

Exercise 13.3

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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 $y = 4 - x$,

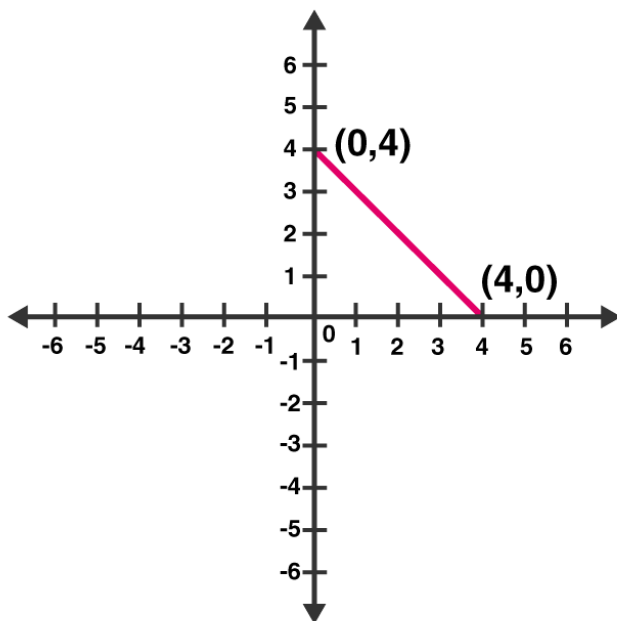
Find values of x and y :

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: $x - y = 2$

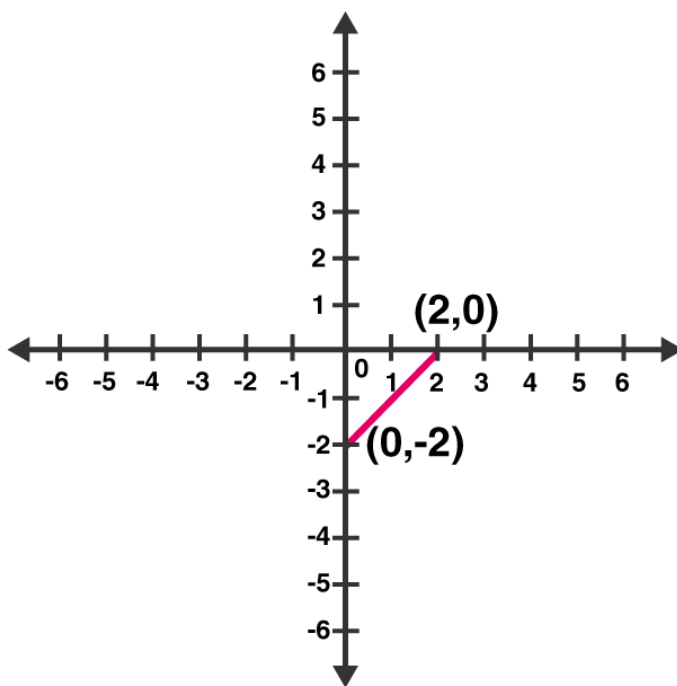
So, $y = x - 2$

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: $-x + y = 6$

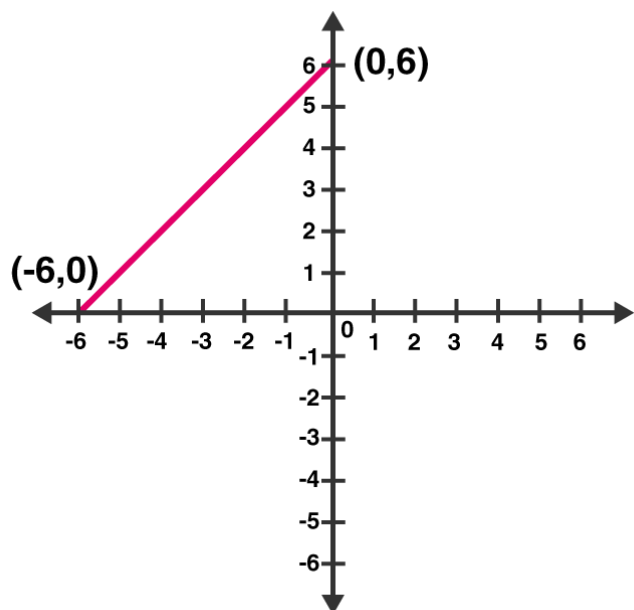
So, $y = 6 + x$

Putting $x = 0 \Rightarrow y = 6$

Putting $x = -6 \Rightarrow y = 0$

Graph:

Mark points $(0, 6)$ and $(-6, 0)$ on the graph and join them.



(iv) Given: $y = 2x$

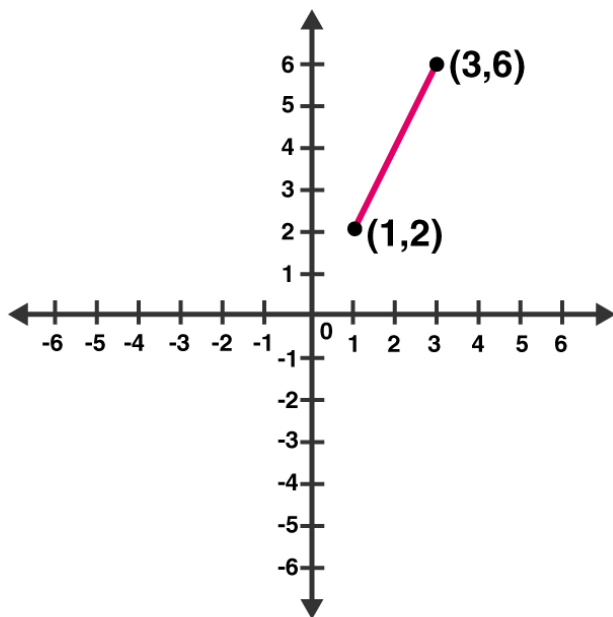
Put $x = 1 \Rightarrow y = 2$

Put $x = 3 \Rightarrow y = 6$

Graph:

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

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

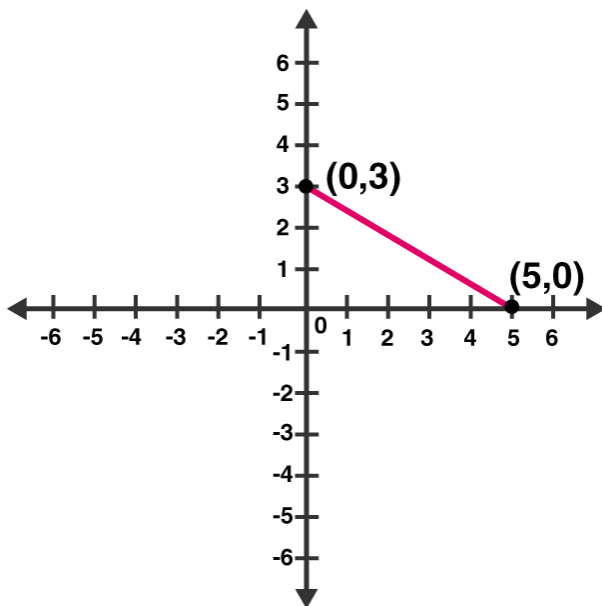
Or $5y = 15 - 3x$

Putting $x = 0 \Rightarrow 5y = 15 \Rightarrow y = 3$

Putting $x = 5 \Rightarrow 5y = 0 \Rightarrow y = 0$

Graph:

