Exercise 13.3

Page No: 13.23

Question 1: Draw the graph of each of the following linear equations in two variables:

(i) x + y = 4 **(ii) x - y = 2** **(iii) -x + y = 6**
(iv) y = 2x **(v) 3x + 5y = 15** **(vi) x/2 – y/3 = 2**
(vii) (x–2)/3 = y - 3 **(viii) 2y = -x +1**

Solution:

(i) Given : x + y = 4

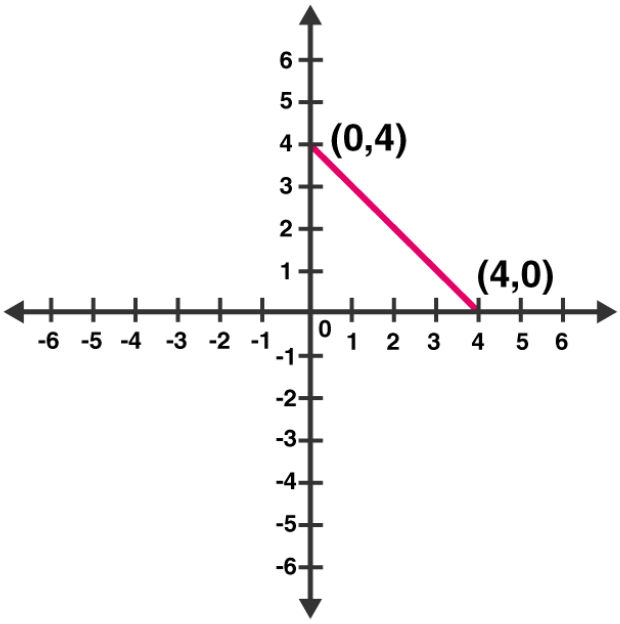
or y = 4 – x,

Find values of x and y:

Putting x = 0 => y = 4

Putting x = 4 => y = 0

Graph:
Mark points (0, 4) and (4, 0) on the graph and join them.



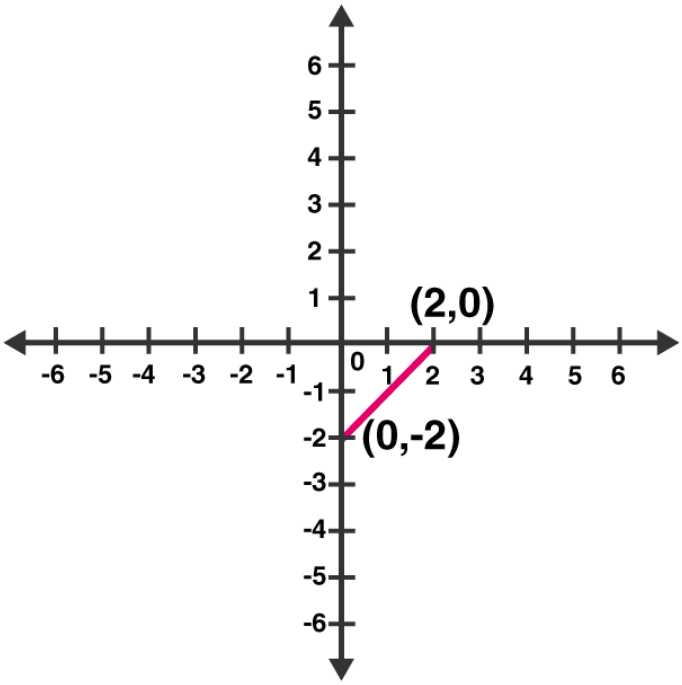
(ii) Given: x – y = 2

So, y = x - 2

Putting x = 0 => y = – 2

Putting x = 2 => y = 0

Graph:
Mark points (0, -2) and (2, 0) on the graph and join them.

