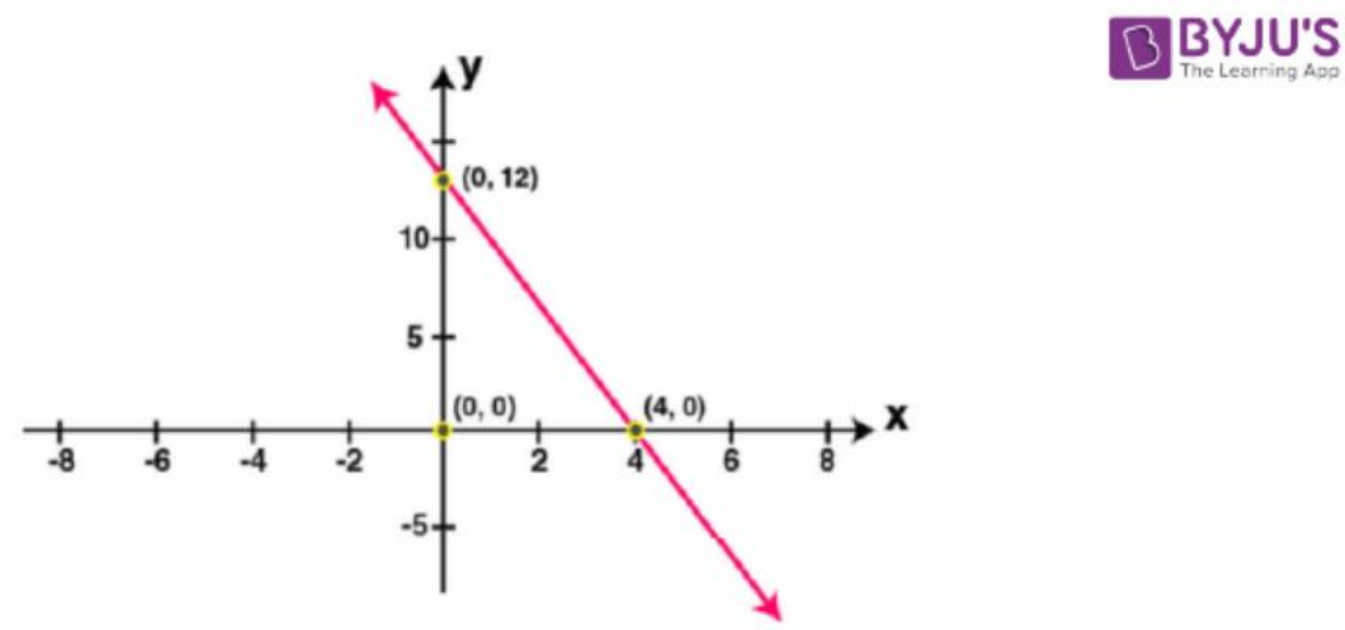
x	-1	0	1
y	-3	1/3	11/3



From the graph, the line intersects x-axis at (-1/10, 0) and y-axis at (0, 4.5).

