EXERCISE 26(A)

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

Dependent variable is y
Independent variable is x

(ii) $x = 9y + 4$

Dependent variable is x
Independent variable is y

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

Dependent variable is x
Independent variable is y

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

Dependent variable is y
Independent variable is x

2. Plot the following points on the same graph paper:

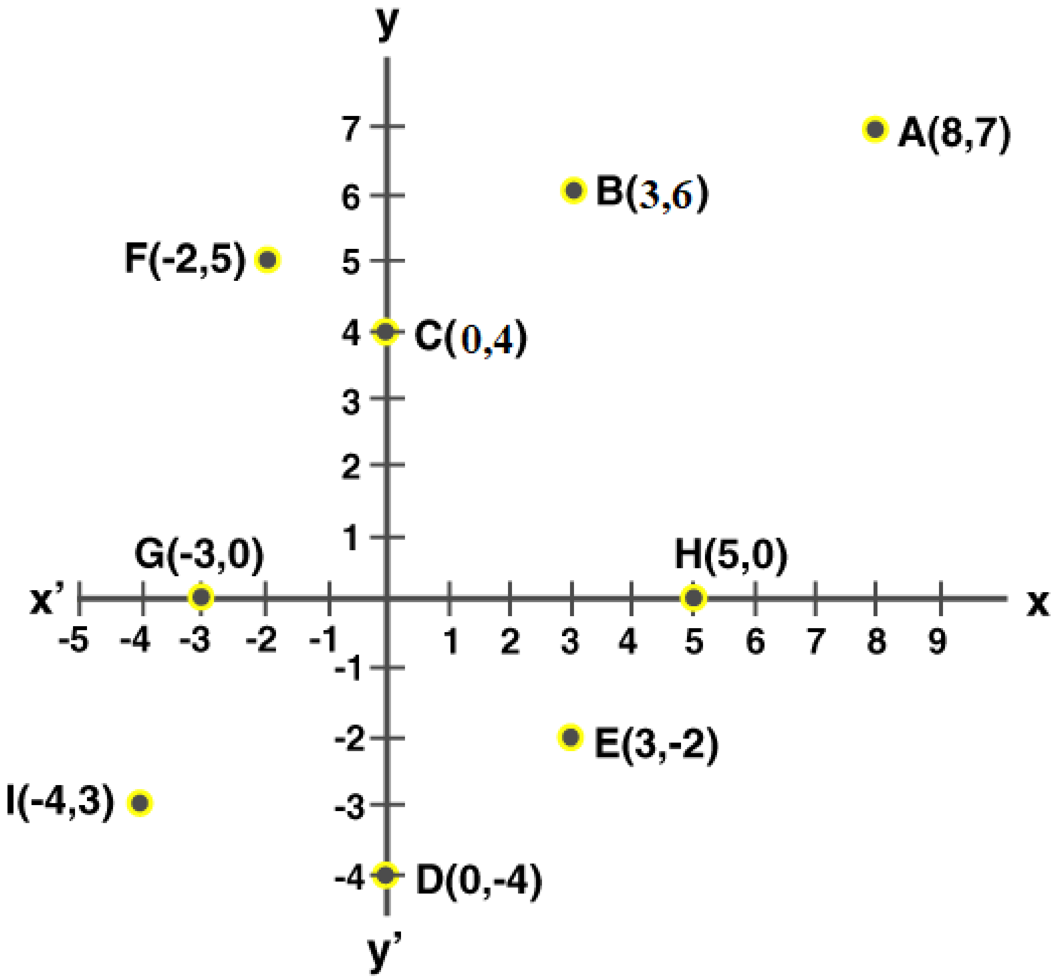
(i) (8, 7)
(ii) (3, 6)
(iii) (0, 4)
(iv) (0, -4)
(v) (3, -2)
(vi) (-2, 5)
(vii) (-3, 0)
(viii) (5, 0)
(ix) (-4, -3)

Solution:

Let the points be,

(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:

Two ordered pairs are equal.

(i)

$$(x-1, y+3) = (4, 4)$$
$$x-1 = 4 \text{ and } y+3 = 4$$
$$x = 5 \text{ and } \quad y = 1$$

(ii)
$$(3x+1, 2y-7) = (9, -9)$$
$$3x+1 = 9 \text{ and } 2y-7 = -9$$
$$3x = 8 \text{ and } \quad 2y = -2$$
$$x = \frac{8}{3} \text{ and } \quad y = -1$$

(iii)
$$(5x-3y, y-3x) = (4, -4)$$
$$5x-3y = 4 \ldots\ldots (A) \text{ and } y-3x = -4 \ldots\ldots (B)$$

Multiplying equation (B) by 3, we get
$$3y-9x = -12 \ldots\ldots (C)$$

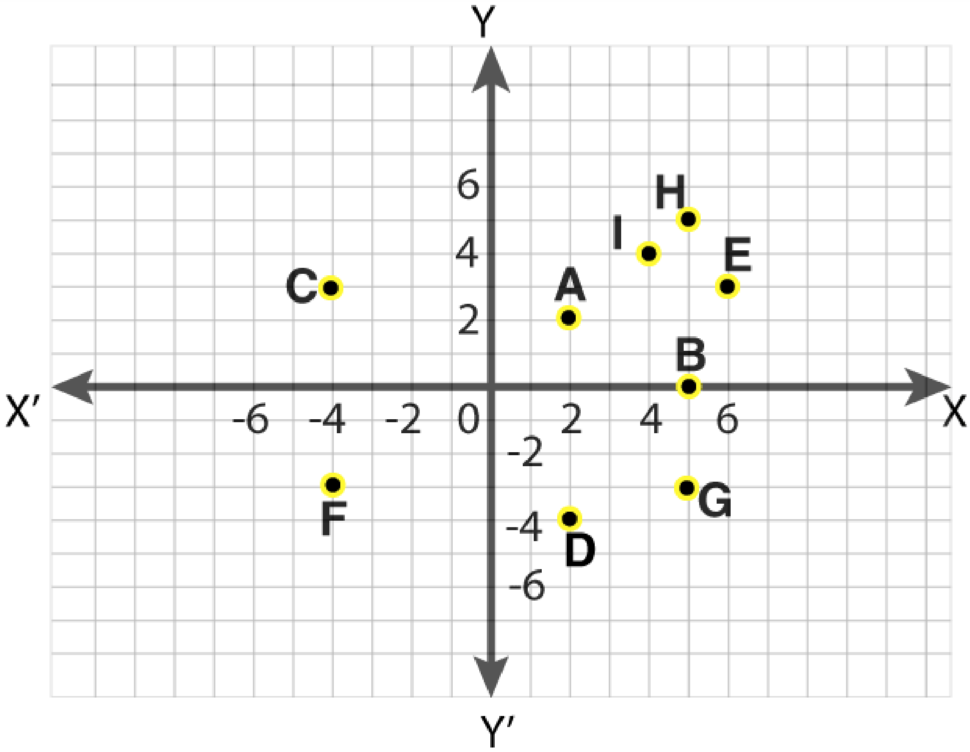
Adding both the equations (A) and (C), we get
$$(5x-3y) + (3y-9x) = (4 + (-12))$$
$$-4x = -8$$
$$x = 2$$

Putting the value of x in the equation (B), we get
$$y - 3x = -4$$
$$\Rightarrow y = 3x - 4$$
$$\Rightarrow y = 3(2) - 4$$
$$\Rightarrow y = 2$$

x = 2, 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
According to the graph,
The co-ordinate of the given point A is given by (2, 2)

(ii) The ordinate is 0
According to the graph,
The co-ordinate of the given point B is given by (5, 0)

(iii) The ordinate is 3
According to the graph,
The co-ordinate of the given point C and E is given by (-4, 3) & (6, 3)

(iv) The ordinate is -4
According to the graph,
The co-ordinate of the given point D is given by (2,-4)

(v) The abscissa is 5
According to the graph,
The co-ordinate of the given point H, B and G is given by (5, 5), (5, 0) & (5,-3)

(vi) The abscissa is equal to the ordinate.
According to the graph,
The co-ordinate of the given point I, A & H is given by (4, 4), (2, 2) & (5, 5)

(vii) The ordinate is half of the abscissa
According to the graph,
The co-ordinate of the given 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)

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

$$3 - 2x = 7$$
$$3 - 7 = 2x$$
$$-4 = 2x$$
$$-2 = x$$

$$2y+1=10-2\frac{1}{2}y$$
$$2y+1=10-\frac{5}{2}y$$
$$4y+2=20-5y$$
$$4y+5y=20-2$$
$$9y=18$$
$$y=2$$

∴ The co-ordinates of the point (-2, 2)

(ii)

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

$$\frac{2a}{3}-1=\frac{a}{2}$$
$$\frac{2a}{3}-\frac{a}{2}=1$$
$$\frac{4a-3a}{6}=1$$
$$a=6$$

$$\frac{15-4b}{7}=\frac{2b-1}{3}$$
$$45-12b=14b-7$$
$$45+7=14b+12b$$
$$52=26b$$

b=2

∴ The co-ordinates of the point (6,2)

(iii)

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

$$5x-(5-x)=\frac{1}{2}(3-x)$$
$$(5x+x)-5=\frac{1}{2}(3-x)$$
$$12x-10=3-x$$
$$12x+x=3+10$$
$$13x=13$$
$$x=1$$

$$4-3y=\frac{4+y}{3}$$
$$12-9y=4+y$$
$$12-4=y+9y$$
$$8=10y$$
$$\frac{8}{10}=y$$
$$\frac{4}{5}=y$$

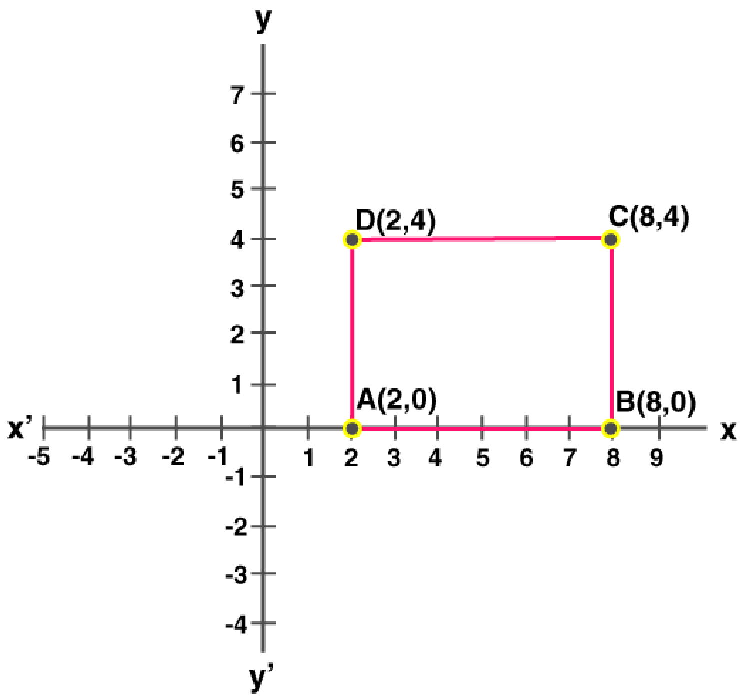
$\therefore$ The co-ordinates of the point $\left(1,\frac{4}{5}\right)$

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).

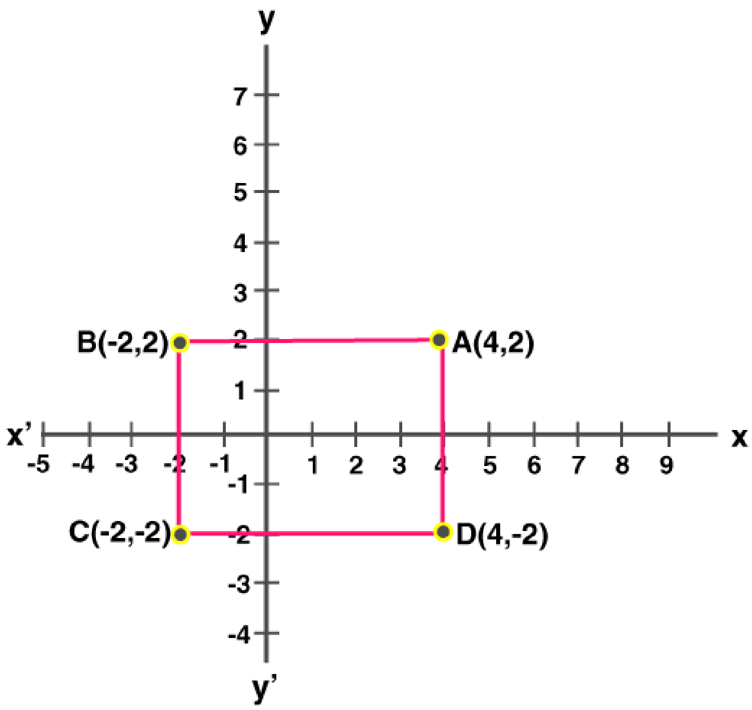
Solution:

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



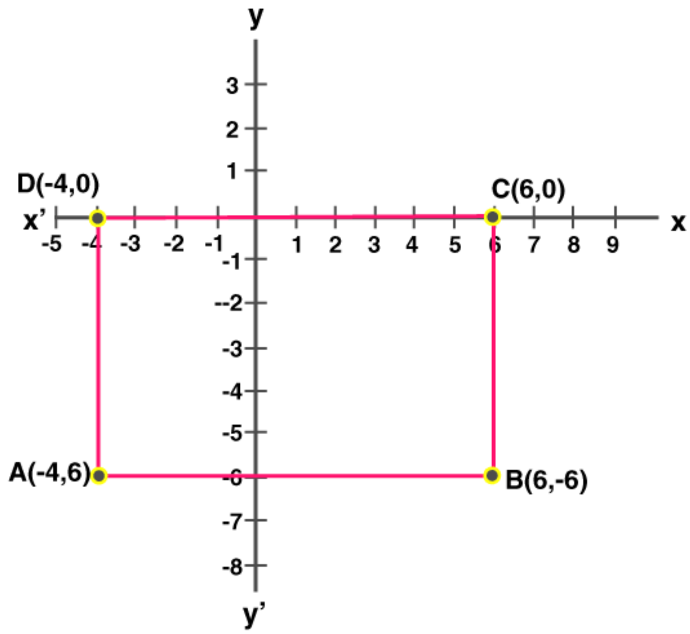
According to the graph D(2,4)

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

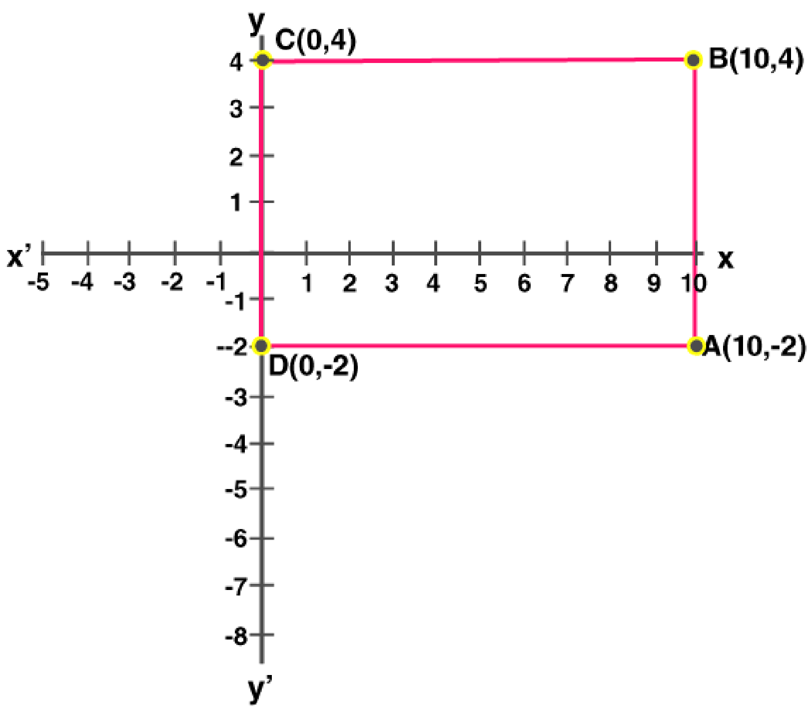


According to the graph C(-2,2)

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



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

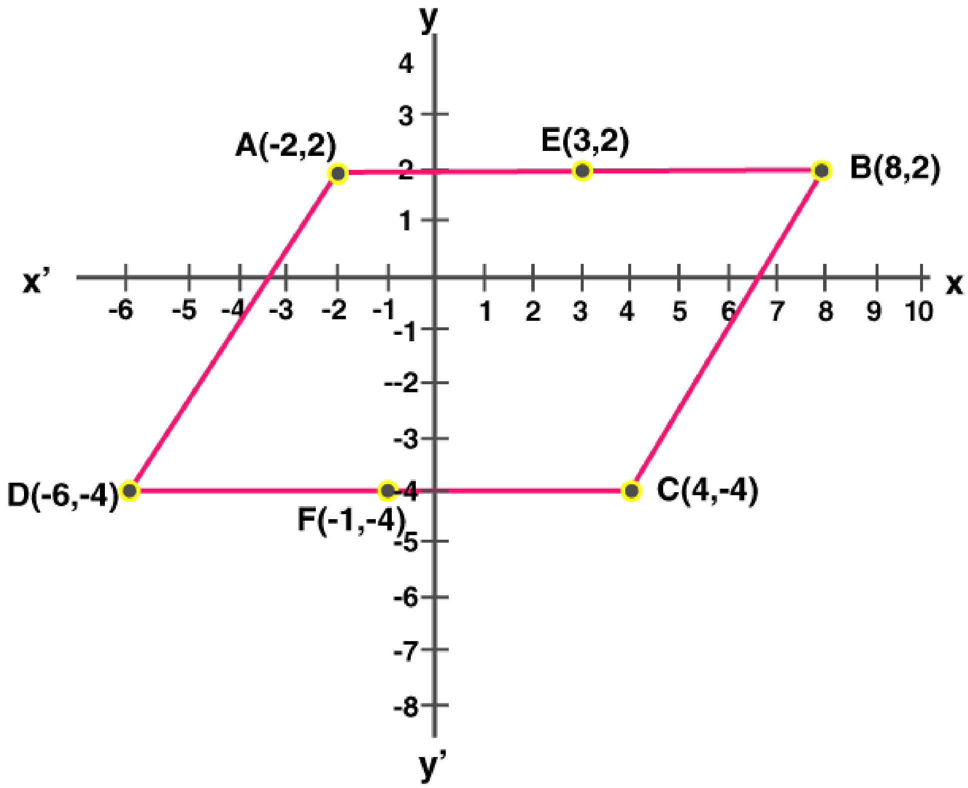


According to the graph A(10, -2)