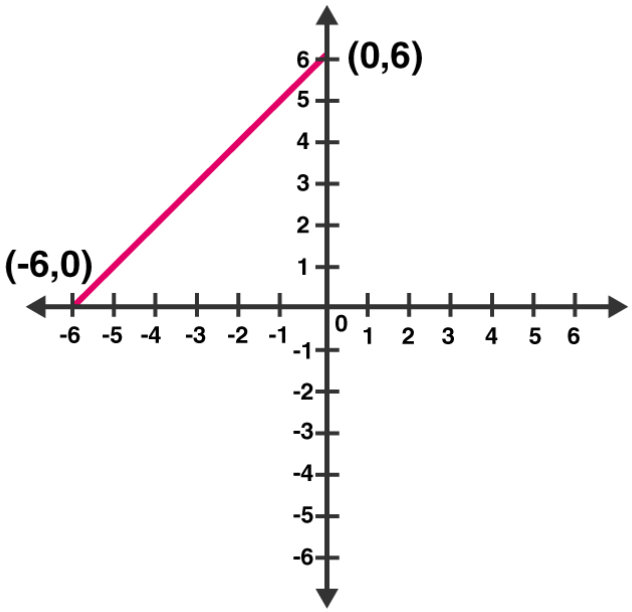


(iii) Given: – x + y = 6

So, y = 6 + x

Putting x = 0 => y =6

Putting x = -6 => y = 0
Graph:
Mark points (0, 6) and (-6, 0) on the graph and join them.

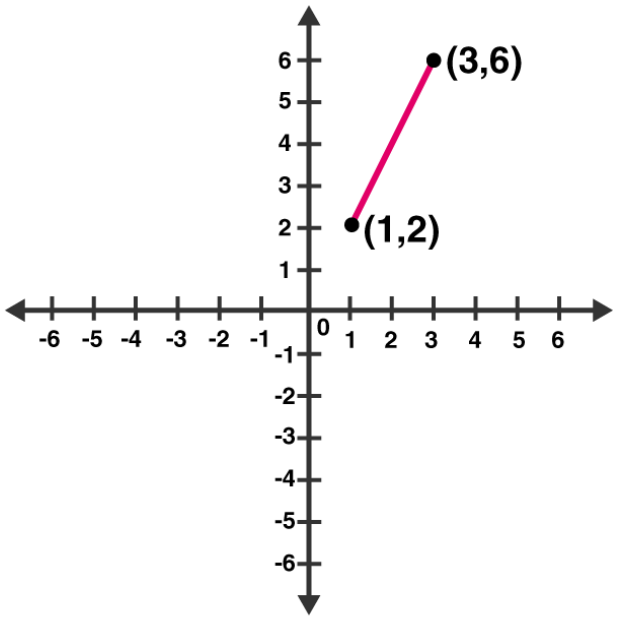


(iv) Given: y = 2x

Put x = 1 => y = 2

Put x = 3 => y = 6

Graph:
Mark points (1, 2) and (3, 6) on the graph and join them.



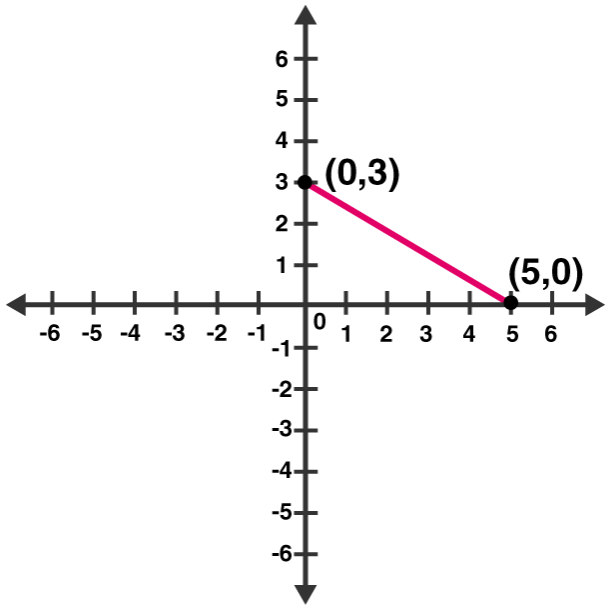
(v) Given: 3x + 5y = 15

Or 5y = 15 – 3x

Putting x = 0 => 5y = 15 => y =3

Putting x = 5 => 5y = 0 => y = 0

Graph:
Mark points (0, 3) and (5, 0) on the graph and join them.