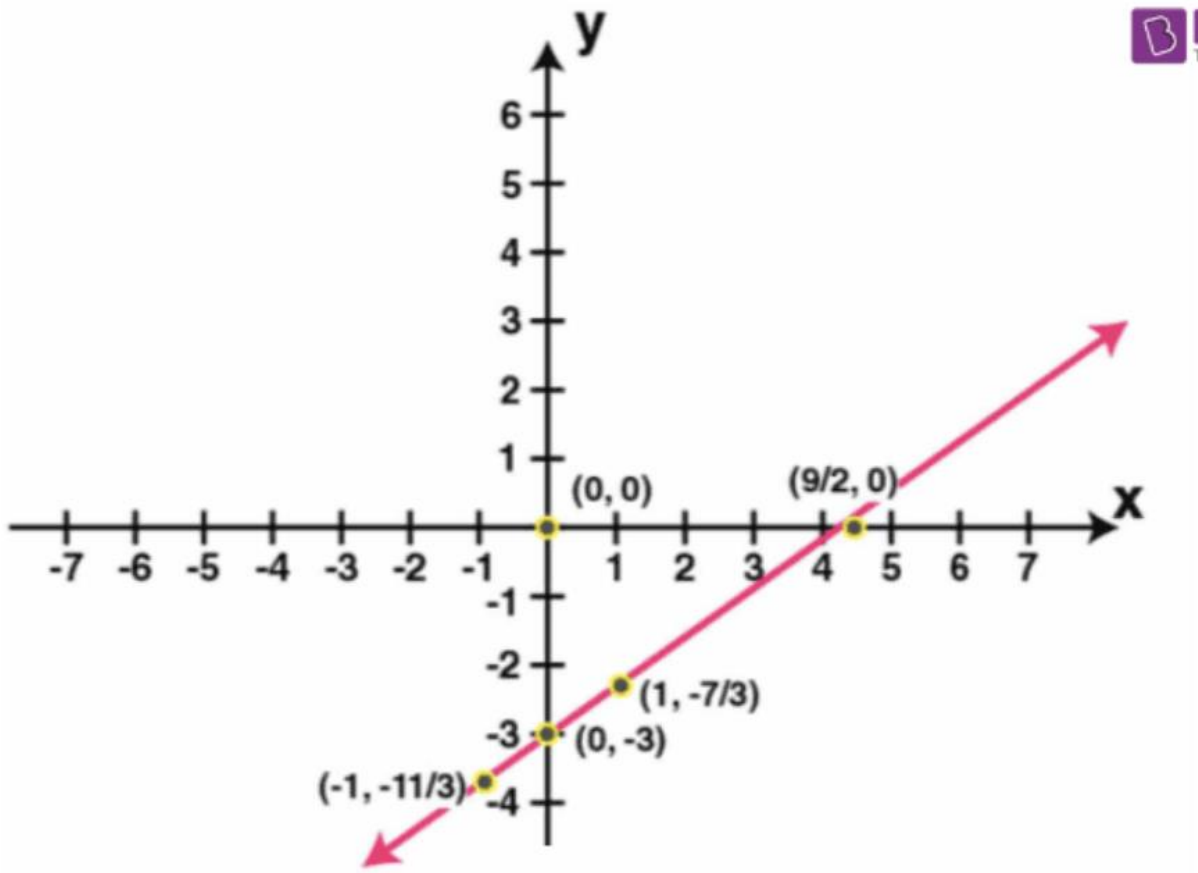
5. For each linear equation, given above, draw the graph and then use the graph drawn (in each case) to find the area of a triangle enclosed by the graph and the co-ordinates axes:
(i) 3x – (5 – y) = 7
(ii) 7 – 3 (1 – y) = - 5 + 2x
Solution:

(i)



We know that
Area of the right triangle obtained = ½ × base × altitude
= ½ × 4 × 12
= 24 sq. units

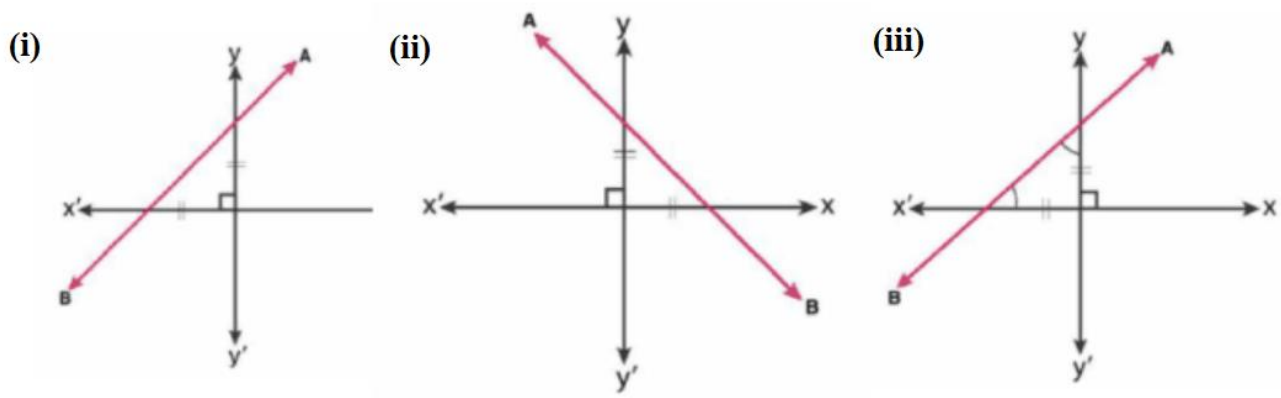
(ii)



