Exercise 4.2 Page: 70

1. Which one of the following options is true, and why?
$y = 3x+5$ has
(i) A unique solution
(ii) Only two solutions
(iii) 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,

$2x+y = 7$

$(2\times2)+y = 7$

$4+y = 7$

$y =7-4$

$y = 3$
$(2,3)$
$\therefore$ 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,

$\pi x +y = 9$
$(\pi\times1)+y = 9$
$\pi+y = 9$
$y = 9-\pi$
$(1, 9-\pi)$

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,

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

$\therefore$ 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,
$x = 4y$
$x= 4\times4$
$x = 16$
$(16,4)$

Let $y = 1$
Then,
$x = 4y$
$x = 4\times1$
$x = 4$
$(4,1)$

$\therefore$ 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, $-4 \neq 4$

$\therefore$ (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, $2 \neq 4$

$\therefore$ (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,

$x-2y = 4$

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

$\Rightarrow$ $4-0 = 4$

$\Rightarrow$ $4 = 4$

$\therefore$ (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,

$x-2y = 4$

$\Rightarrow$ $\sqrt{2}-(2\times4\sqrt{2}) = 4$

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

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

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

$x-2y = 4$

$\Rightarrow$ $1-(2\times1) = 4$

$\Rightarrow$ $1-2 = 4$

But, $-1 \neq 4$

$\therefore$ (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 equation2x+3y = k,

We get,

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

$\Rightarrow$ $4+3 = k$

$\Rightarrow$ $7 = k$

$k = 7$

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