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:

Given, A(2,-2), B(8,2) and C(4,-4) are the vertices of the parallelogram ABCD



Joining A, B , C and D we get the parallelogram ABCD.
According to the graph, we get, D(-6,4)
From 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:

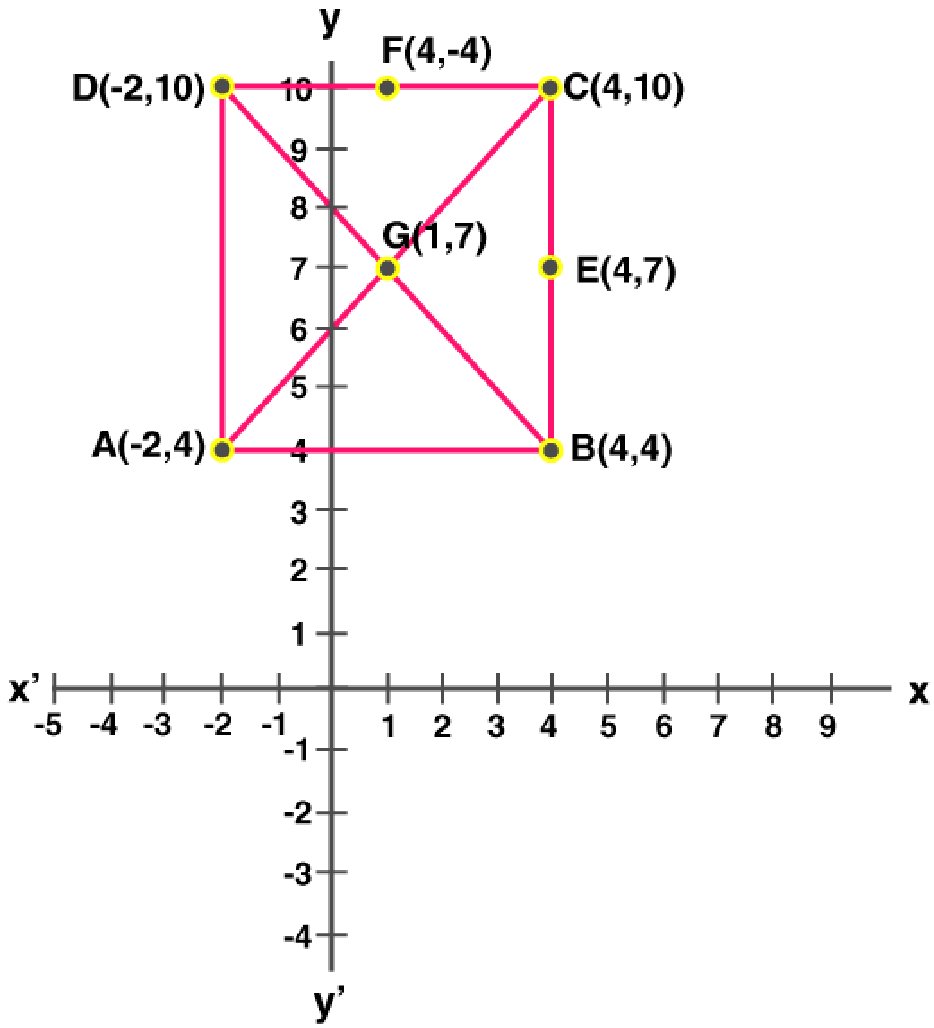
(i) The co-ordinates of the mid-point of BC;

(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:

Given , A (-2, 4), C(4, 10) and D(-2, 10) are the vertices of a square ABCD



According to the graph, we get, B(4,4)
From the graph,

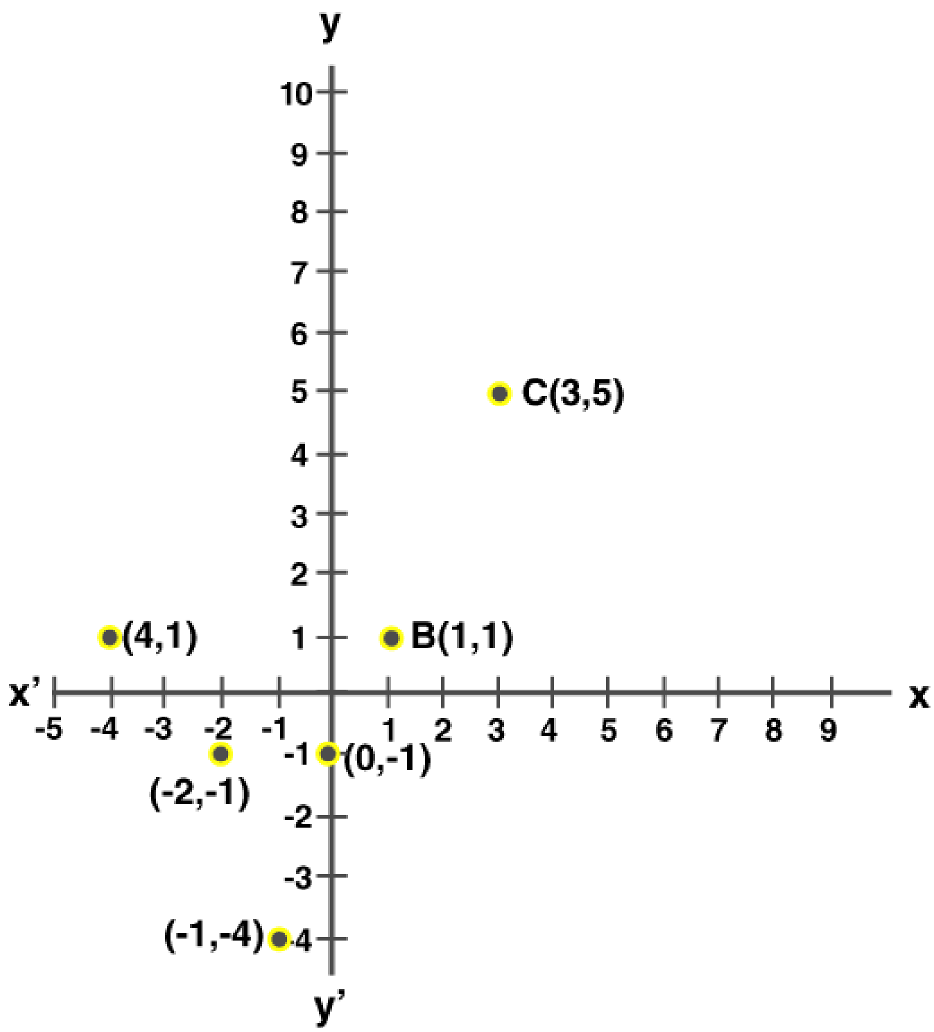
The co-ordinates of the mid-point of BC is E(4,7)
The co-ordinates of the mid-point of CD is F(1,10)
the co-ordinates of the diagonals of the square is G(1,7)

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 given points, we have clearly seen from the graph that

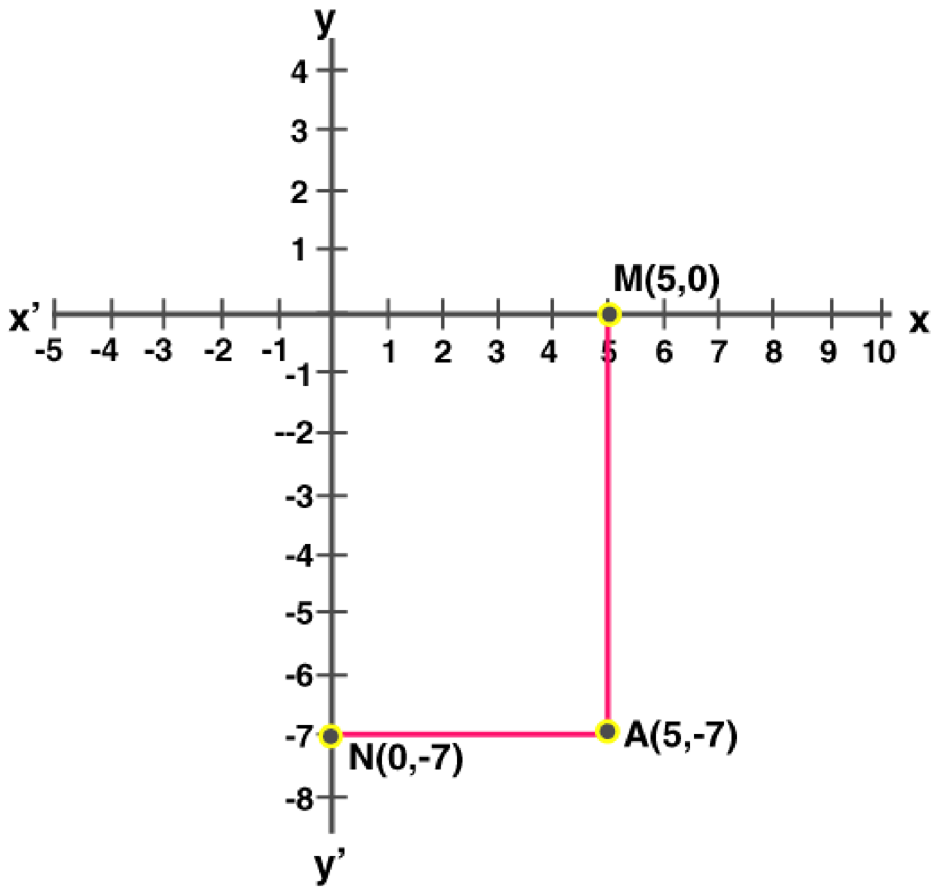
(i) A (3, 5), B (1, 1) and C (0, -1) are collinear

(ii) P (-2, -1), Q (-1, -4) and R (-4, 1) are non-collinear

11. Plot the point A (5, -7). From point A, draw AM perpendicular to x-axis and AN perpendicular to y-axis. Write the co-ordinates of points M and N.

Solution:

Given A (5, -7).

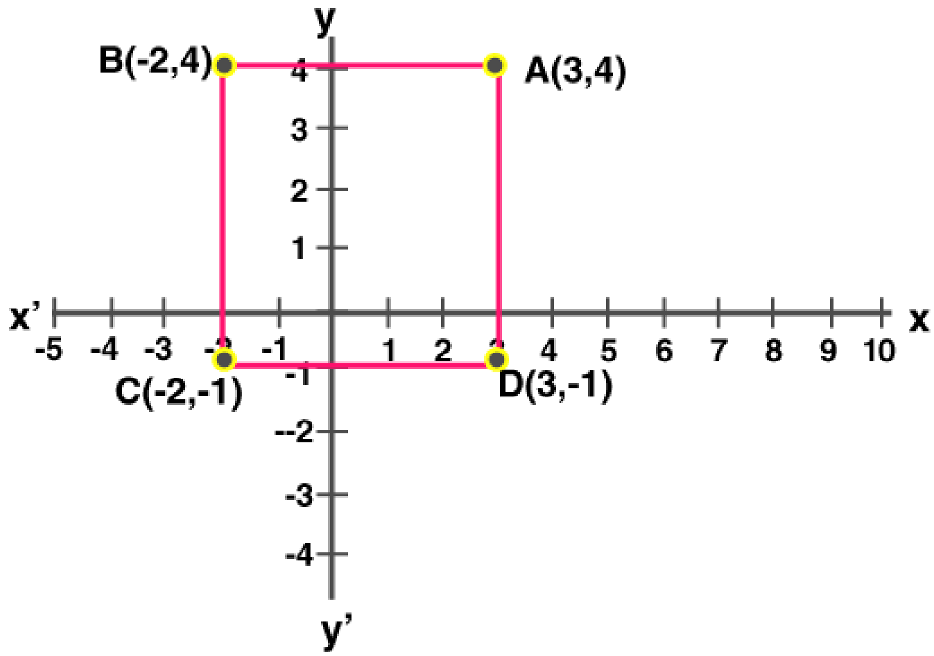


According to the graph,
Co-ordinate of the point M is (5, 0)
Co-ordinate of the point N is (0,-7)

12. In square ABCD; A = (3, 4), B = (-2, 4) and C = (-2, -1). By plotting these points on a graph paper, find the co-ordinates of vertex D. Also, find the area of the square.

Solution:

Given that in square ABCD; A = (3, 4), B = (-2, 4) and C = (-2, -1)



According to the graph,

The vertical distance between the points B (-2, 4) and C (-2, -1) is 5 units.

The horizontal distance between the points B (-2, 4) and A (3, 4) is 5 units.

The vertical distance between the points A (3, 4) and D must be 5 units.

The horizontal distance between the points C (-2, -1) and D must be 5 units.

Now, complete the square ABCD

Hence, from the graph D (3,-1)

Thus, the area of the square ABCD is given by,

Area of ABCD = $(\text{side})^2 = (5)^2 = 25$ units

13. In rectangle OABC; point O is the origin, OA = 10 units along x-axis and AB = 8 units. Find the co-ordinates of vertices A, B and C.

Solution:

According to the question,

Since,

O is the origin, OA = 10 units along x-axis,

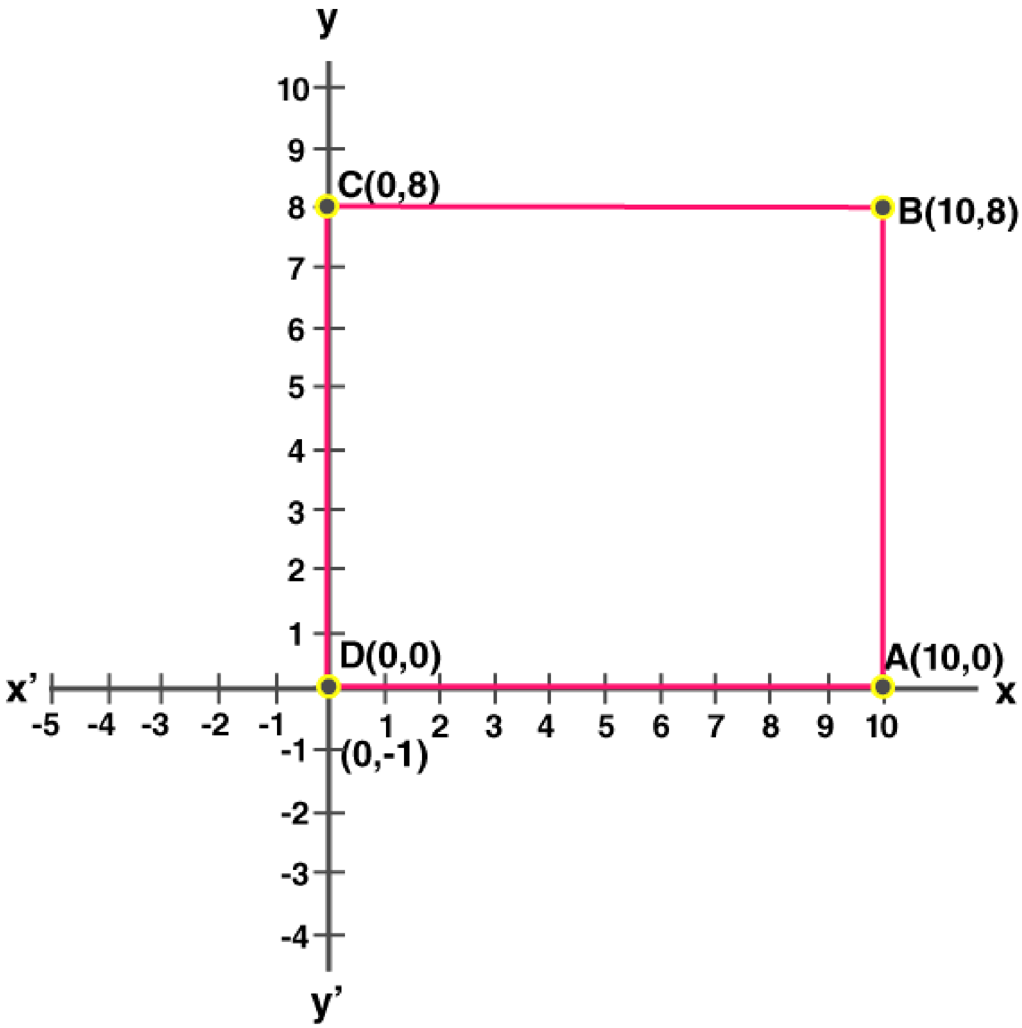
We get,

O (0,0) and A(10,0)

Similarly,

As AB = 8 units

B (10, 8) and C (0, 8)


y
10
9
8
7
6
5
4
3
2
1
C(0,8)
B(10,8)
D(0,0)
A(10,0)
x'
x
-5 -4 -3 -2 -1
1 2 3 4 5 6 7 8 9 10
-1
(0,-1)
-2
-3
-4
y'

EXERCISE 26(B)

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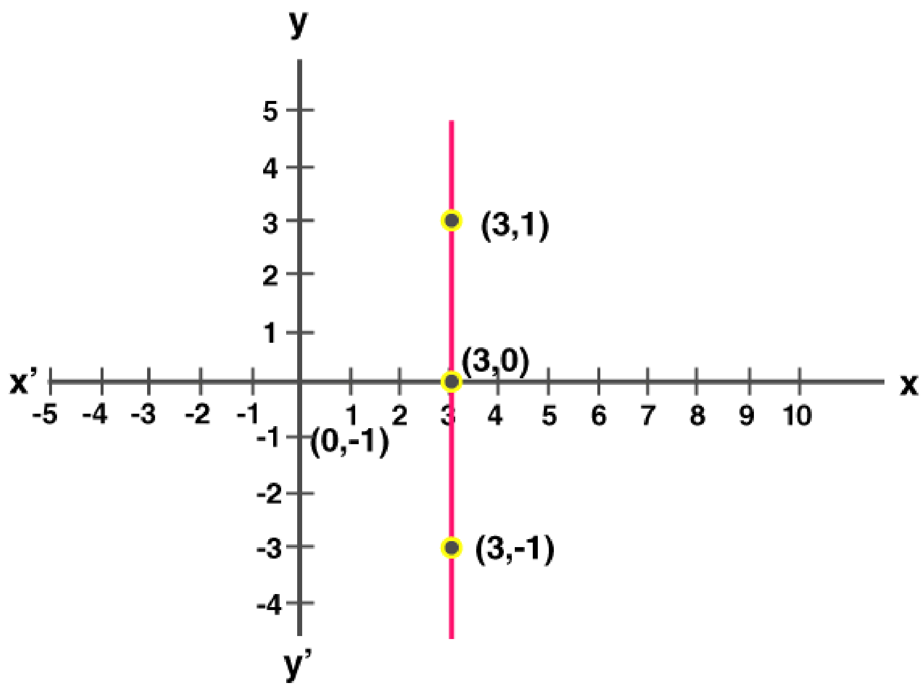
1. **Draw the graph for each linear equation given below:**
   - **(i)** **x = 3**
   - **(ii)** **x + 3 = 0**
   - **(iii)** **x - 5 = 0**
   - **(iv)** **2x - 7 = 0**
   - **(v)** **y = 4**
   - **(vi)** **y + 6 = 0**
   - **(vii)** **y -2 = 0**
   - **(viii)** **3y + 5 = 0**
   - **(ix)** **2y - 5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