We know that
Area of the right triangle obtained = ½ × base × altitude
= ½ × 9/2 × 3
= 27/4
= 6.75 sq. units

EXERCISE 26C

1. In each of the following, find the inclination of line AB:



Solution:

The angle which is a straight line makes with the positive direction of x-axis (measured in anticlockwise direction) is called as inclination of the line.
(i) The inclination of line AB is $\theta = 45^0$
(ii) The inclination of line AB is $\theta = 135^0$
(iii) The inclination of line AB is $\theta = 30^0$

2. Write the inclination of a line which is:
(i) Parallel to x-axis.
(ii) Perpendicular to x-axis.
(iii) Parallel to y-axis.
(iv) Perpendicular to y-axis.
Solution:

(i) The inclination of a line which is parallel to x-axis is $\theta = 0^0$.

(ii) The inclination of a line which is perpendicular to x-axis is $\theta = 90^0$.

(iii) The inclination of a line which is parallel to y-axis is $\theta = 90^0$.

(iv) The inclination of a line which is perpendicular to y-axis $\theta = 0^0$.

3. Write the slope of the line whose inclination is:
(i) 0^0
(ii) 30^0
(iii) 45^0
(iv) 60^0
Solution:

The slope of the line is tan θ if θ is the inclination of a line.
Here slope is usually denoted by the letter m.

(i) The inclination of a line is 0^0 then $\theta = 0^0$.
Therefore, the slope of the line is $m = \tan 0^0 = 0$

(ii) The inclination of a line is 30^0 then $\theta = 30^0$.
Therefore, the slope of the line is $m = \tan \theta = \tan 30^0 = 1/\sqrt{3}$

(iii) The inclination of a line is 45^0 then $\theta = 45^0$.
Therefore, the slope of the line is $m = \tan \theta = \tan 45^0 = 1$

(iv) The inclination of a line is 60^0 then $\theta = 60^0$.
Therefore, the slope of the line is $m = \tan \theta = \tan 60^0 = \sqrt{3}$

4. Find the inclination of the line whose slope is:
(i) 0
(ii) 1
(iii) $\sqrt{3}$
(iv) $1/\sqrt{3}$
Solution:

If $\tan \theta$ is the slope of a line; then the inclination of the line is θ

(i) If the slope of the line is 0; then $\tan \theta = 0$
$\tan \theta = 0$
$\tan \theta = \tan 0^0$
$\theta = 0^0$
Hence, the inclination of the given line is $\theta = 0^0$.

(ii) If the slope of the line is 1; then $\tan \theta = 1$
$\tan \theta = 1$
$\tan \theta = \tan 45^0$
$\theta = 45^0$
Hence, the inclination of the given line is $\theta = 45^0$.

(iii) If the slope of the line is $\sqrt{3}$; then $\tan \theta = \sqrt{3}$
$\tan \theta = \sqrt{3}$
$\tan \theta = \tan 60^0$
$\theta = 60^0$
Hence, the inclination of the given line is $\theta = 60^0$.

(iv) If the slope of the line is $1/\sqrt{3}$; then $\tan \theta = 1/\sqrt{3}$
$\tan \theta = 1/\sqrt{3}$
$\tan \theta = \tan 30^0$
$\theta = 30^0$
Hence, the inclination of the given line is $\theta = 30^0$.

5. Write the slope of the line which is:
(i) Parallel to x-axis.
(ii) Perpendicular to x-axis.
(iii) Parallel to y-axis.
(iv) Perpendicular to y-axis.
Solution:

(i) We know that the inclination of line parallel to x-axis $\theta = 0^0$
So the slope (m) = $\tan\theta = \tan 0^0 = 0$

(ii) We know that the inclination of line perpendicular to x-axis $\theta = 90^0$
So the slope (m) = $\tan\theta = \tan 90^0 = \infty$ (not defined)

(iii) We know that the inclination of line parallel to y-axis $\theta = 90^0$
So the slope (m) = $\tan\theta = \tan 90^0 = \infty$ (not defined)

(iv) We know that the inclination of line perpendicular to y-axis $\theta = 0^0$
So the slope (m) = $\tan\theta = \tan 0^0 = 0$