(vi) Given: x/2 – y/3 = 2

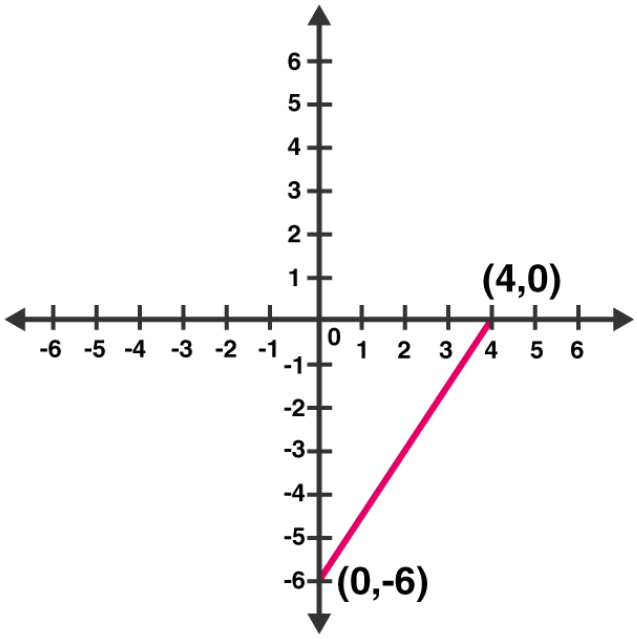
3x – 2y = 12

y = (3x–12)/2

Putting x = 0 => y = -6

Putting x = 4 => y = 0

Graph:
Mark points (0, -6) and (4, 0) on the graph and join them.



(vii) Given: (x −2)/3 = y − 3

x - 2 = 3(y - 3)

x – 2 = 3y – 9

x = 3y – 7

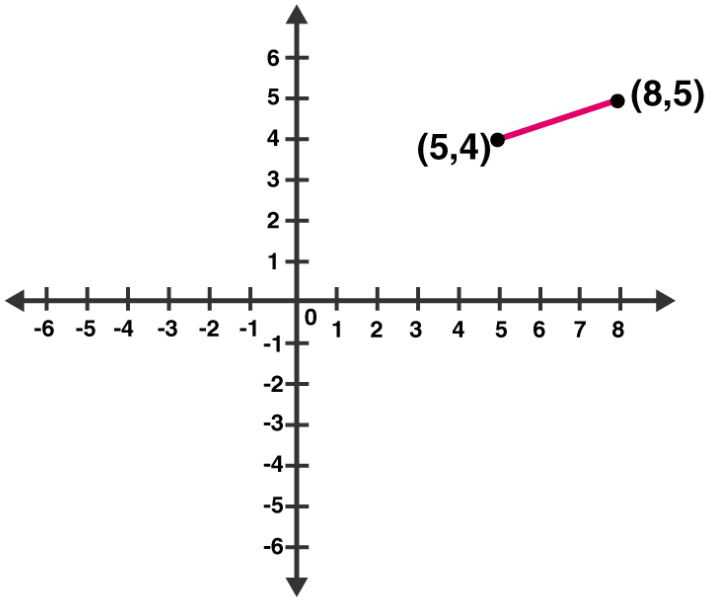
Now, put x = 5 in x = 3y – 7

y = 4

Putting x = 8 in x = 3y – 7,

y = 5

Graph:
Mark points (5, 4) and (8, 5) on the graph and join them.