Solution:

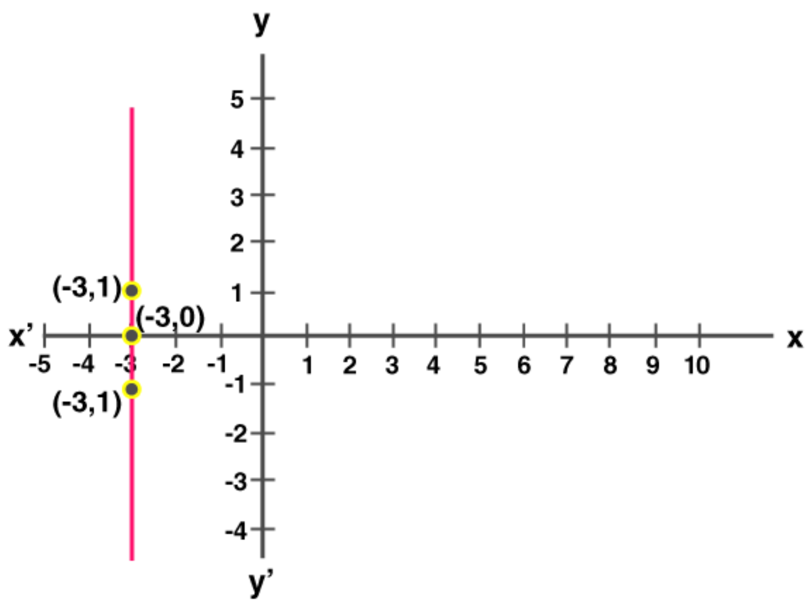
(i)

x	3	3	3
y	-1	0	1



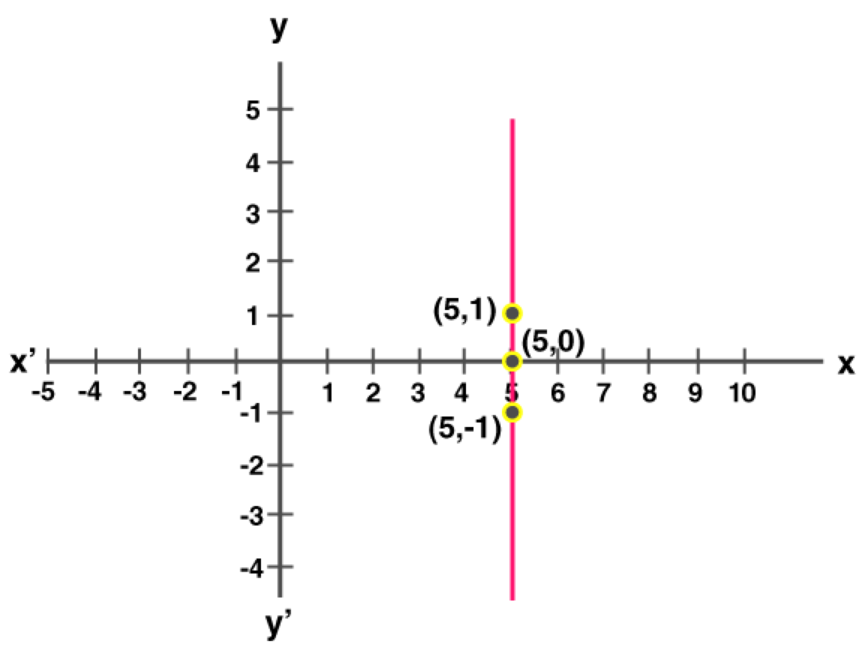
(ii)

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



(iii)

x	5	5	5
y	-1	0	1

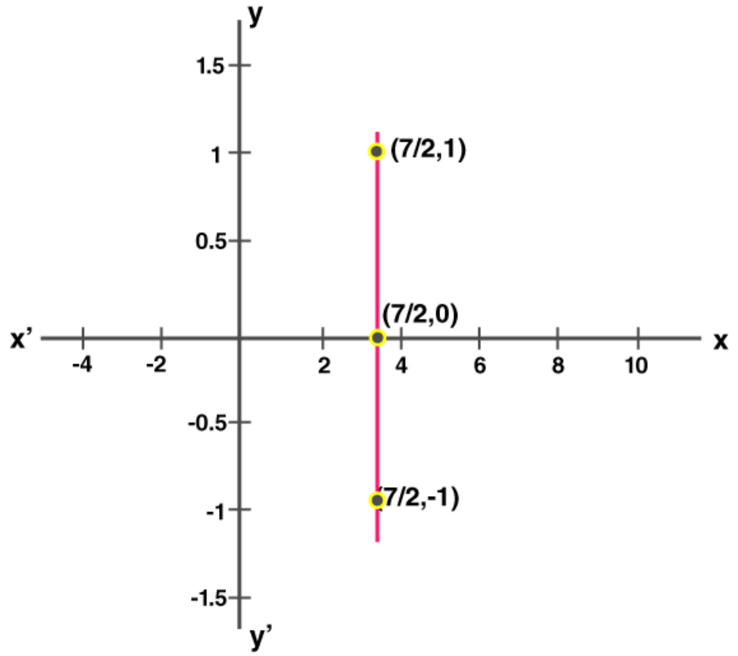


(iv)

We can also write the equation as:

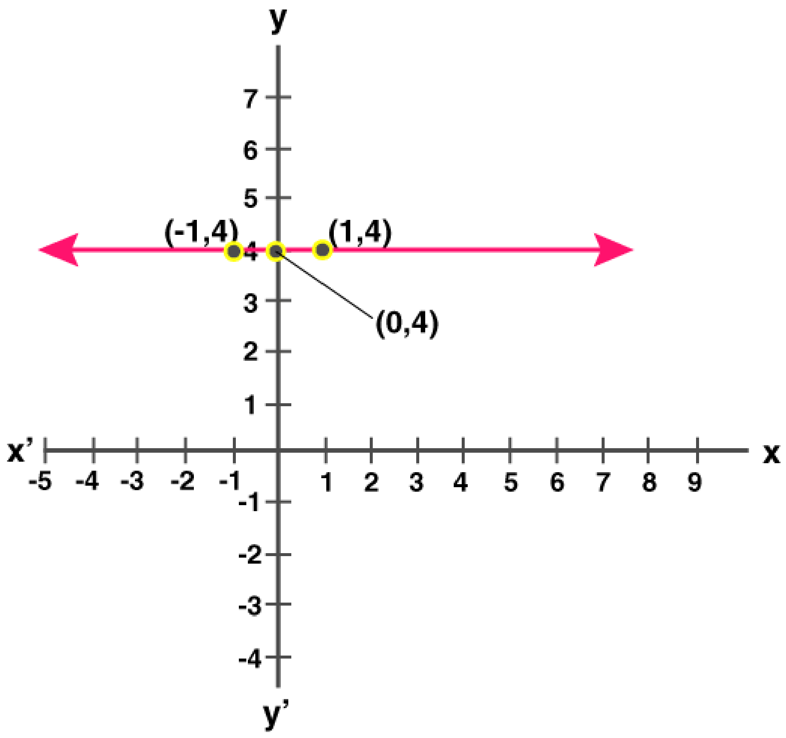
$$x = \frac{7}{2}$$

x	$\frac{7}{2}$	$\frac{7}{2}$	$\frac{7}{2}$
y	-1	0	1



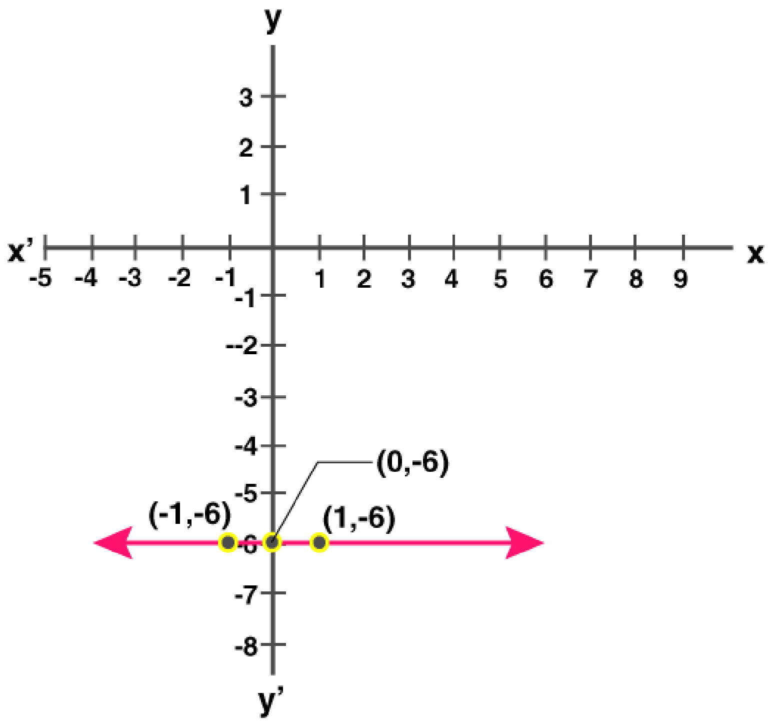
(v)

x	-1	0	1
y	4	4	4



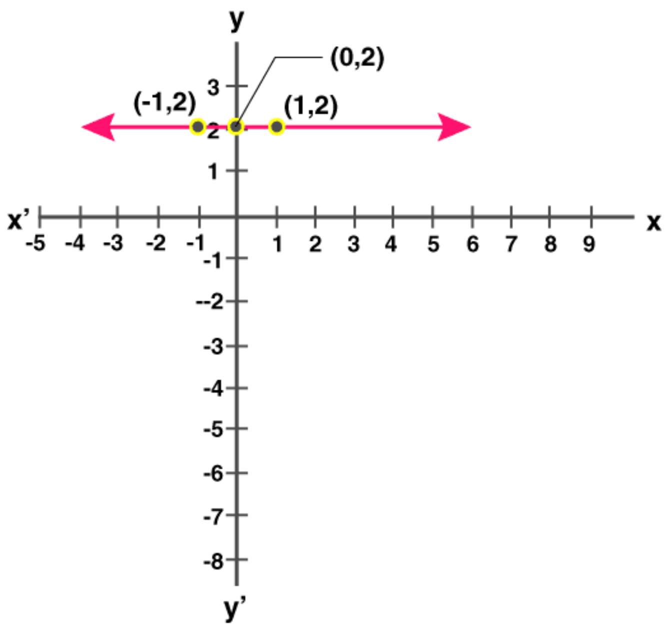
(vi)

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



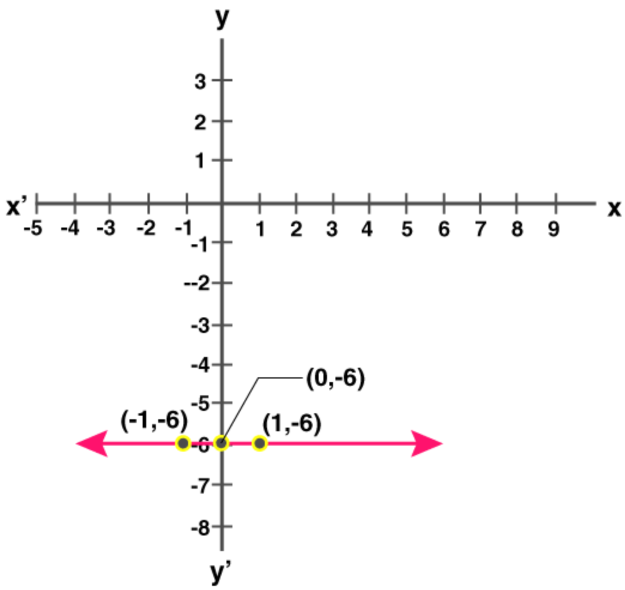
(vii)

x	-1	0	1
y	2	2	2



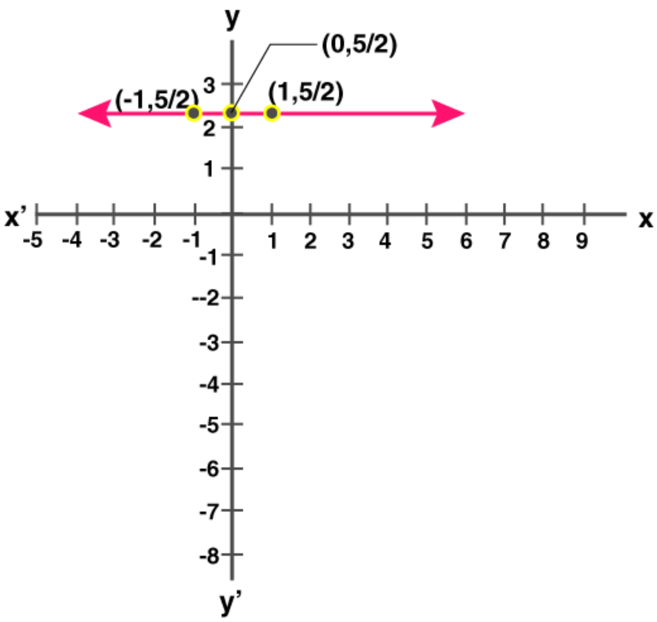
(viii)

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



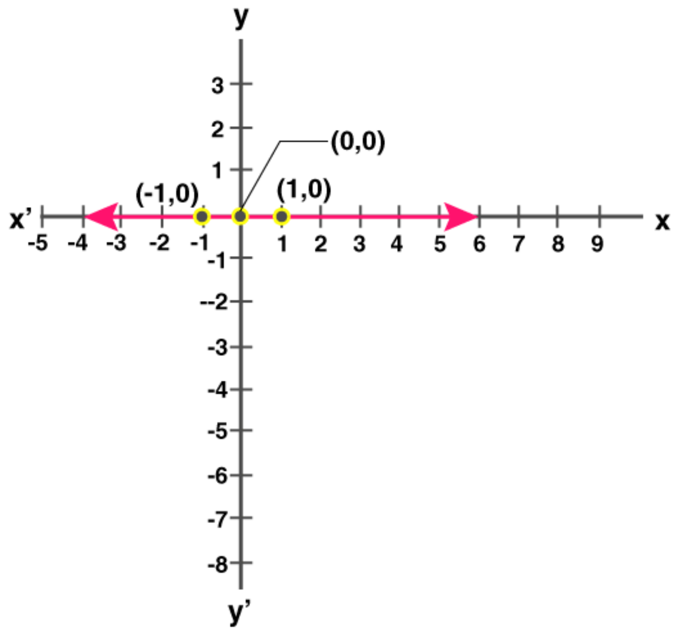
(ix)

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



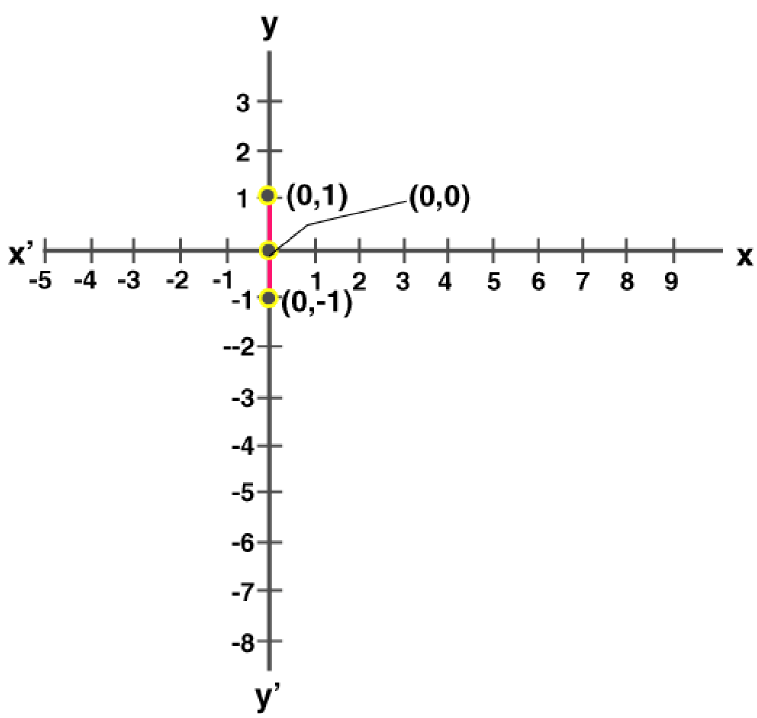
(x)

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) $4x - y = 0$

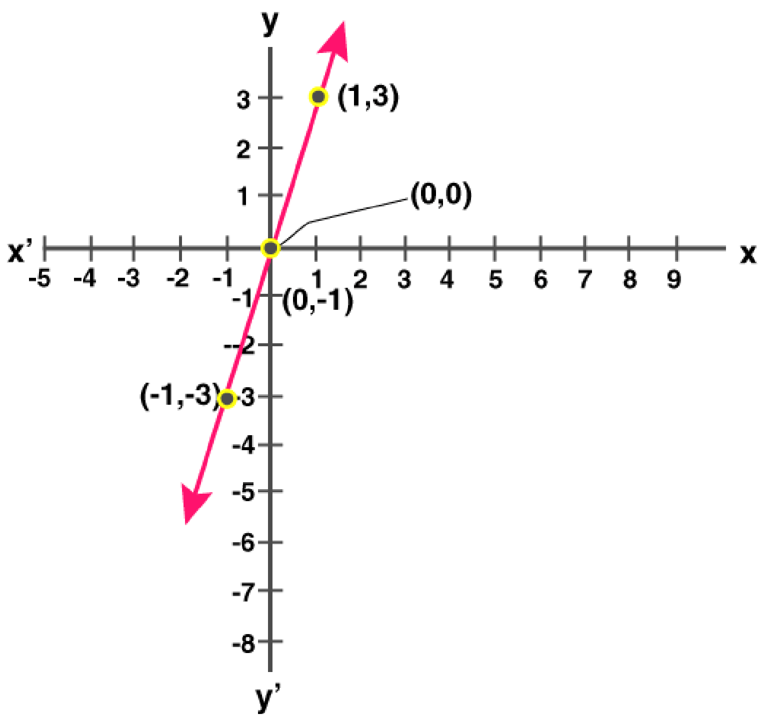
(viii) $3x + 2y = 0$

(ix) $x = -2y$

Solution:

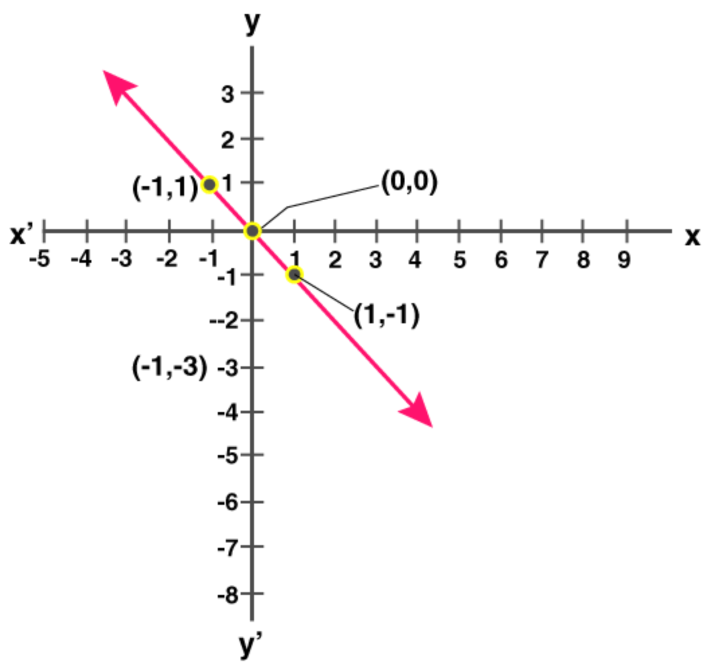
(i)

x	-1	0	1
y	-3	0	3



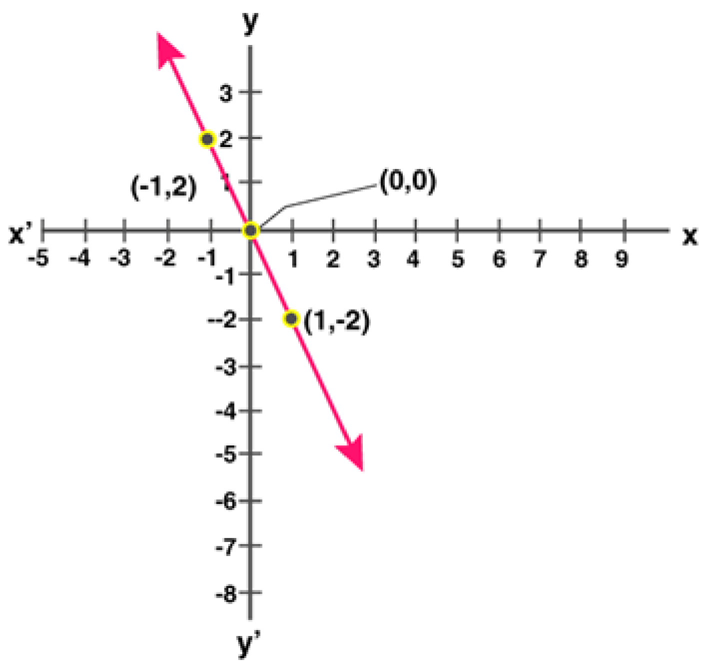
(ii)

x	-1	0	1
y	1	0	-1



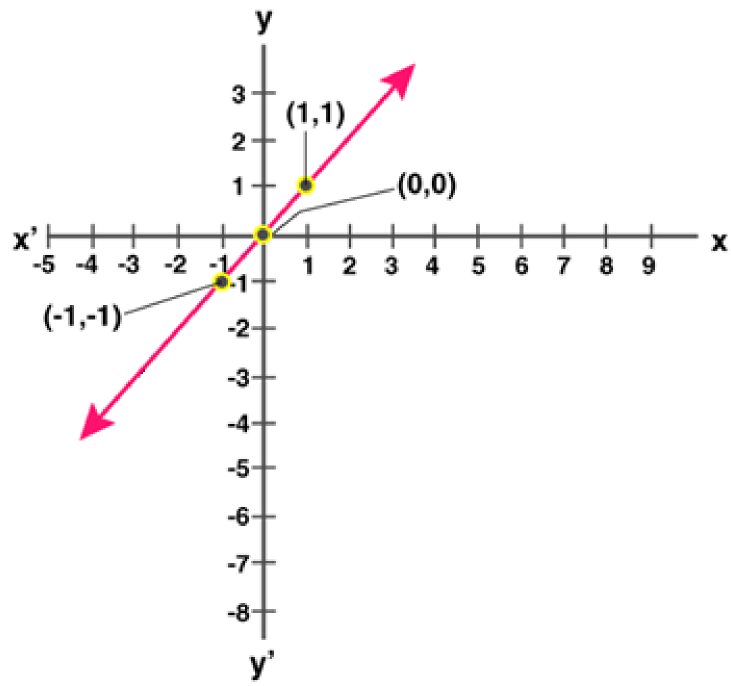
(iii)

x	-1	0	1
y	2	0	-2



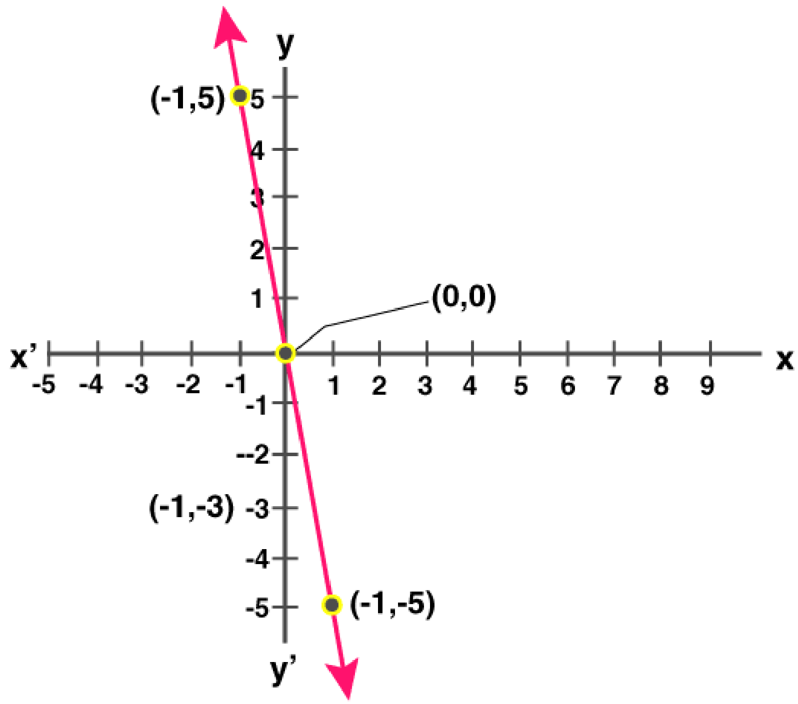
(iv)

x	-1	0	1
y	-1	0	1



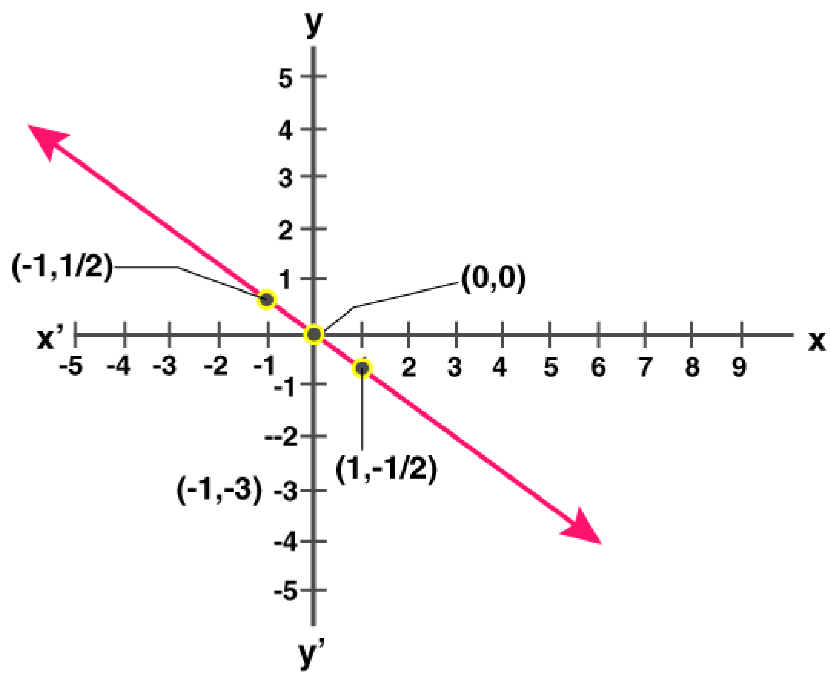
(v)

x	-1	0	1
y	5	0	-5



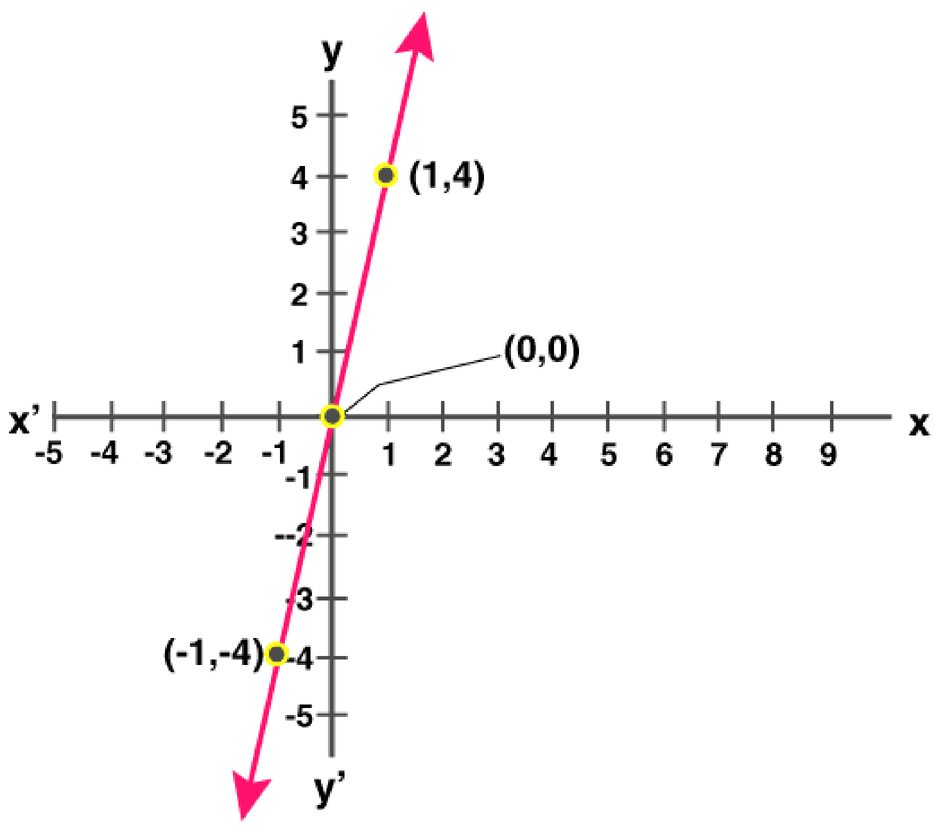
(vi)

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



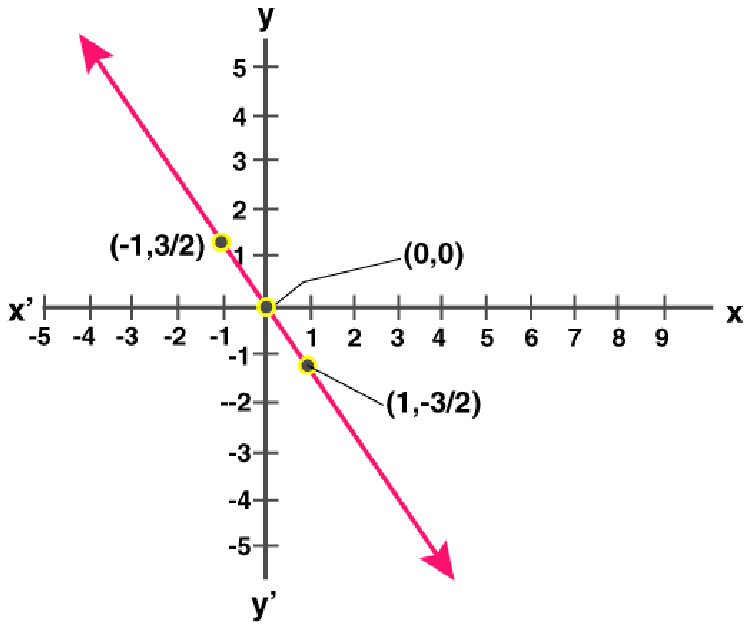
(vii)

x	-1	0	1
y	-4	0	4



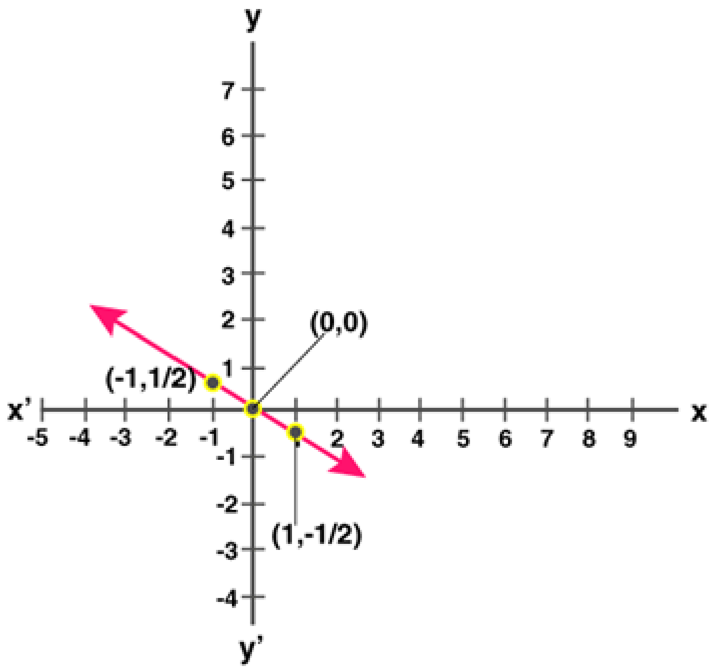
(viii)

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



(ix)

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



3. Draw the graph for the 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) $\frac{x-1}{3} - \frac{y+2}{2} = 0$

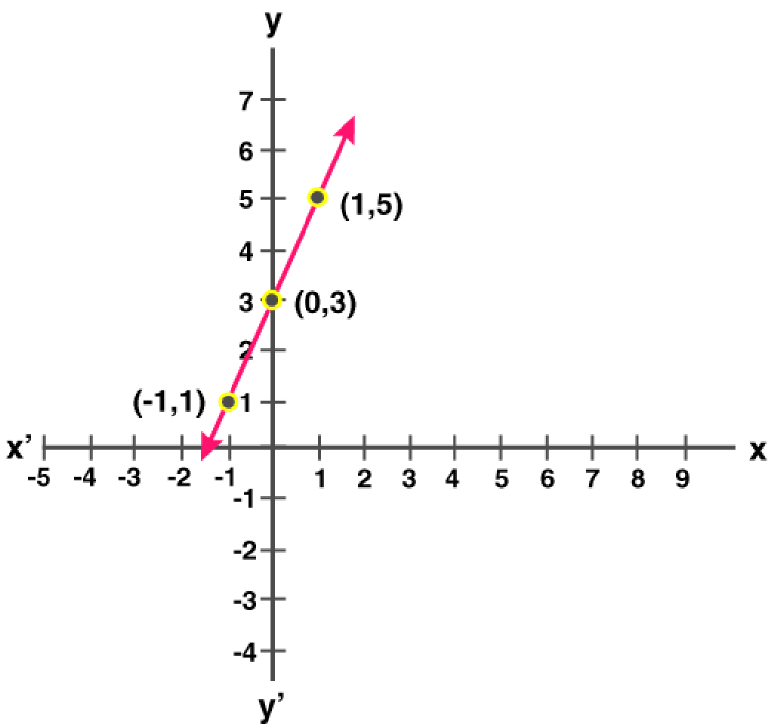
(viii) $x - 3 = \frac{2}{5}(y + 1)$

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

Solution:

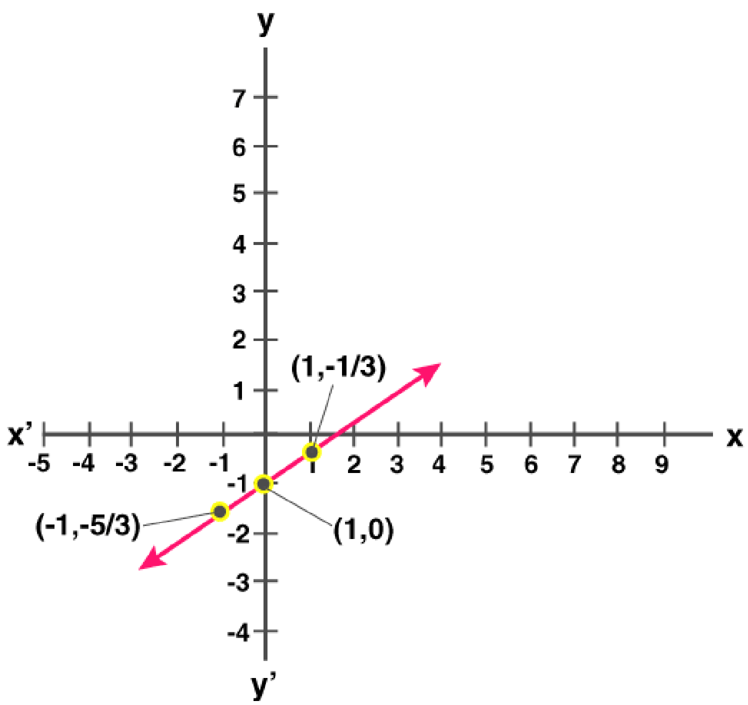
(i)

x	-1	0	1
y	$-\frac{5}{3}$	3	5



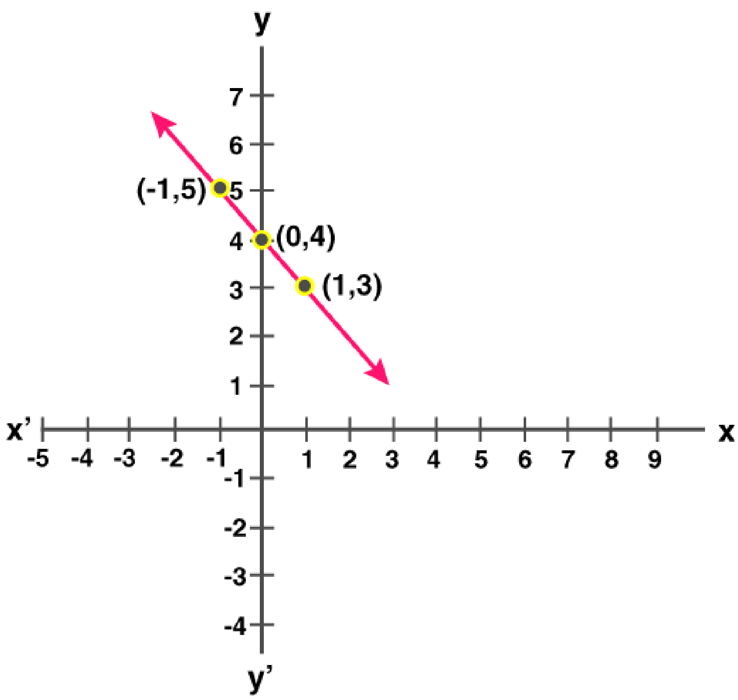
(ii)

x	-1	0	1
y	$-\frac{5}{3}$	-1	$-\frac{1}{3}$



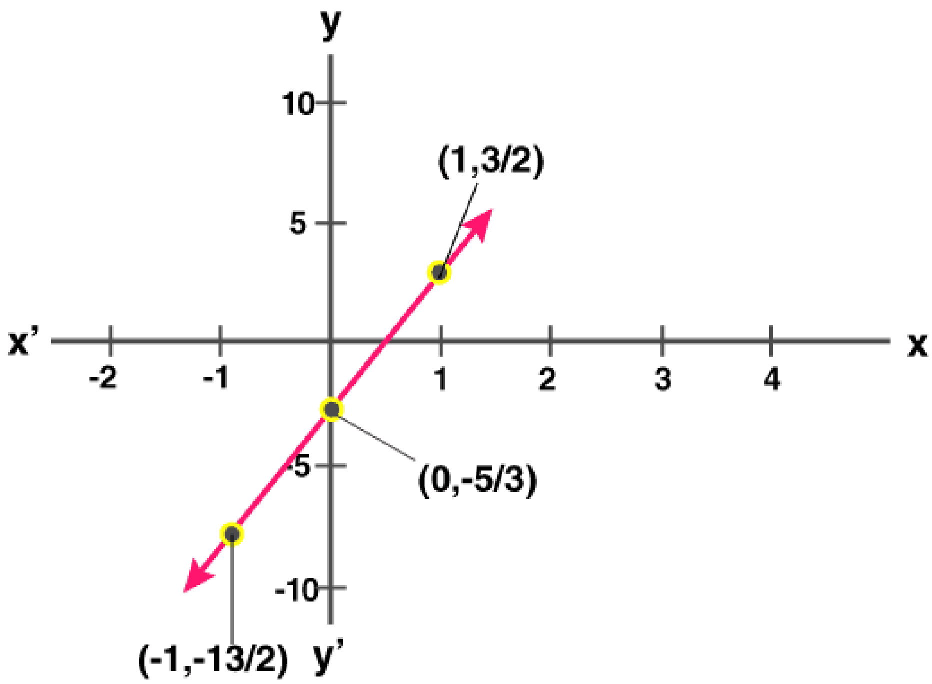
(iii)

x	-1	0	1
y	5	4	3



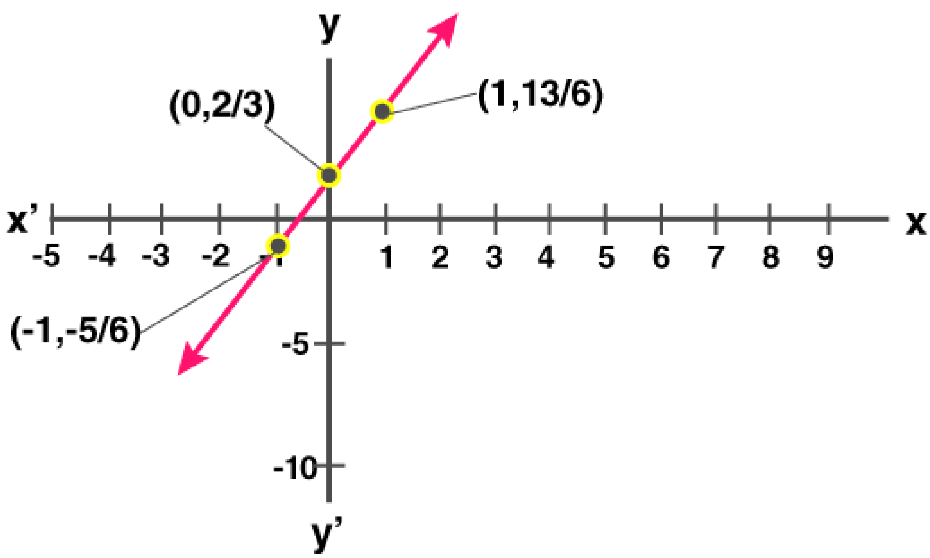
(iv)

x	-1	0	1
y	$-\frac{13}{2}$	$-\frac{5}{2}$	$\frac{3}{2}$



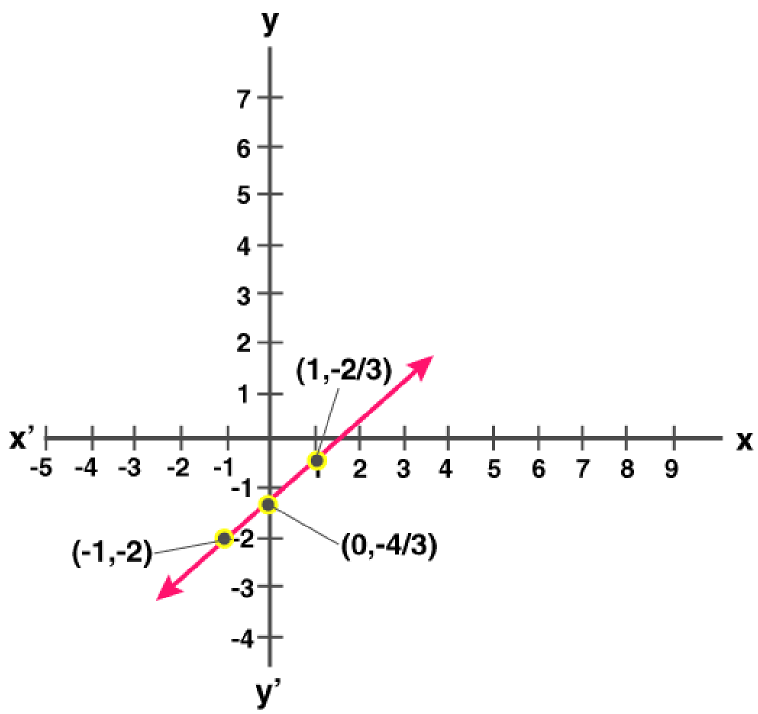
(v)

x	-1	0	1
y	$-\frac{5}{6}$	$\frac{2}{3}$	$\frac{13}{6}$



(vi)

x	-1	0	1
y	-2	$-\frac{4}{3}$	$-\frac{2}{3}$

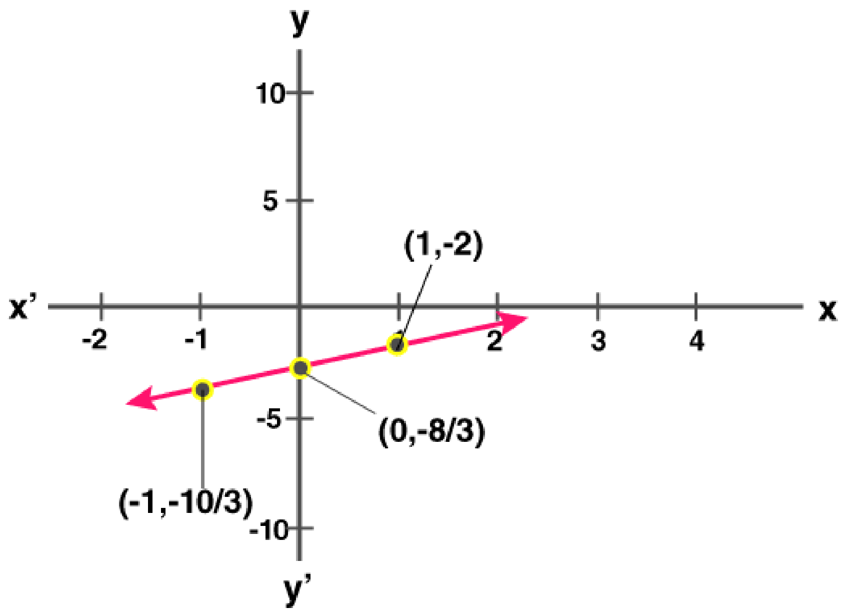


(vii)

The equation can be written as,

2x-3y=8

x	-1	0	1
y	$-\frac{10}{3}$	$-\frac{8}{3}$	-2

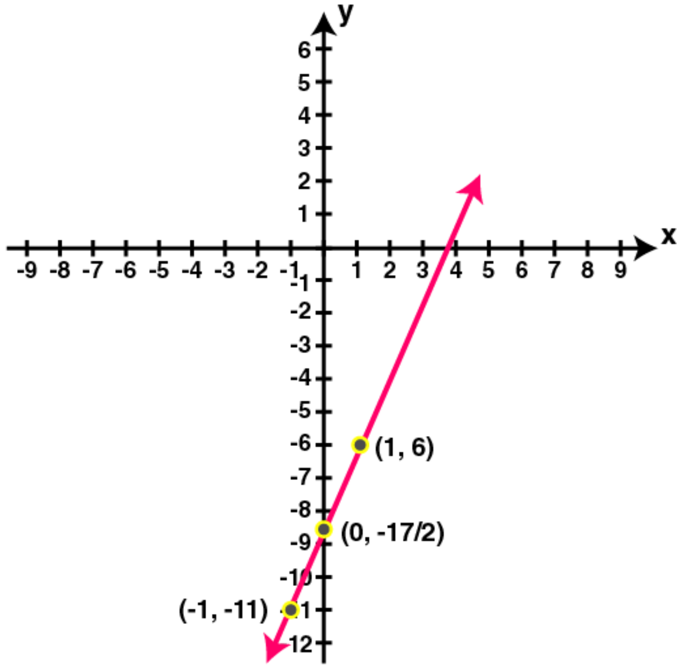


(viii)

The equation can be written as,

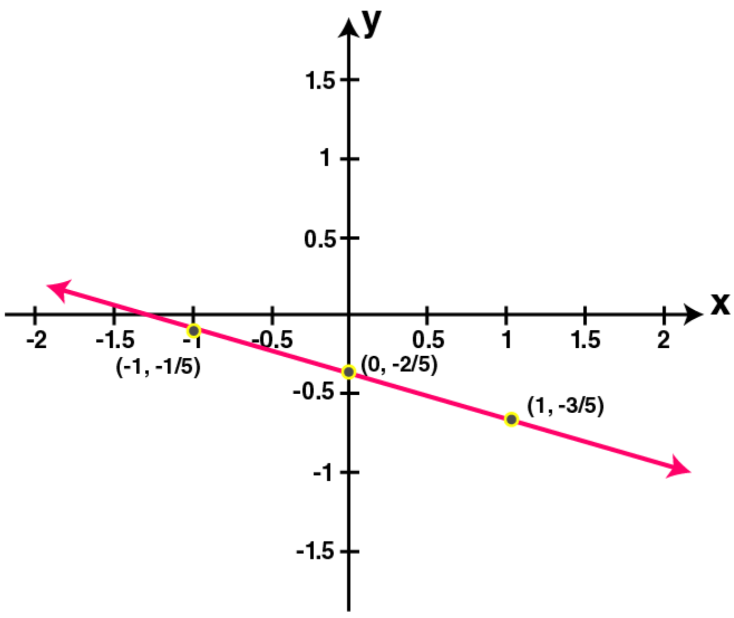
5x-2y=17

x	-1	0	1
y	-11	$-\frac{17}{2}$	-6



(ix)

x	-1	0	1
y	$-\frac{1}{5}$	$-\frac{2}{5}$	$-\frac{3}{5}$



4. Draw the graph for each equation given below:

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

(ii) $2x - 5y = 10$

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

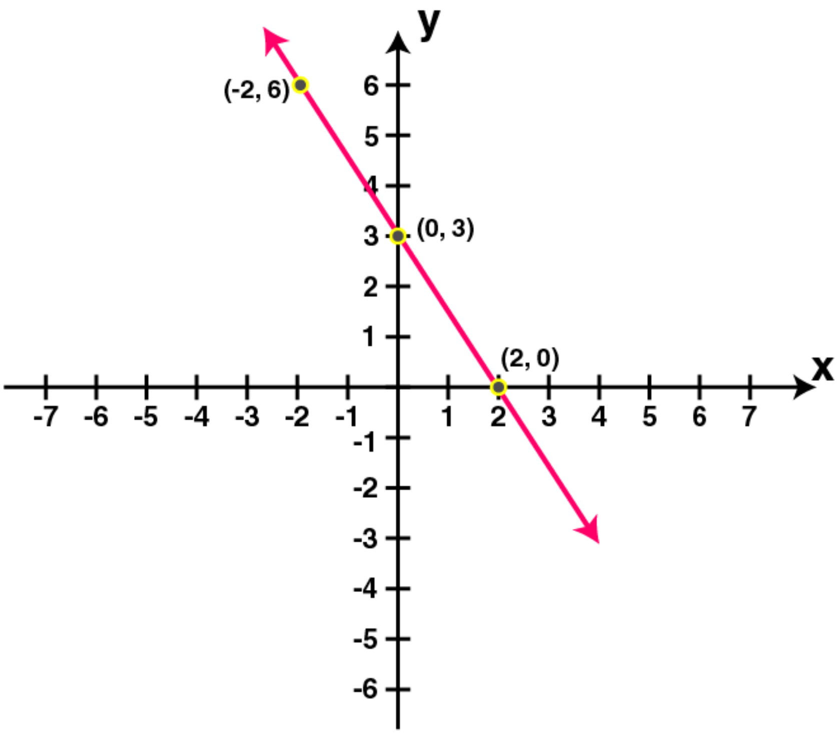
(iv) $\frac{2x-1}{3} - \frac{y-2}{5} = 0$

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

Solution:

(i)

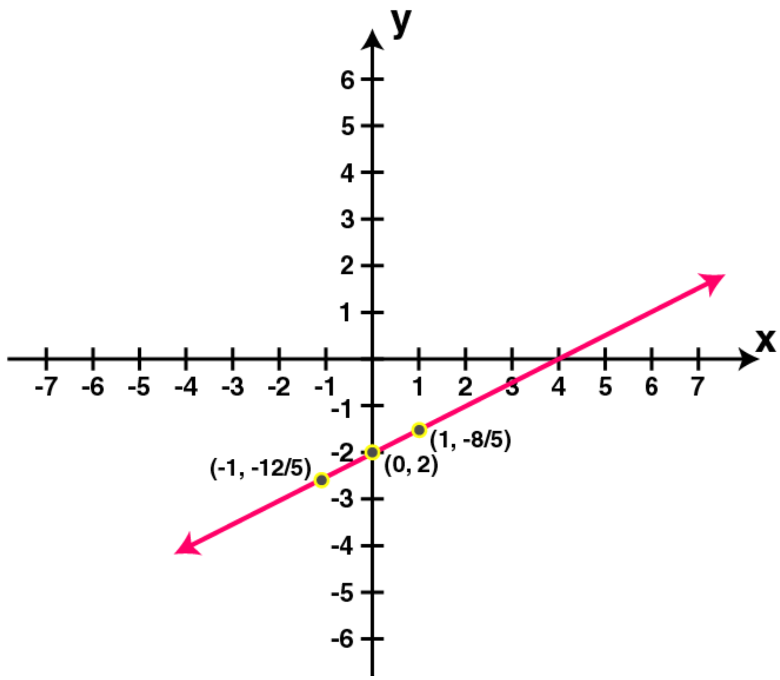
X	-2	0	2
Y	6	3	0



According to the graph, the line intersect *x* axis at (2,0) and *y* at (0,3).

(ii)

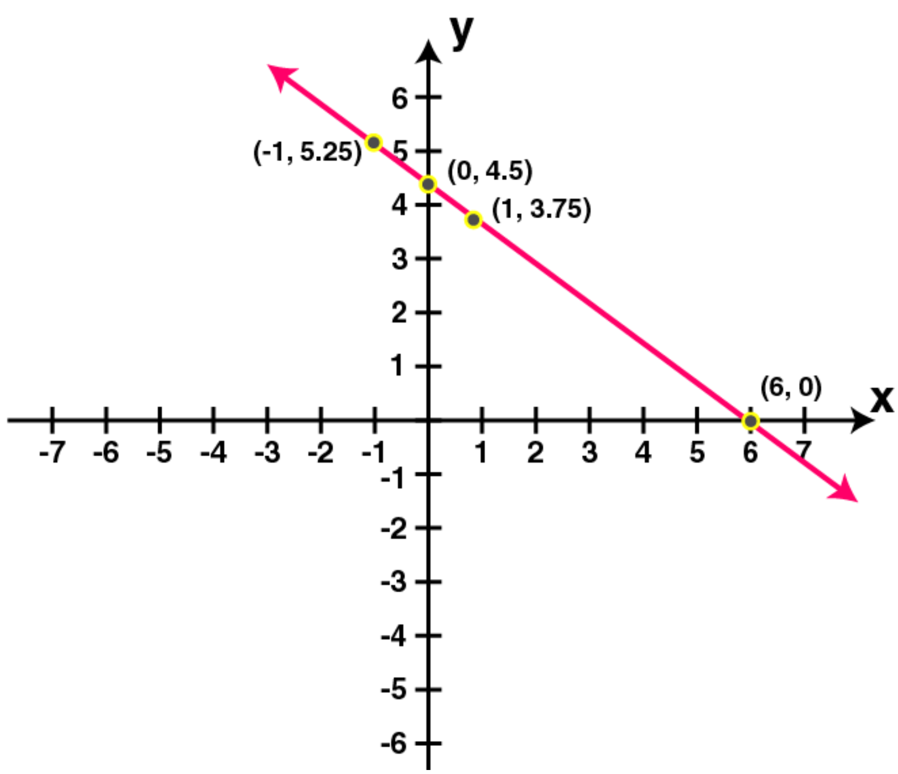
X	-1	0	1
Y	$-\frac{12}{5}$	-2	$-\frac{8}{5}$



According to the graph, the line intersect *x* axis at (5,0) and *y* at (0,-2).