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



(vi) Given: $x/2 - y/3 = 2$

$$3x - 2y = 12$$

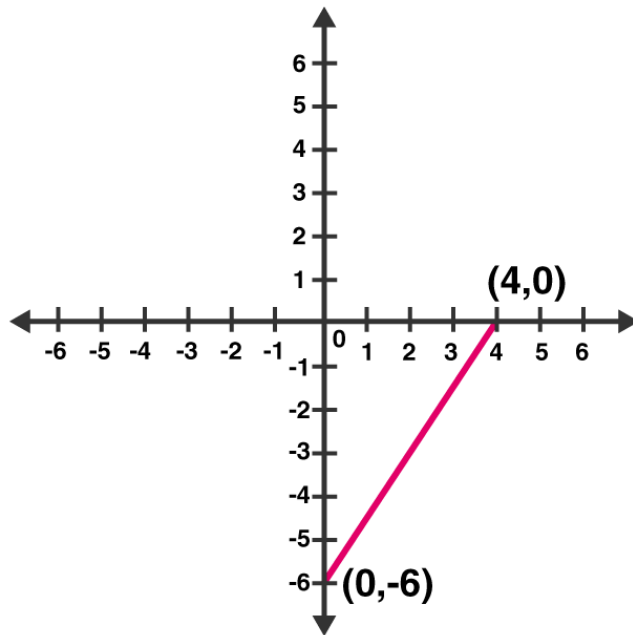
$$y = (3x - 12)/2$$

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 $x = 3y - 7$

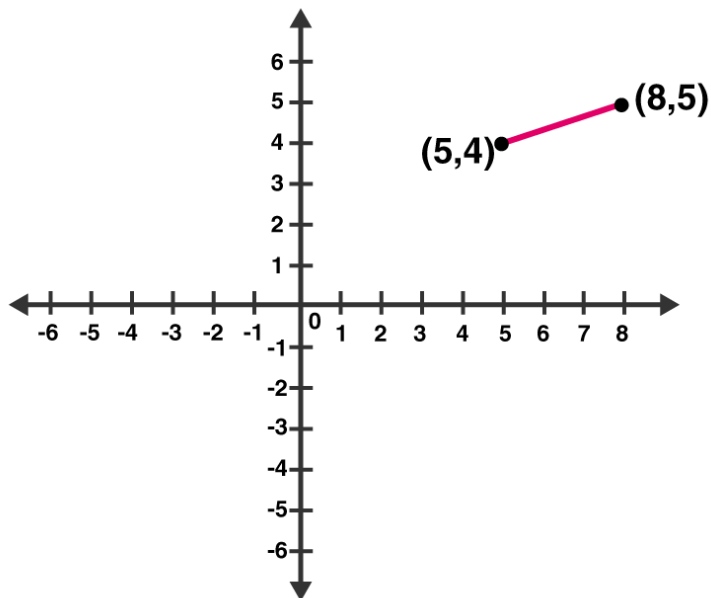
$$y = 4$$

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;

$$y = 0$$

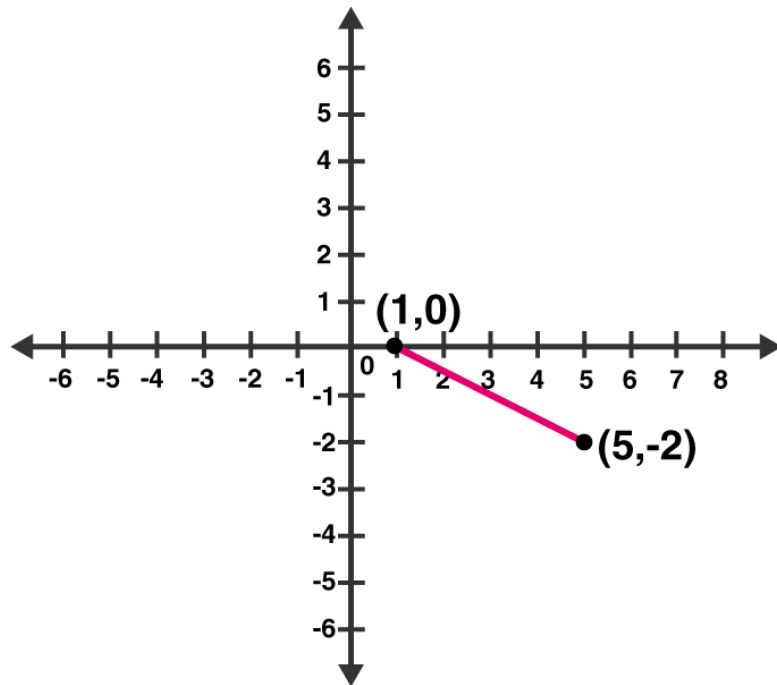
Again, putting $x = 5$ in $2y = 1 - x$, we get;

$$y = -2$$

Graph:

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

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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)

$$10y + x + 10x + y = 121$$

$$11x + 11y = 121$$

$$x + y = 11$$

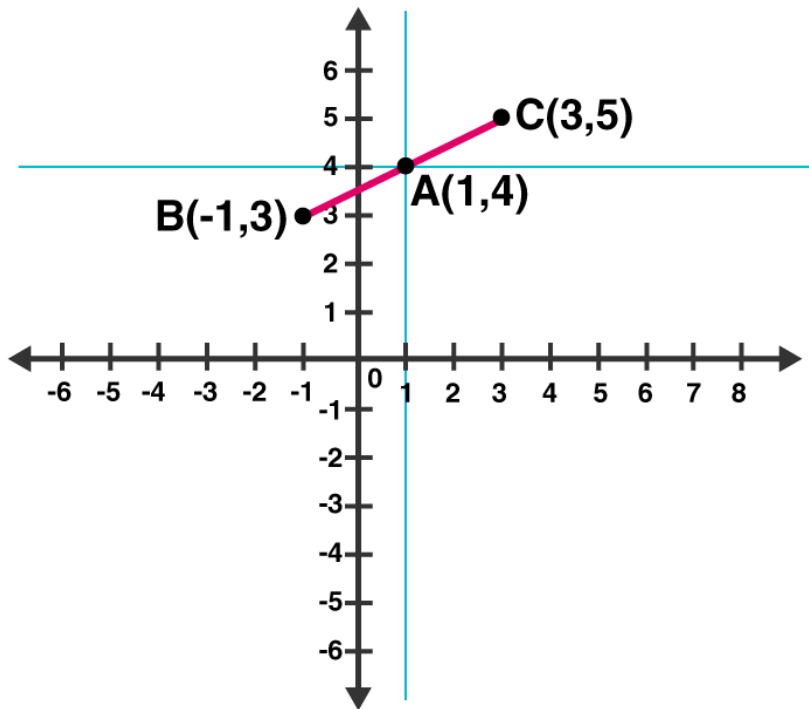
Which represents the required linear equation.

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)