(viii) Given: $2y = – x + 1$

$2y = 1 – x$

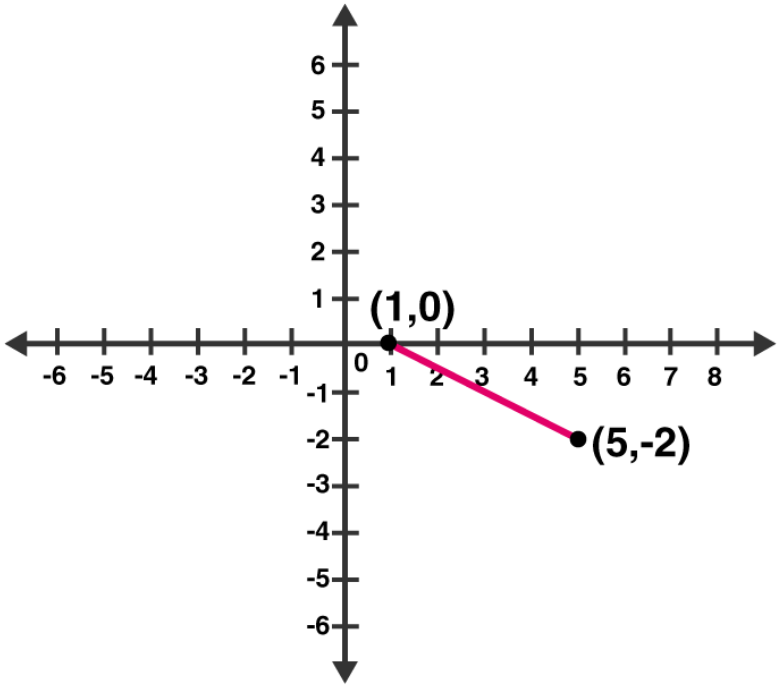
Now, putting $x = 1$ in $2y = 1 – x$, we get;

$y = 0$

Again, putting $x = 5$ in $2y = 1 – x$, we get;

$y = -2$

Graph:
Mark points (1, 0) and (5, -2) on the graph and join them.



Question 2: Give the equations of two lines passing through (3, 12). How many more such lines are there, and why?

Solution:

Since a = 3 and b = 12 is the solution of required equations. So we have to find the set of any two equations which satisfy this point.

Consider 4a – b = 0 and 3a – b + 3 = 0 set of lines which are passing through (3, 12).

We know, infinite lines can be pass through a point.

So, there are infinite lines passing through (3, 12).

Question 3: A three-wheeler scooter charges Rs 15 for first kilometer and Rs 8 each for every subsequent kilometer. For a distance of x km, an amount of Rs y is paid. Write the linear equation representing the above information.

Solution:

Let, total fare for covering the distance of 'x' km is given by Rs y

As per the given statement;

$y = 15 + 8(x – 1)$

$y = 15 + 8x – 8$

$y = 8x + 7$

Above equation represents the linear equation for the given information.

Question 4: A lending library has a fixed charge for the first three days and an additional charge for each day thereafter. Aarushi paid Rs 27 for a book kept for seven days. If fixed charges are Rs x and per day charges are Rs y. Write the linear equation representing the above information.

Solution:

Aarushi paid Rs 27, of which Rs. x for the first three days and Rs. y per day for 4 more days is given by

$x + (7 – 3) y = 27$

$x + 4y = 27$

Above equation represents the linear equation for the given information.

Question 5: A number is 27 more than the number obtained by reversing its digits. If its unit's and ten's digit are x and y respectively, write the linear equation representing the statement.

Solution:

Given: The original number is 27 more than the number obtained by reversing its digits

The given number is in the form of $10y + x$.
Number produced by reversing the digits of the number is $10x + y$.

As per statement:

$10y + x = 10x + y + 27$

$10y – y + x – 10x = 27$

$9y – 9x = 27$

9 (y – x) = 27

y – x = 3

x – y + 3 = 0

Above equation represents the required linear equation.

Question 6: The Sum of a two digit number and the number obtained by reversing the order of its digits is 121. If units and ten's digit of the number are x and y respectively, then write the linear equation representing the above statement.

Solution:

As per the statement given, the number is 10y + x.

On reversing the digits of the number, we get, 10x + y

Sum of the two numbers is 121. (Given)