(iii)

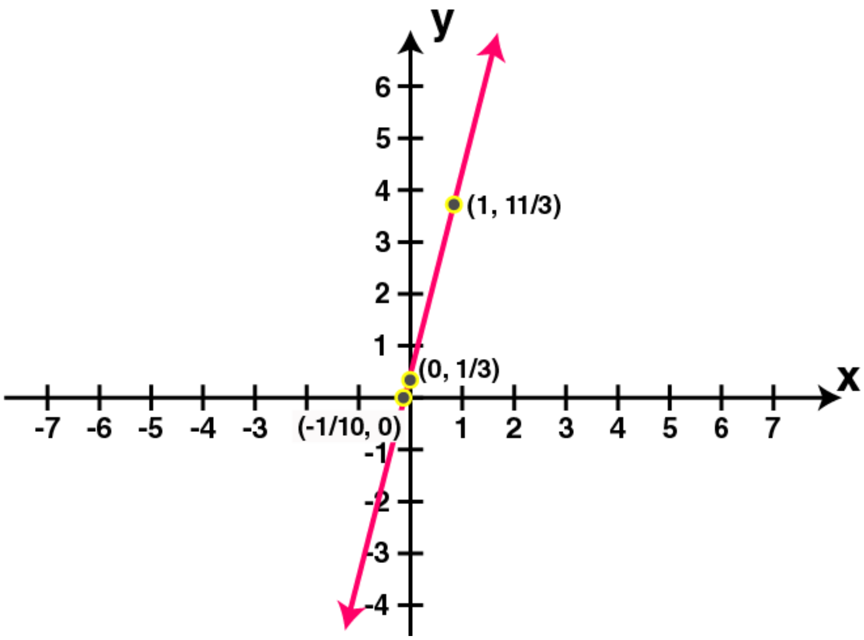
X	-1	0	1
Y	5.25	4.5	3.75



According to the graph, the line intersect *x* axis at (10,0) and *y* at (0,7.5).

(iv)

X	-1	0	1
Y	-3	$\frac{1}{3}$	$\frac{11}{3}$



According to the graph, the line intersect *x* axis at $\left(-\frac{1}{10}, 0\right)$ and *y* at (0, 4.5).

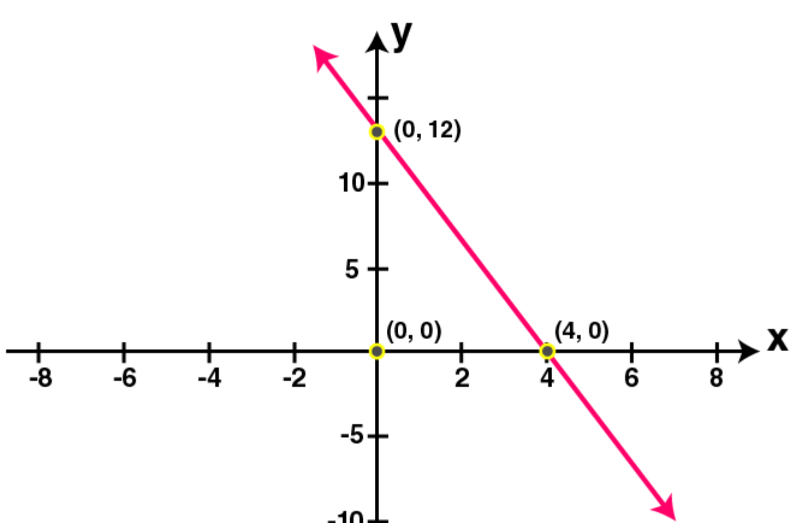
5. For each linear equation, given above, draw the graph and then use the graph drawn (in each case) to find the area of a triangle enclosed by the graph and the co-ordinates axes:

(i) 3x - (5 - y) = 7

(ii) 7 - 3 (1 - y) = -5 + 2x.

Solution:

(i)



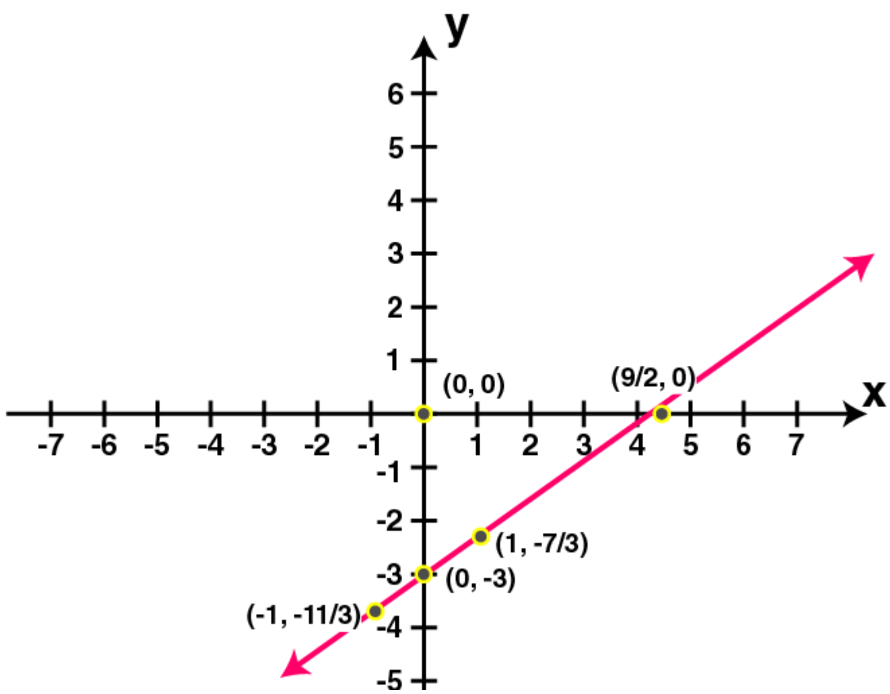
Area of the right triangle obtained will be:

$$= \frac{1}{2} \times \text{base} \times \text{altitude}$$

$$= \frac{1}{2} \times 4 \times 12$$

$$= 24 \text{ sq.units}$$

(ii)



Area of the right triangle obtained will be:

$$A = \frac{1}{2} \times \text{base} \times \text{altitude}$$

$$= \frac{1}{2} \times \frac{9}{2} \times 3$$

$$= \frac{27}{4} = 6.75 \text{ sq.units}$$

6. For each pair of linear equations given below, draw graphs and then state, whether the lines drawn are parallel or perpendicular to each other.

(i) $y = 3x - 1$

$y = 3x + 2$

(ii) $y = x - 3$

$y = -x + 5$

(iii) $2x - 3y = 6$

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

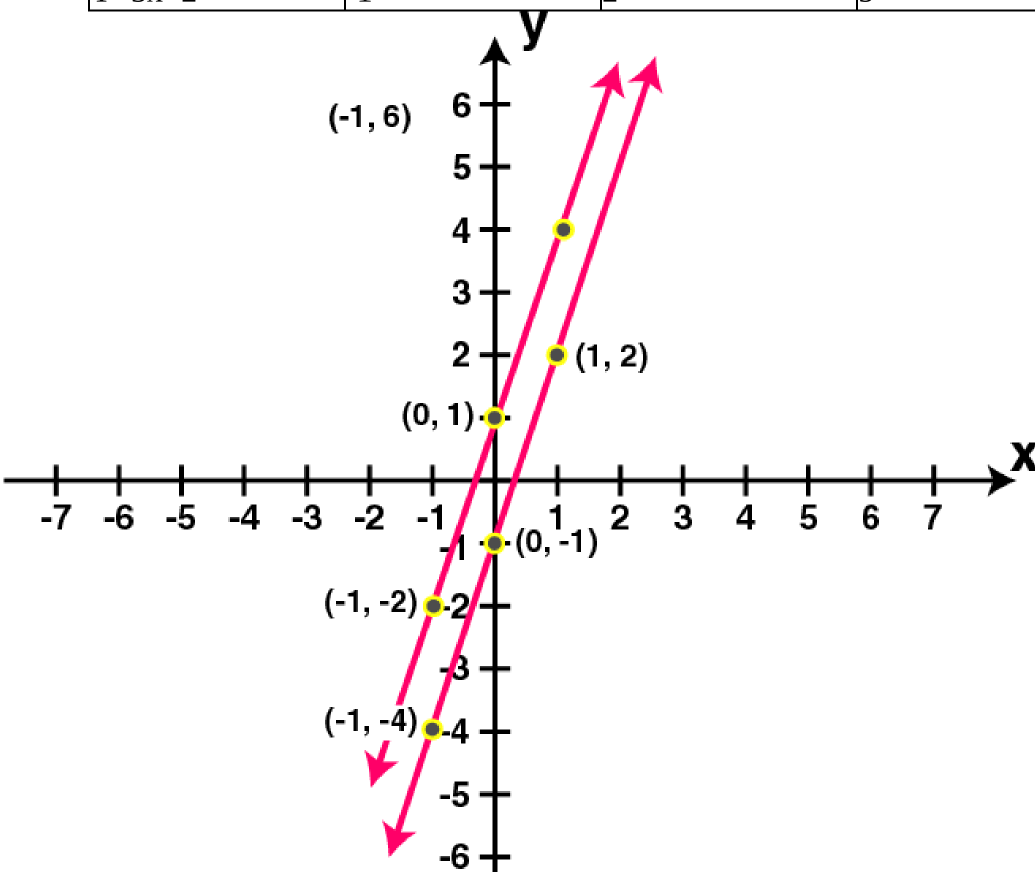
(iv) **3x + 4y = 24**

$$\frac{x}{4} + \frac{y}{3} = 1$$

Solution:

(i) To draw the graph of y = 3x - 1 and y = 3x + 2 follows the steps:

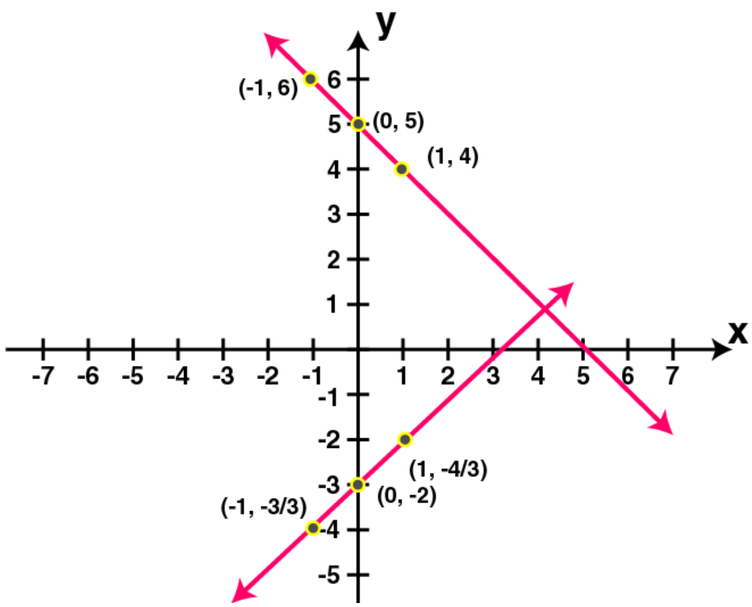
X	-1	0	1
Y=3x-1	-4	-1	2
Y=3x+2	-1	2	5



According to the graph, the lines are parallel.

(ii) To draw the graph of y = x - 3 and y = -x + 5 follows the steps:

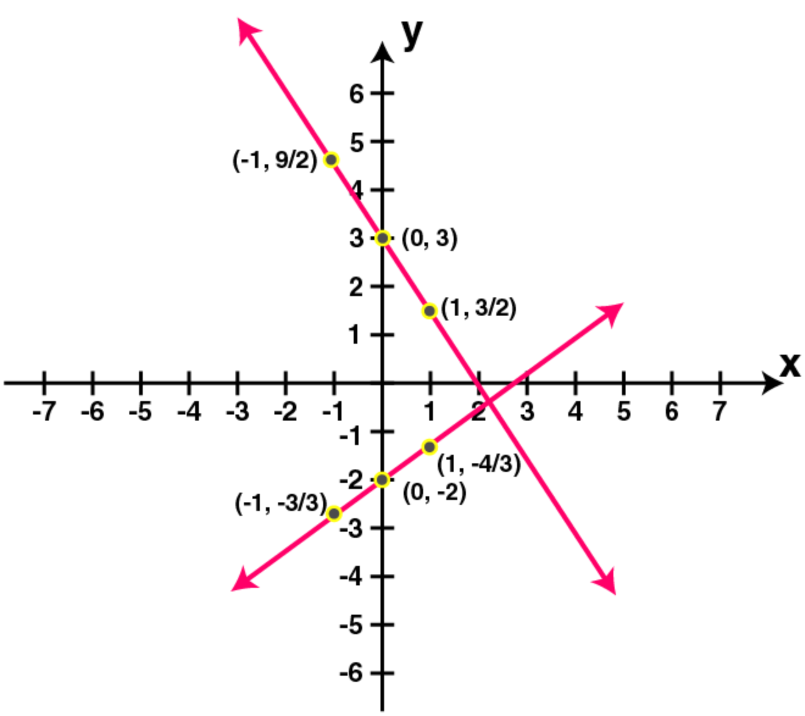
X	-1	0	1
Y=x-3	-4	-3	-2
Y=-x+5	6	5	4



According to the graph, the lines are perpendicular.

(iii)

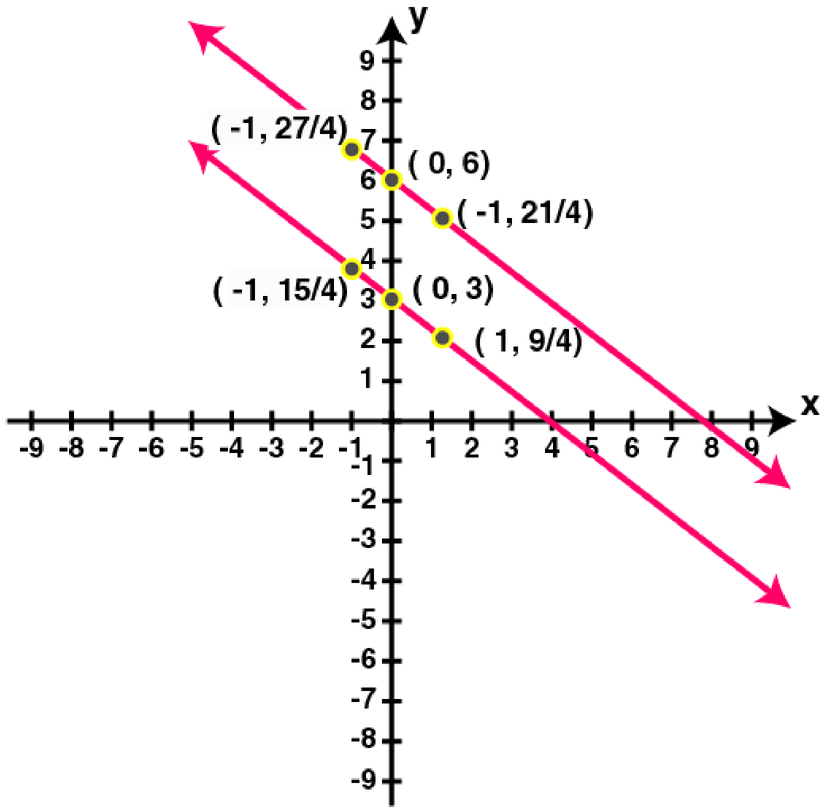
X	-1	0	1
$y=\frac{2}{3}x-2$	$-\frac{8}{3}$	-2	$-\frac{4}{3}$
$y=-\frac{3}{2}x+3$	$\frac{9}{2}$	3	$\frac{3}{2}$



According to the graph, the lines are perpendicular.

(iv)

X	-1	0	1
$y = -\frac{3}{4}x + 6$	$\frac{27}{4}$	6	$\frac{21}{4}$
$y = -\frac{3}{4}x + 3$	$\frac{15}{4}$	3	$\frac{9}{4}$



According to the graph, the lines are parallel.

