Exercise 13.3

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 $x = 0 \Rightarrow y = 4$

Putting $x = 4 \Rightarrow y = 0$

Graph:

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



(ii) Given: x – y = 2

So, y = x - 2

Putting $x = 0 \Rightarrow y = -2$

Putting $x = 2 \Rightarrow y = 0$

Graph:

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



(iii) Given: -x + y = 6

So, y = 6 + x

Putting $x = 0 \Rightarrow y = 6$

Putting x = -6 => y = 0Graph: 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 $x = 0 \Rightarrow y = -6$

Putting $x = 4 \Rightarrow y = 0$

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;

$$y = 15 + 8(x - 1)$$

$$y = 15 + 8x - 8$$

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

$$x + 4y = 27$$

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.

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(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.
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(iii) y = 2x
Putting x = 1 and y = -1
-1 = 2 (Not True)
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Putting x = -1 and y = 1
1 = -2 (Not True)
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Thus, the given solutions does not satisfy this equation.

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(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)
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Thus, the given solutions does not satisfy this equation.

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

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

 $3 \neq -1+2$

 $L.H.S \neq R.H.S$

Putting, x = 2 and y = 0

0 ≠ 4

 $L.H.S \neq R.H.S$

Thus, this solution does not satisfy the given equation.

(ii) y = x − 2

Putting, x = -1 and y = 3

 $3 \neq -1 - 2$

 $L.H.S \neq R.H.S$

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 + 2Putting, x = -1 and y = 3 3 = -(-1) + 2L.H.S = R.H.S Putting x = 2 and y = 0 0 = -2 + 2 0 = 0L.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.

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Now, putting x = 2 and y = -2 in 5x + ky = 4
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5 \times 2 + (-2) k = 4

10 - 2k = 4

2k = 10 - 4

2k = 6

k = 6/2 = 3
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The value of k is 3.