10y + x + 10x + y = 121

11x + 11y = 121

x + y = 11

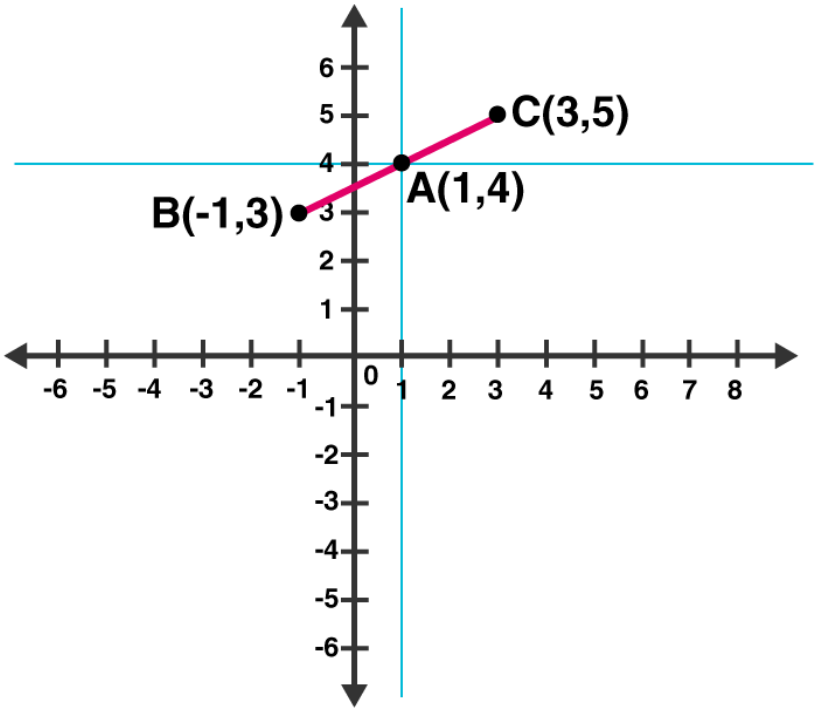
Which represents the required linear equation.

Question 7: Plot the Points (3, 5) and (-1, 3) on a graph paper and verify that the straight line passing through the points, also passes through the point (1, 4).

Solution:

Plot points (3, 5), (-1, 3) and (1, 4) on a graph.

Let A(1, 4), B(3, 5) and C(-1, 3)

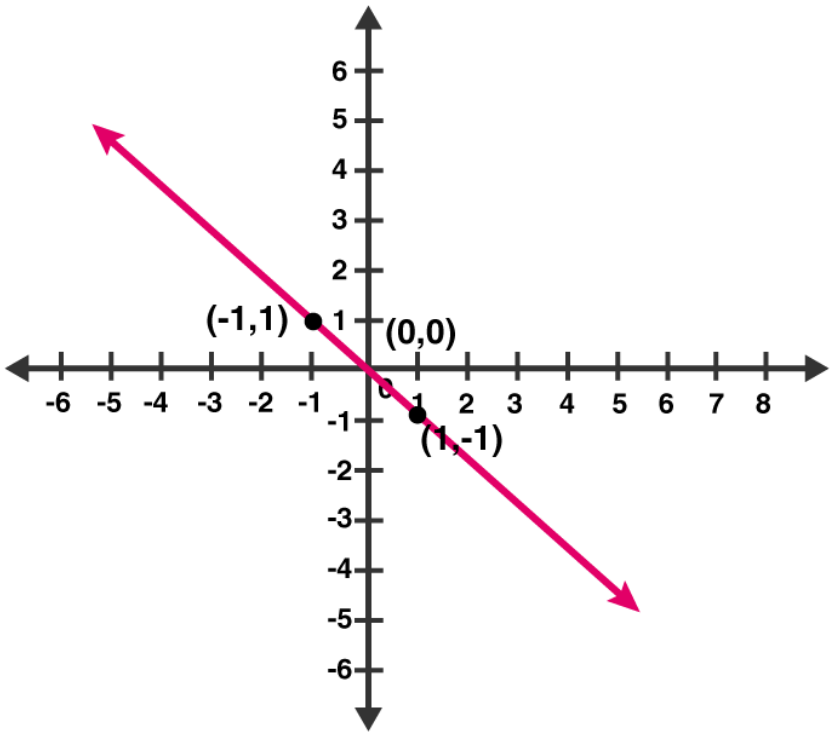


From above graph, we can see that, Point A (1, 4) is already plotted on the graph, and a point of intersection of two intersecting lines.

Hence, it is proved that the straight line passing through (3, 5) and (-1, 3) and also passes through A (1, 4).