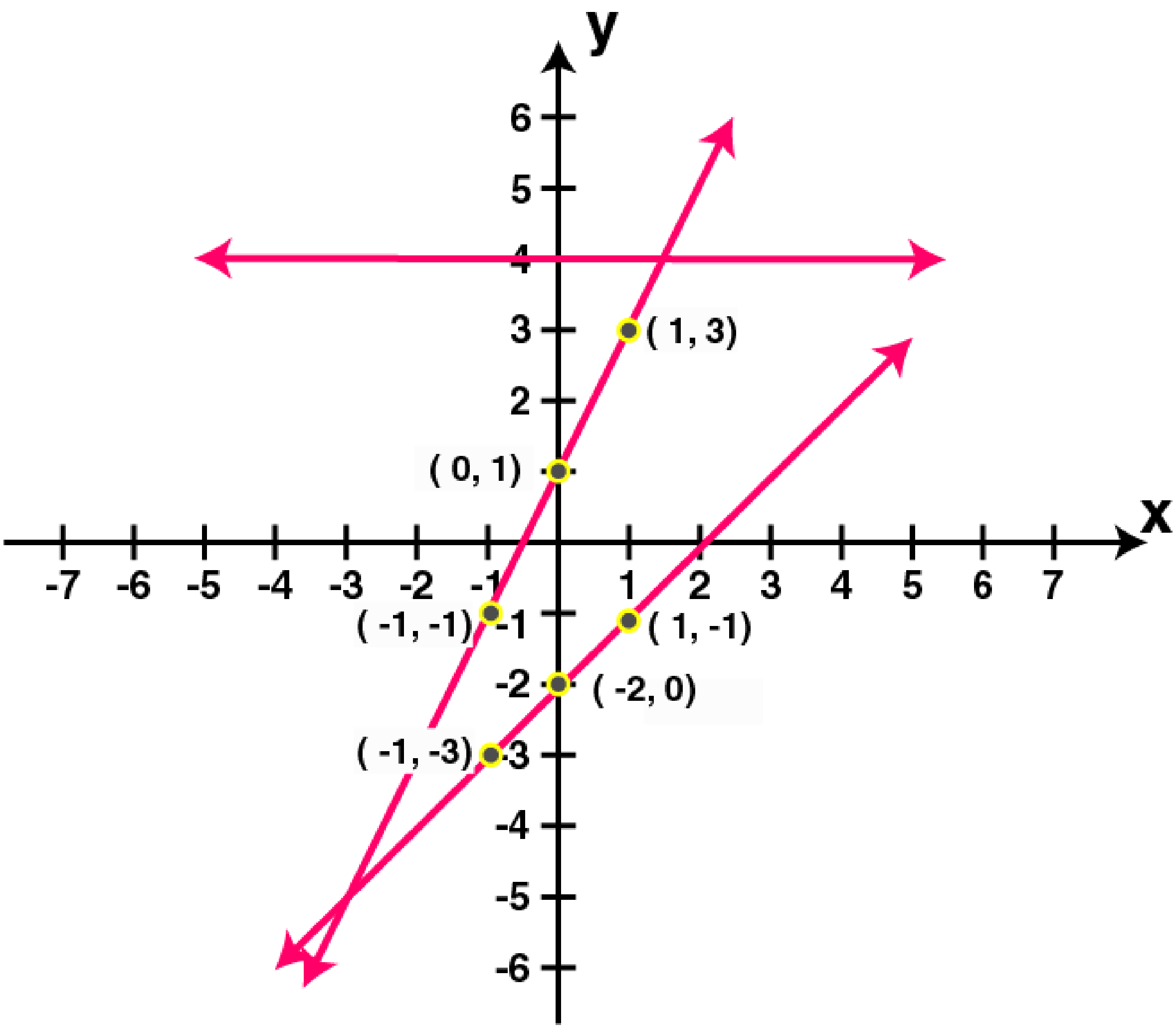
7. On the same graph paper, plot the graph of y = x - 2, y = 2x + 1 and y = 4 from x= -4 to 3.

Solution:

First prepare a table as follows:

X	-1	0	1
Y=x-2	-3	-2	-1
Y=2x+1	-1	1	3
Y=4	4	4	4

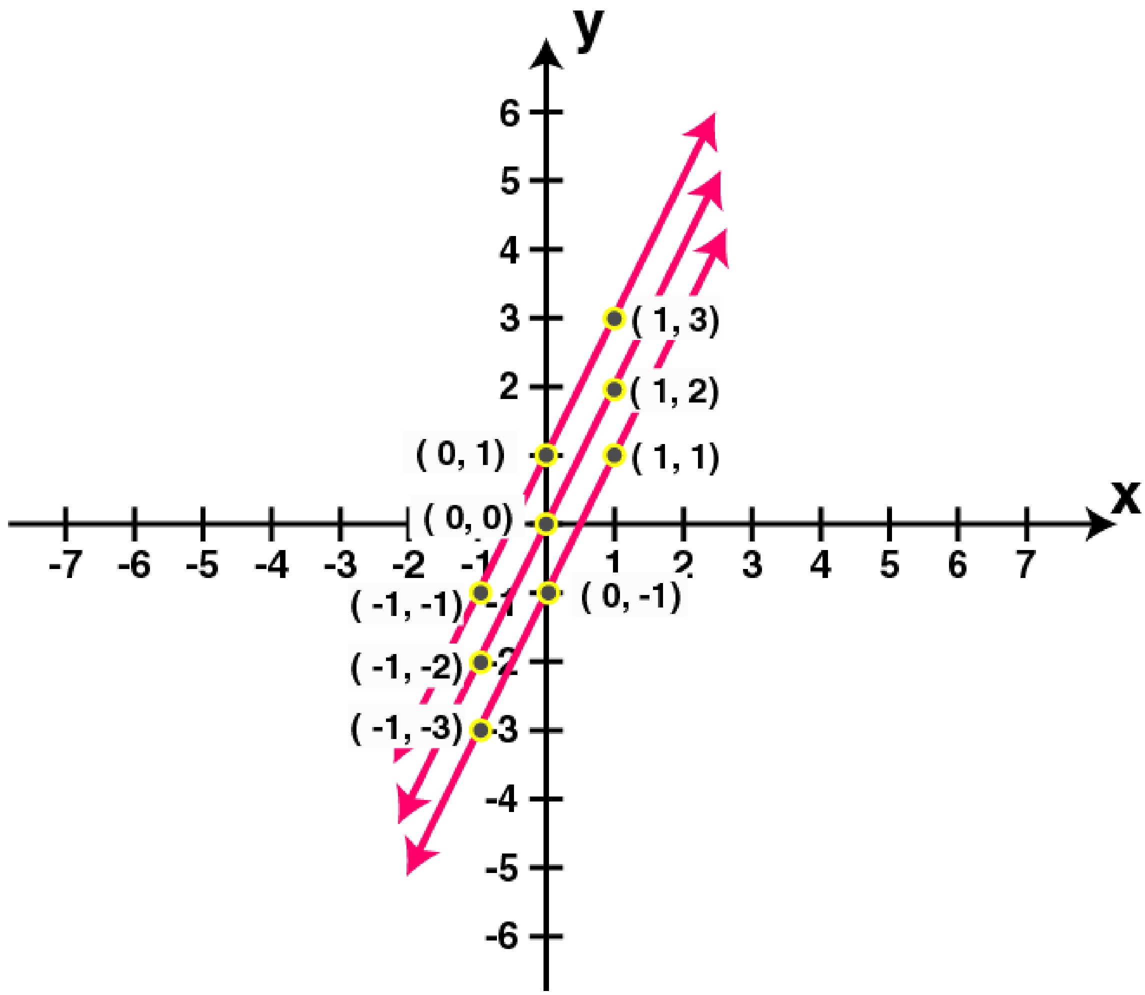
Now the graph can be drawn as follows:



8. **On the same graph paper, plot the graphs of y = 2x - 1, y = 2x and y = 2x + 1 from x = -2 to x = 4. Are the graphs (lines) drawn parallel to each other?**

Solution:

X	-1	0	1
Y=2x-1	-3	-1	1
Y = 2x	-2	0	2
Y=2x+1	-1	1	3

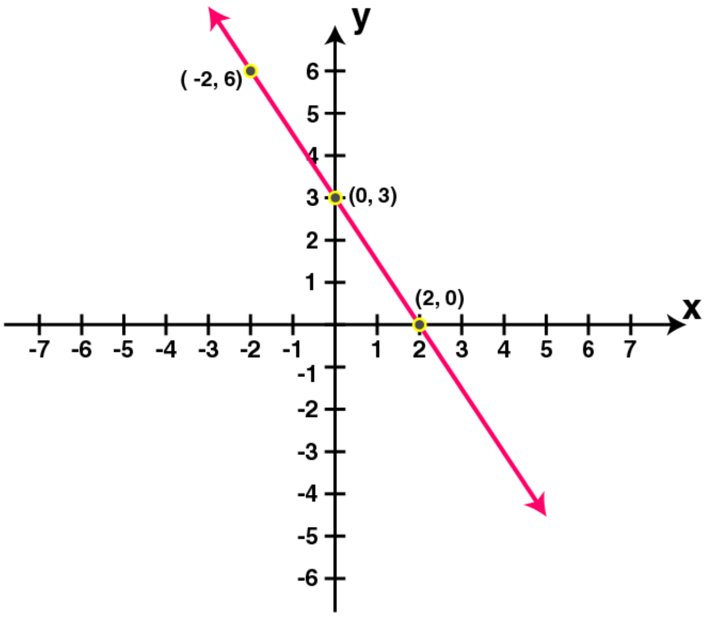


According to the graph, the lines are parallel to each other.

9. The graph of 3x + 2y = 6 meets the x=axis at point P and the y-axis at point Q. Use the graphical method to find the co-ordinates of points P and Q.

Solution:

X	-2	0	2
Y	6	3	0



According to the graph, the line intersect *x* axis at (2,0) and *y* at (0,3).
The coordinates of P(x-axis) and Q(y-axis) are (2,0) and (0,3) respectively.

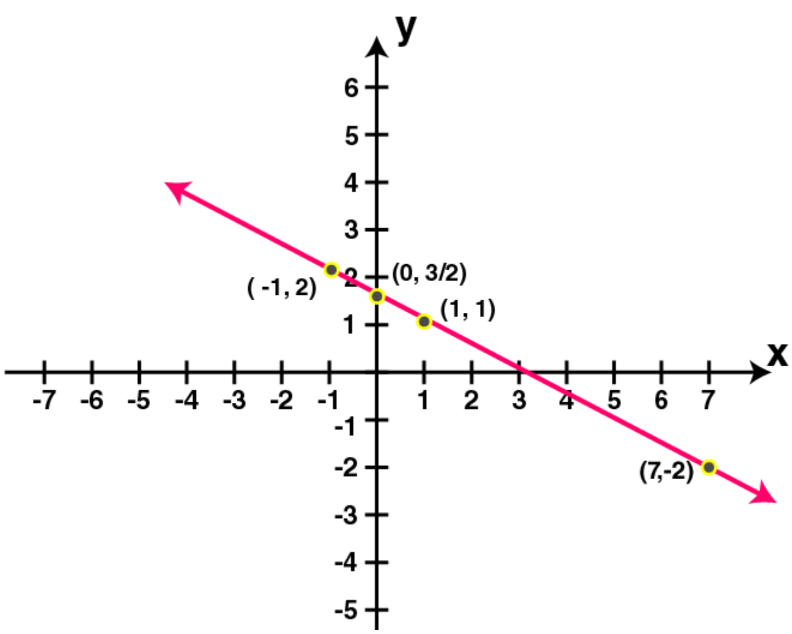
10. Draw the graph of equation x + 2y - 3 = 0. From the graph, find:

(i) x_1, the value of x, when y = 3

(ii) x_2, the value of x, when y = -2.

Solution:

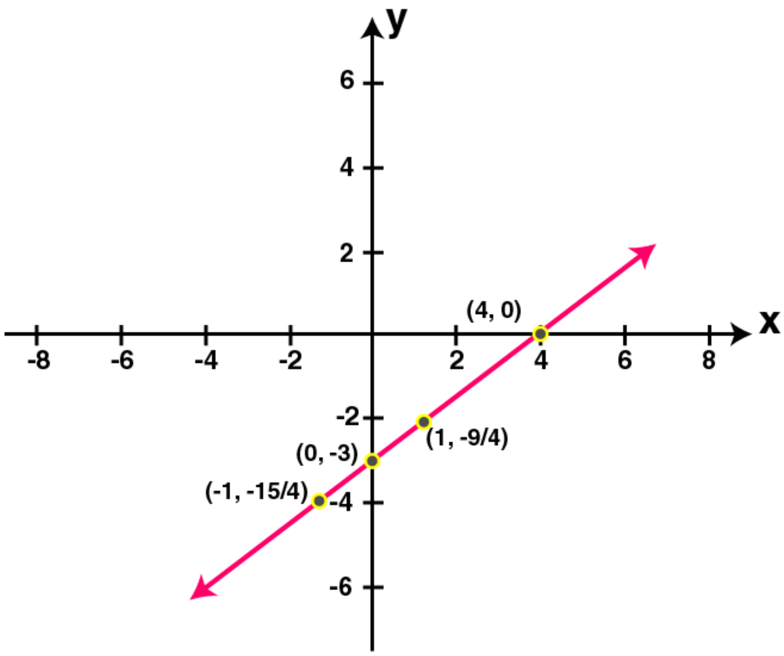
X	-1	0	1
Y	2	$\frac{3}{2}$	1



(i)
When y = 3, we get x = -3
(ii)
When y = -2, we get x = 7

11. Draw the graph of the equation 3x - 4y = 12.
Use the graph drawn to find:
(i) y_1, the value of y, when x = 4.
(ii) y_2, the value of y, when x = 0.
Solution:

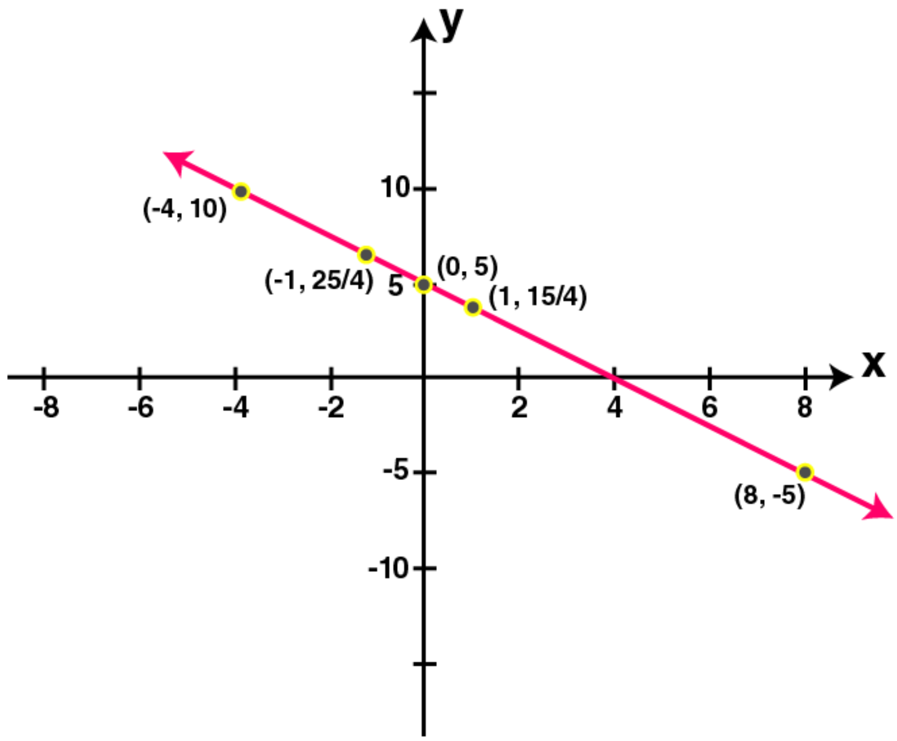
x	-1	0	1
y	$-\frac{15}{4}$	-3	$-\frac{9}{4}$



According to the graph,
When x = 4, y = 0
When x = 0, y = -3.

12. Draw the graph of equation $\frac{x}{4}+\frac{y}{5}=1$. Use the graph drawn to find:
(i) x_1, the value of x, when y = 10
(ii) y_1, the value of y, when x = 8.
Solution:

x	-1	0	1
y	$\frac{25}{4}$	5	$\frac{15}{4}$



According to the graph,
When y = 10, the value of x = -4.
When x = 8 the value of y = -5.

13. Use the graphical method to show that the straight lines given by the equations x + y = 2, x - 2y = 5 and $\frac{x}{3} + y = 0$ pass through the same point.

Solution:

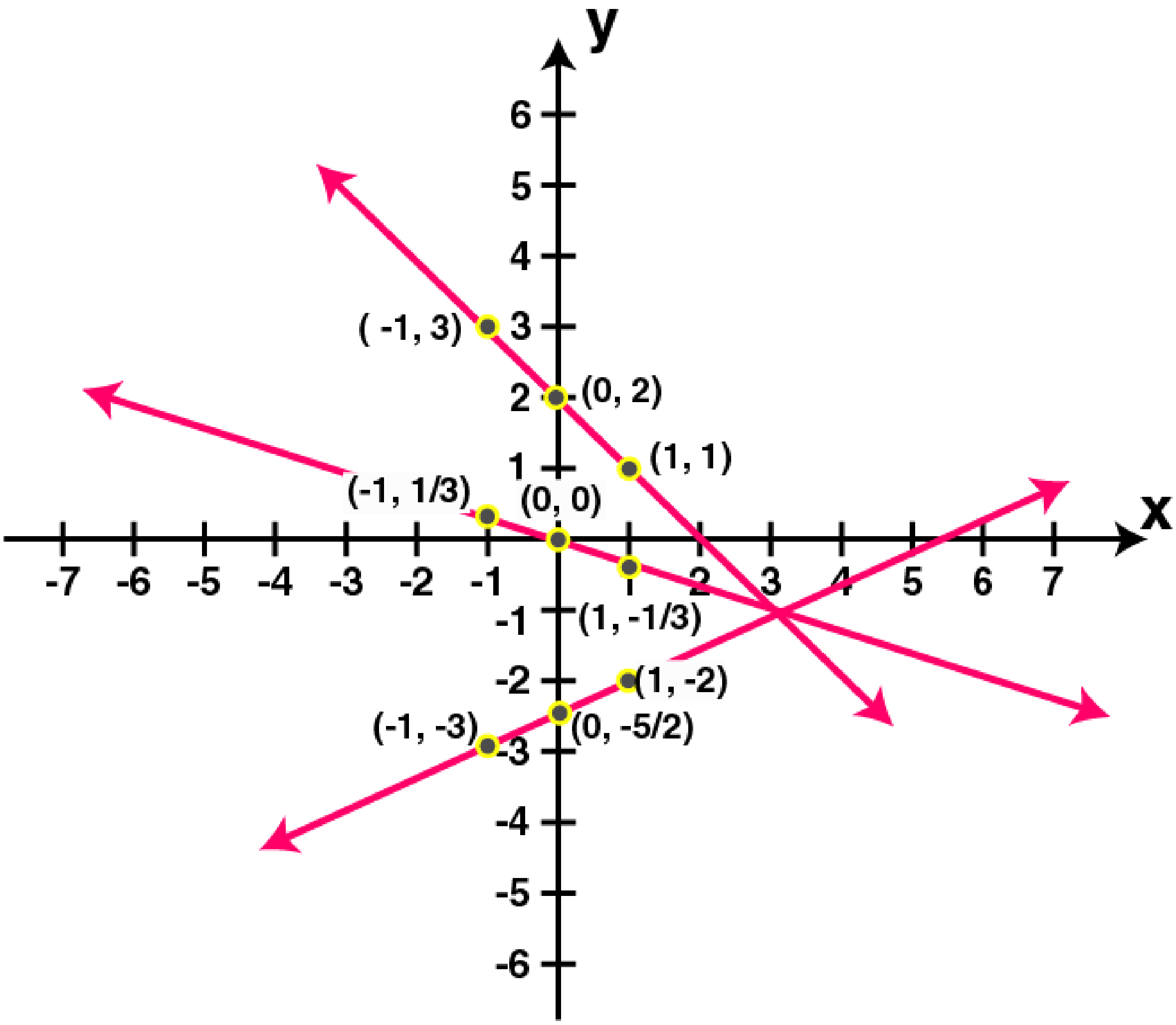
We can write the given equation as:

y = 2 - x

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

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

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

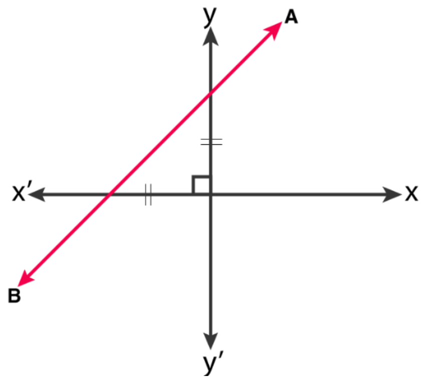


According to the graph, the equation of lines are passes through the same point.