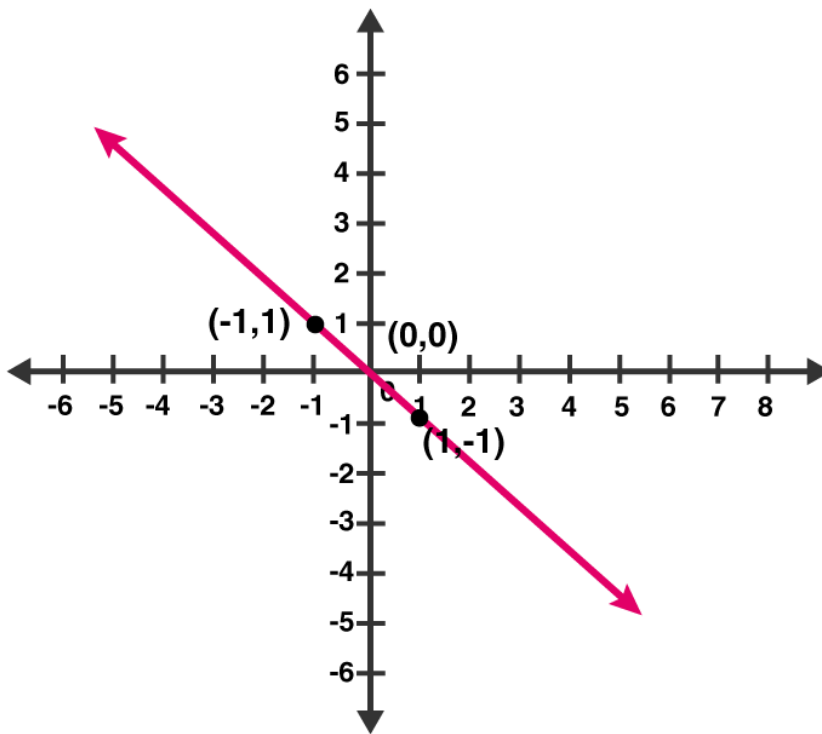


From above graph, we can see that, Point A (1, 4) is already plotted on the graph, and a point of intersection of two intersecting lines.

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, $1 \neq -1$

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

Putting $x = -1$ and $y = 1$,

$-1 \neq 1$

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

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

(ii) $x + y = 0$

Putting $x = 1$ and $y = -1$,

$$\Rightarrow 1 + (-1) = 0$$

$$\Rightarrow 0 = 0$$

$$\text{L.H.S} = \text{R.H.S}$$

Putting $x = -1$ and $y = 1$,

$$(-1) + 1 = 0$$

$$0 = 0$$

$$\text{L.H.S} = \text{R.H.S}$$

Thus, the given solutions satisfy this equation.

(iii) $y = 2x$

Putting $x = 1$ and $y = -1$

$$-1 = 2 \text{ (Not True)}$$

Putting $x = -1$ and $y = 1$

$$1 = -2 \text{ (Not True)}$$

Thus, the given solutions does not satisfy this equation.

(iv) $2 + 3y = 7x$

Putting $x = 1$ and $y = -1$

$$2 - 3 = 7$$

$$-1 = 7 \text{ (Not true)}$$

Putting $x = -1$ and $y = 1$

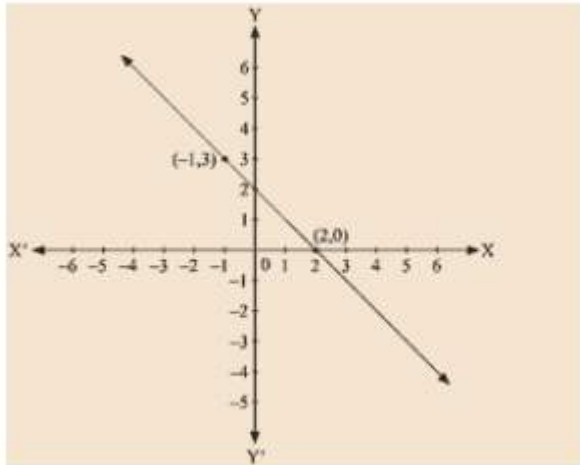
$$2 + 3 = -7$$

$$5 = -7 \text{ (Not True)}$$

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 $y = 3$

$$3 \neq -1 + 2$$

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

Putting, $x = 2$ and $y = 0$

$$0 \neq 4$$

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) $y = -x + 2$

Putting, $x = -1$ and $y = 3$

$$3 = -(-1) + 2$$

$$\text{L.H.S} = \text{R.H.S}$$

Putting $x = 2$ and $y = 0$

$$0 = -2 + 2$$

$$0 = 0$$

$$\text{L.H.S} = \text{R.H.S}$$

Therefore, $(0, 2)$ and $(-1, 3)$ satisfy this equation.

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

(iv) $x + 2y = 6$

Putting, $x = -1$ and $y = 3$

$$-1 + 2(3) = 6$$

$$-1 + 6 = 6$$

$$5 \neq 6$$

$$\text{L.H.S} \neq \text{R.H.S}$$

Putting $x = 2$ and $y = 0$

$$2 + 2(0) = 6$$

$$2 \neq 6$$

$$\text{L.H.S} \neq \text{R.H.S}$$

Thus, this solution does not satisfy the given equation.

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 $5x + ky = 4$

$$5 \times 2 + (-2)k = 4$$

$$10 - 2k = 4$$

$$2k = 10 - 4$$

$$2k = 6$$

$$k = 6/2 = 3$$

The value of k is 3.