CHAPTER 4 LINEAR EQUATIONS IN TWO VARIABLES

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1. Which one of the following options is true, and why?

y = 3x+5 has

1. **A unique solution**
2. **Only two solutions**
3. **Infinitely many solutions**

Solution:

Let us substitute different values for x in the linear equation y = 3x+5

x	0	1	2	….	100
y, where y=3x+5	5	8	11	….	305

From the table, it is clear that x can have infinite values, and for all the infinite values of x, there are infinite values of y as well.

Hence, (iii) infinitely many solutions is the only option true.

2. Write four solutions for each of the following equations:

(i) 2x+y = 7

Solution:

To find the four solutions of 2x+y =7, we substitute different values for x and y.

Let x = 0

Then,

$2x+y = 7$

$(2\times0)+y = 7$

$y = 7$

(0,7)

Let x = 1

Then,

$2x+y = 7$

$(2\times1)+y = 7$

$2+y = 7$

$y = 7-2$

$y = 5$

$(1,5)$

Let $y = 1$

Then,

$2x+y = 7$

$(2x)+1 = 7$

$2x = 7-1$

$2x = 6$

$x = 6/2$

$x = 3$

$(3,1)$

Let $x = 2$

Then,

$2x+y = 7$

$(2\times2)+y = 7$

$4+y = 7$

$y = 7-4$

$y = 3$

(2,3)

The solutions are (0, 7), (1,5), (3,1), (2,3)

(ii) $\pi x+y = 9$

Solution:

To find the four solutions of $\pi x+y = 9$, we substitute different values for x and y.

Let $x = 0$

Then,

$\pi x+y = 9$

$(\pi\times0)+y = 9$

$y = 9$

(0,9)

Let $x = 1$

Then,

$\pi x +y = 9$

$(\pi \times 1)+y = 9$

$\pi+y = 9$

$y = 9-\pi$

$(1, 9-\pi)$

Let $y = 0$

Then,

$\pi x+y = 9$

$\pi x+0 = 9$

$\pi x = 9$

$x = 9/\pi$

$(9/\pi,0)$

Let $x = -1$

Then,

$\pi x + y = 9$

$(\pi \times -1) + y = 9$

$-\pi+y = 9$

$y = 9+\pi$

$(-1,9+\pi)$

The solutions are (0,9), (1,9-π), (9/π,0), (-1,9+π)

(iii) x = 4y

Solution:

To find the four solutions of x = 4y, we substitute different values for x and y.

Let x = 0

Then,

x = 4y

0 = 4y

4y= 0

y = 0/4

y = 0

(0,0)

Let x = 1

Then,

x = 4y

1 = 4y

4y = 1

y = 1/4

$(1,1/4)$

Let $y = 4$

Then,

$x = 4y$

$x = 4\times4$

$x = 16$

$(16,4)$

Let $y = 1$

Then,

$x = 4y$

$x = 4\times1$

$x = 4$

$(4,1)$

The solutions are $(0,0)$, $(1,1/4)$, $(16,4)$, $(4,1)$

3. Check which of the following are solutions of the equation $x-2y = 4$ and which are not:

(i) (0, 2)

(ii) (2, 0)

(iii) (4, 0)

(iv) ($\sqrt{2}$, 4$\sqrt{2}$)

(v) (1, 1)

Solutions:

(i) (0, 2)

$(x,y) = (0,2)$

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

Substituting the values of x and y in the equation $x-2y = 4$, we get,

$x-2y = 4$

$\Rightarrow 0 - (2\times2) = 4$

But, $-4 \neq 4$

(0, 2) is **not** a solution of the equation $x-2y = 4$

(ii) (2, 0)

$(x,y) = (2, 0)$

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

Substituting the values of x and y in the equation $x - 2y = 4$, we get,

$x - 2y = 4$

$\Rightarrow 2-(2\times0) = 4$

$\Rightarrow 2 - 0 = 4$

But, $2 \neq 4$

(2, 0) is **not** a solution of the equation $x-2y = 4$

(iii) (4, 0)

Solution:

$(x,y) = (4, 0)$

Here, $x= 4$ and $y=0$

Substituting the values of x and y in the equation $x - 2y = 4$, we get,

$x-2y = 4$

$\Rightarrow 4 - 2\times0 = 4$

$\Rightarrow 4-0 = 4$

$\Rightarrow 4 = 4$

(4, 0) is a solution of the equation $x-2y = 4$

(iv) (√2,4√2)

Solution:

$(x,y) = (\sqrt{2},4\sqrt{2})$

Here, $x = \sqrt{2}$ and $y = 4\sqrt{2}$

Substituting the values of x and y in the equation $x-2y = 4$, we get,

$x - 2y = 4$

$\Rightarrow \sqrt{2} - (2 \times 4\sqrt{2}) = 4$

$\sqrt{2} - 8\sqrt{2} = 4$

But, $-7\sqrt{2} \neq 4$

$(\sqrt{2}, 4\sqrt{2})$ is **not** a solution of the equation $x - 2y = 4$

(v) (1, 1)

Solution:

$(x,y) = (1, 1)$

Here, $x = 1$ and $y = 1$

Substituting the values of x and y in the equation $x - 2y = 4$, we get,

$x - 2y = 4$

$\Rightarrow 1 - (2 \times 1) = 4$

$\Rightarrow 1 - 2 = 4$

But, $-1 \neq 4$

(1, 1) is **not** a solution of the equation $x - 2y = 4$

4. Find the value of k, if x = 2, y = 1 is a solution of the equation 2x+3y = k.

Solution:

The given equation is

$2x+3y = k$

According to the question, $x = 2$ and $y = 1$

Now, substituting the values of x and y in the equation$2x+3y = k$,

We get,

$(2\times2)+(3\times1) = k$

$\Longrightarrow 4+3 = k$

$\Longrightarrow 7 = k$

$k = 7$

The value of k, if $x = 2$, $y = 1$ is a solution of the equation $2x+3y = k$, is 7.