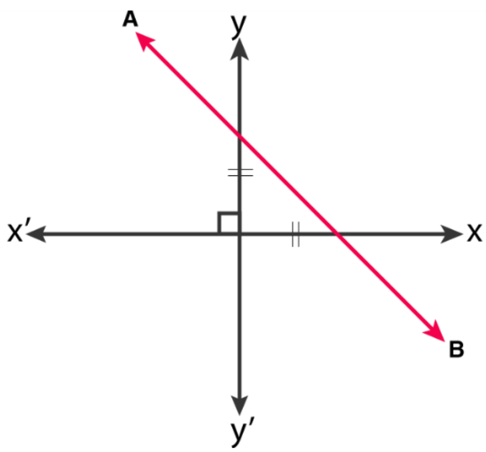
EXERCISE 26(C)

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

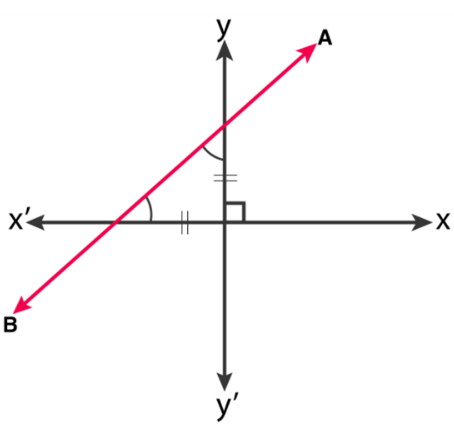
(i)



(ii)



(iii)



Solution:

We know that, the angle which a straight line makes with the positive direction of x-axis (measured in anticlockwise direction) is called inclination of the line.

(i) The inclination is $\theta = 45°$

(ii) The inclination is $\theta = 135°$

(iii) The inclination is $\theta = 30°$

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) $\theta = 0°$ is the inclination of a line parallel to x-axis.
(ii) $\theta = 90°$ is the inclination of a line perpendicular to x-axis.
(iii) $\theta = 90°$ is the inclination of a line parallel to y-axis.
(iv) $\theta = 0°$ is the inclination of a line perpendicular to y-axis.

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

Solution:

We know that, the slope of the line is $\tan\theta$ if θ is the inclination of a line.
Slope is usually denoted by letter m.

(i) Here the inclination of a line is 0°, then $\theta = 0°$
Hence, the slope of the line is $m = \tan 0° = 0$
(ii) Here the inclination of a line is 30°, then $\theta = 30°$
Hence, the slope of the line is $m = \tan\theta = 30° = \frac{1}{\sqrt{3}}$
(iii) Here the inclination of a line is 45° , then $\theta = 45°$
Hence, the slope of the line is $m = \tan 45° = 1$
(iv) Here the inclination of a line is 60°, then $\theta = 60°$
Hence, the slope of the line is $m = \tan 60° = \sqrt{3}$

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

Solution:

We know that, if $\tan\theta$ is the slope of a line; then inclination of the line is θ

(i) When slope of line is 0; then $\tan\theta = 0$

$$\tan\theta = 0$$

$$\tan\theta = \tan 0^0$$

$$\theta = 0^0$$

So, the inclination of the given line is $\theta = 0°$

(ii) When slope of line is 1; then tan θ = 1

$\tan\theta = 1$

$\tan\theta = \tan 45^0$

$\theta = 45^0$

So, the inclination of the given line is θ = 45°

(iii) When slope of line is $\sqrt{3}$; then tan θ = √3

$\tan\theta = \sqrt{3}$

$\tan\theta = \tan 60^0$

$\theta = 60^0$

So, the inclination of the given line is θ = 60°

(iv) When slope of line is $\frac{1}{\sqrt{3}}$; then $\tan\theta = \frac{1}{\sqrt{3}}$

$\tan\theta = \frac{1}{\sqrt{3}}$

$\tan\theta = \tan 30^0$

$\theta = 30^0$

So, the inclination of the given line is θ = 30°

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) The inclination of line parallel to x-axis is θ = 0°
Slope (m) = tan θ = tan 0° = 0

(ii) The inclination of line perpendicular to x-axis, the inclination is θ = 90°
Slope (m) = tan θ = tan 90° = ∞ (not defined)

(iii) The inclination of line parallel to y-axis, the inclination is θ = 90°
Slope(m) = tan θ = tan 90° = ∞(not defined)

(iv) The inclination of line perpendicular to y-axis, the inclination is θ = 0°
Slope(m) = tan θ = tan 0° = 0

6. For each of the equation given below, find the slope and the y-intercept:
(i) x + 3y + 5 = 0
(ii) 3x - y - 8 = 0
(iii) 5x = 4y + 7
(iv) x= 5y - 4
(v) y = 7x - 2
(vi) 3y = 7

(vii) 4y + 9 = 0

Solution:

Equation of any straight line in the form y = mx + c, where slope = m(co-efficient of x) and y-intercept = c(constant term)

(i)

$$x+3y+5=0$$
$$3y=-x-5$$
$$y=\frac{-x-5}{3}$$
$$y=\frac{-1}{3}x+\left(-\frac{5}{3}\right)$$

$$\text{slope} = \text{co-efficient of } x = -\frac{1}{3}$$
$$\text{y-intercept} = \text{constant term} = -\frac{5}{3}$$

(ii)

$$3x-y-8=0$$
$$-y=-3x+8$$
$$y=3x+(-8)$$

$$\text{slope} = \text{co-efficient of } x = 3$$
$$\text{y-intercept} = \text{constant term} = -8$$

(iii)

$$5x=4y+7$$
$$4y=5x-7$$
$$y=\frac{5x-7}{4}$$
$$y=\frac{5}{4}x+\left(-\frac{7}{4}\right)$$

$$\text{slope} = \text{co-efficient of } x = \frac{5}{4}$$
$$\text{y-intercept} = \text{constant term} = -\frac{7}{4}$$

(iv)

$$x = 5y - 4$$
$$5y = x + 4$$
$$y = \frac{x+4}{5}$$
$$y = \frac{1}{5}x + \frac{4}{5}$$

$$\text{slope} = \text{co-efficient of } x = \frac{1}{5}$$
$$\text{y-intercept} = \text{constant term} = \frac{4}{5}$$

(v)

$$y = 7x - 2$$
$$y = 7x + (-2)$$

$$\text{slope} = \text{co-efficient of } x = 7$$
$$\text{y-intercept} = \text{constant term} = -2$$

(vi)

$$3y = 7$$
$$3y = 0 \cdot x + 7$$
$$y = \frac{0}{7}x + \frac{7}{3}$$
$$y = 0 \cdot x + \frac{7}{3}$$

$$\text{slope} = \text{co-efficient of } x = 0$$
$$\text{y-intercept} = \text{constant term} = \frac{7}{3}$$

(vii)

$$4y + 9 = 0$$
$$4y = 0 \cdot x - 9$$
$$y = \frac{0}{4}x - \frac{9}{4}$$
$$y = 0 \cdot x + \left(-\frac{9}{4}\right)$$
$$\text{slope} = \text{co-efficient of } x = 0$$
$$\text{y-intercept} = \text{constant term} = -\frac{9}{4}$$

7. Find the equation of the line whose:

(i) **slope = 2 and y-intercept = 3**
(ii) **slope = 5 and y-intercept = -8**
(iii) **slope = -4 and y-intercept = 2**
(iv) **slope = -3 and y-intercept = -1**
(v) **slope = 0 and y-intercept = -5**
(vi) **slope = 0 and y-intercept = 0**

Solution:

(i) Slope is 2, so, m = 2
Y-intercept is 3, so, c = 3
$y = mx + c$
$y = 2x + 3$
Hence, the equation of the required line is y = 2x + 3

(ii) Slope is 5, so m = 5
Y-intercept is -8, so c = -8
$y = mx + c$
$y = 5x + -8$
Hence, the equation of the required line is y = 5x + (-8)

(iii) Slope is -4, so, m = -4
Y-intercept is 2, so, c = 2
$y = mx + c$
$y = -4x + 2$
Hence, the equation of the required line is y = -4x + 2

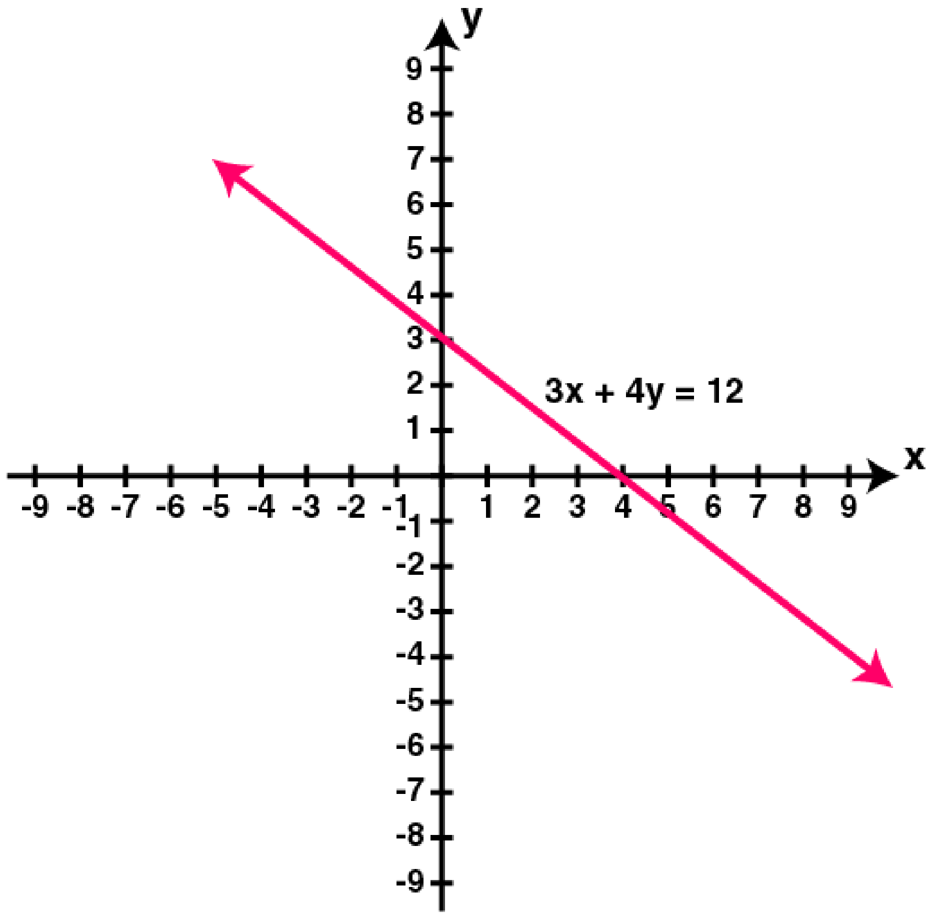
(iv) Slope is -3, so, m = -3
Y-intercept is -1, so, c = -1
$y = mx + c$
$y = -3x - 1$
Hence, the equation of the required line is y = -3x - 1

(v) Slope is 0, so, m = 0
Y-intercept is -5, so, c = -5
$y = mx + c$
$y = 0 \cdot x + (-5)$
$y = -5$
Hence, the equation of the required line is y = -5

(vi) Given
Slope is 0, so, m = 0
Y-intercept is 0, so, c = 0
$y = mx + c$
$y = 0 \cdot x + 0$
$y = 0$
Hence, the equation of the required line is y = 0

8. **Draw the line 3x + 4y = 12 on a graph paper. From the graph paper. Read the y-intercept of the line.**

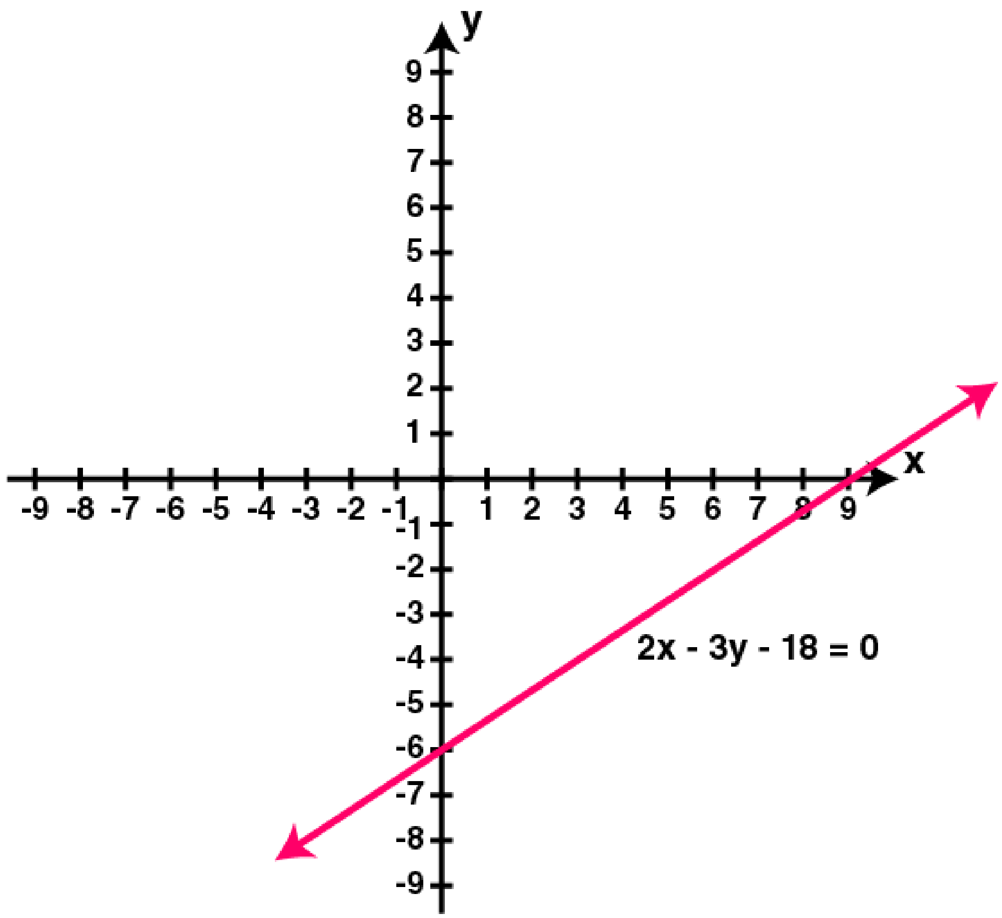
Solution:



According to the graph, the required y-intercept is 3

9. **Draw the line 2x - 3y - 18 = 0 on a graph paper. From the graph paper read the y-intercept of the line?**

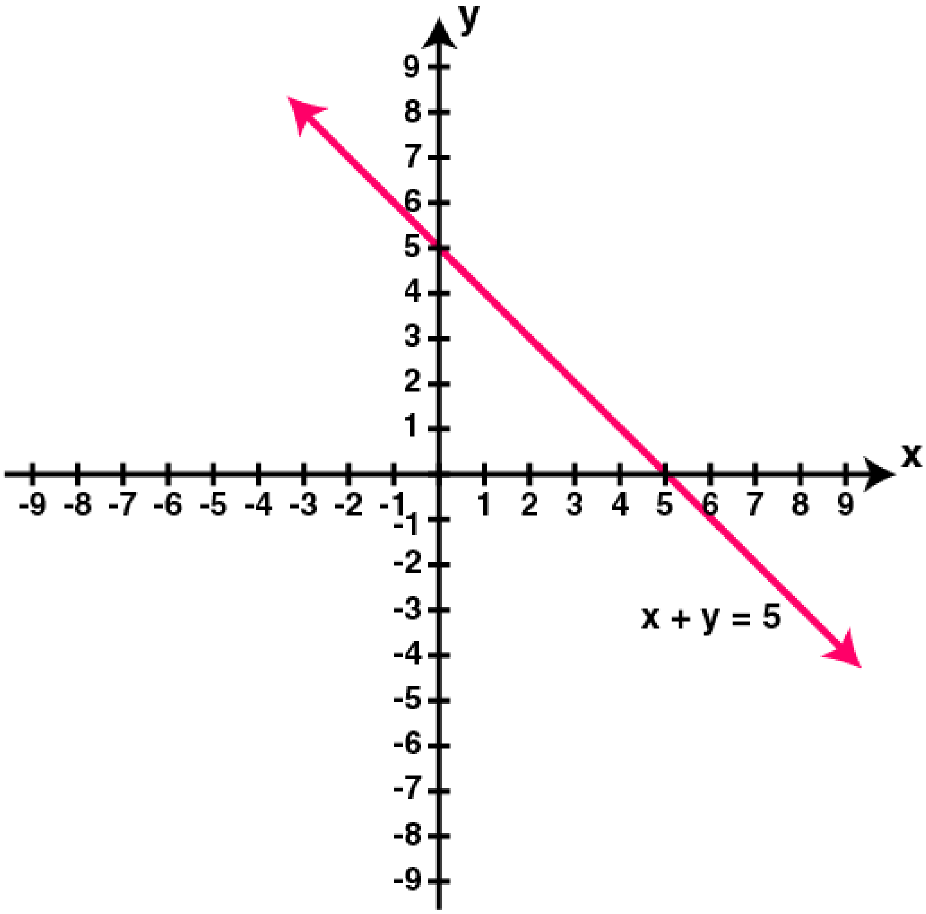
Solution:



According to the graph, the required y-intercept is -6

10. Draw the graph of line x + y = 5. Use the graph paper drawn to find the inclination and the y-intercept of the line.

Solution:



$x + y = 5$

$y = -x + 5$

$y = (-1) \cdot x + 5$ ...... (A)

We know that equation of any straight line in the form y = mx + c,
From equation (A) , we have

$m = -1$

$\tan\theta = -1$

$\tan\theta = \tan 135^0$

$\theta = 135^0$

And, c = 5

Hence, the required inclination is θ = 135° and y-intercept is c = 5