

EXERCISE 4.2

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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,

$$2x + y = 7$$

$$(2 \times 0) + y = 7$$

$$y = 7$$

$$(0, 7)$$

Let $x = 1$

Then,

$$2x+y = 7$$

$$(2 \times 1)+y = 7$$

$$2+y = 7$$

$$y = 7-2$$

$$y = 5$$

$$(1,5)$$

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,

$$2x+y = 7$$

$$(2 \times 2)+y = 7$$

$$4+y = 7$$

$$y = 7-4$$

$$y = 3$$

$$(2,3)$$

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,

$$\pi x + y = 9$$

$$(\pi \times 0) + y = 9$$

$$y = 9$$

$$(0, 9)$$

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 $(0,9)$, $(1,9-\pi)$, $(9/\pi,0)$, $(-1,9+\pi)$

(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,

$$x = 4y$$

$$x = 4 \times 4$$

$$x = 16$$

$$(16,4)$$

Let $y = 1$

Then,

$$x = 4y$$

$$x = 4 \times 1$$

$$x = 4$$

$$(4, 1)$$

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,

$$x-2y = 4$$

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

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,

$$x-2y = 4$$

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

$$\Rightarrow 2 - 0 = 4$$

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,

$$x - 2y = 4$$

$$\Rightarrow 4 - 2 \times 0 = 4$$

$$\Rightarrow 4 - 0 = 4$$

$$\Rightarrow 4 = 4$$

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

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

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,

$$x - 2y = 4$$

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

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

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

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

$$(2 \times 2) + (3 \times 1) = k$$

$$\Rightarrow 4 + 3 = k$$

$$\Rightarrow 7 = k$$

$$k = 7$$

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