Question 8: From the choices given below, choose the equations whose graph is given in figure.

(i) y = x (ii) x + y = 0 (iii) y = 2x (iv) 2 + 3y = 7x



Solution:

From graph, co-ordinates (1, -1) and (-1, 1) are solutions of one of the equations.

We will put the value of all the co-ordinates in each equation and check which equation satisfy them.

(i) y = x

Put x = 1 and y = -1 ,

Thus, 1 ≠ -1

L.H.S ≠ R.H.S

Putting x = -1 and y = 1 ,

-1 ≠ 1

L.H.S ≠ R.H.S

Therefore, y = x does not represent the graph in the given figure.

(ii) x + y = 0

Putting x = 1 and y = -1 ,

=> 1 + (-1) = 0

=> 0 = 0

L.H.S = R.H.S

Putting x = -1 and y = 1 ,

(-1) + 1 = 0

0 = 0

L.H.S = R.H.S

Thus, the given solutions satisfy this equation.

(iii) y = 2x
Putting x = 1 and y = -1
-1 = 2 (Not True)

Putting x = -1 and y = 1
1 = -2 (Not True)

Thus, the given solutions does not satisfy this equation.

(iv) 2 + 3y = 7x

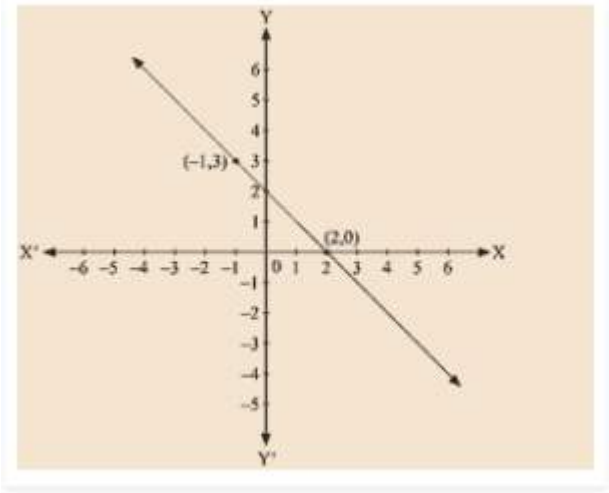
Putting x = 1 and y = -1
2 - 3 = 7
-1 = 7 (Not true)

Putting x = -1 and y = 1
2 + 3 = -7
5 = -7 (Not True)

Thus, the given solutions does not satisfy this equation.

Question 9: From the choices given below, choose the equation whose graph is given fig:

(i) y = x + 2 (ii) y = x – 2 (iii)y = – x + 2 (iv) x + 2y = 6



Solution:

Given: (-1, 3) and (2, 0) are the solution of one of the following given equations.
Check which equation satisfy both the points.

(i) y = x + 2

Putting, x = -1 and y = 3

3 ≠ – 1 + 2

L.H.S ≠ R.H.S

Putting, x = 2 and y = 0

0 ≠ 4

L.H.S ≠ R.H.S

Thus, this solution does not satisfy the given equation.

(ii) y = x – 2

Putting, x = -1 and y = 3

$3 \neq -1-2$

L.H.S ≠ R.H.S

Putting, x = 2 and y = 0

0 = 0

L.H.S = R.H.S

Thus, the given solutions does not satisfy this equation completely.

(iii) $y = -x + 2$

Putting, x = – 1 and y = 3
3 = – (– 1) + 2
L.H.S = R.H.S
Putting x = 2 and y = 0
0 = -2 + 2
0 = 0
L.H.S = R.H.S
Therefore, (0, 2) and (-1,3) satisfy this equation.

Hence, this is the graph for equation y = -x + 2 .

Question 10 : If the point (2, -2) lies on the graph of linear equation, 5x + ky = 4, find the value of k.

Solution:

Point (2,-2) lies on the given linear equation, which implies (2, -2) satisfy this equation 5x + ky = 4.

Now, putting x = 2 and y = -2 in 5x + ky = 4

5 × 2 + (-2) k = 4
10 – 2k = 4
2k = 10 – 4
2k = 6
k = 6/2 = 3

The value of k is 3.