Exercise 4.2

Question 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

Answer 1:

(iii) Infinitely many solutions

Because a line has infinite many points and each point is a solution of the linear equation.

Question 2:

Write four solutions for each of the following equations:

(i) $2x + y = 7$ **(ii)** $\pi x + y = 9$ **(iii)** $x = 4y$

Answer 2:

(i) $2x + y = 7 \Rightarrow y = 7 - 2x$

Putting $x = 0$, we have, $y = 7 - 2 \times 0 = 7$, therefore, $(0, 7)$ is a solution of the equation.

Putting $x = 1$, we have, $y = 7 - 2 \times 1 = 5$, therefore, $(1, 5)$ is a solution of the equation.

Putting $x = 2$, we have, $y = 7 - 2 \times 2 = 3$, therefore, $(2, 3)$ is a solution of the equation.

Putting $x = 3$, we have, $y = 7 - 2 \times 3 = 1$, therefore, $(3, 1)$ is a solution of the equation.

Hence, $(0, 7)$, $(1, 5)$, $(2, 3)$ and $(3, 1)$ are the four solutions of the equation $2x + y = 7$.

(ii) $\pi x + y = 9 \quad \Rightarrow y = 9 - \pi x$

Putting $x = 0$, we have, $y = 9 - \pi \times 0 = 9$, therefore, $(0, 9)$ is a solution of the equation.

Putting $x = 1$, we have, $y = 9 - \pi \times 1 = 9 - \pi$, therefore, $(1, 9 - \pi)$ is a solution of the equation.

Putting $x = 2$, we have, $y = 9 - \pi \times 2 = 9 - 2\pi$, therefore, $(2, 9 - 2\pi)$ is a solution of the equation.

Putting $x = 3$, we have, $y = 9 - \pi \times 3 = 9 - 3\pi$, therefore, $(3, 9 - 3\pi)$ is a solution of the equation.

Hence, $(0, 9)$, $(1, 9 - \pi)$, $(2, 9 - 2\pi)$ and $(3, 9 - 3\pi)$ are the four solutions of the equation $\pi x + y = 9$.

(iii) $x = 4y$

Putting $y = 0$, we have, $x = 4 \times 0 = 0$, therefore, $(0, 0)$ is a solution of the equation.

Putting $y = 1$, we have, $x = 4 \times 1 = 4$, therefore, $(4, 1)$ is a solution of the equation.

Putting $y = 2$, we have, $x = 4 \times 2 = 8$, therefore, $(8, 2)$ is a solution of the equation.

Putting $y = 3$, we have, $x = 4 \times 3 = 12$, therefore, $(12, 3)$ is a solution of the equation.

Hence, $(0, 0)$, $(4, 1)$, $(8, 2)$ and $(12, 3)$ are the four solutions of the equation $x = 4y$.

Question 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)** $(1, 1)$

Answer 3:

(i) $(0, 2)$

Given equation: $x - 2y = 4$

In $x - 2y = 4$, putting $x = 0$ and $y = 2$, we have, $0 - 2 \times 2 = -4 \neq 4$

Therefore, $(0, 2)$ is not a solution of the equation.

(ii) $(2, 0)$

Given equation: $x - 2y = 4$

In $x - 2y = 4$, putting $x = 2$ and $y = 0$, we have, $2 - 2 \times 0 = 2 \neq 4$

Hence, $(2, 0)$ is not a solution of the equation.

(iii) $(4, 0)$
Given equation: $x - 2y = 4$
In $x - 2y = 4$, putting $x = 4$ and $y = 0$, we have, $4 - 2 \times 0 = 4$
Hence, $(4, 0)$ is a solution of the equation.

(iv) $(\sqrt{2}, 4\sqrt{2})$
Given equation: $x - 2y = 4$
In $x - 2y = 4$, putting $x = \sqrt{2}$ and $y = 4\sqrt{2}$, we have, $\sqrt{2} - 2 \times 4\sqrt{2} = -7\sqrt{2} \neq 4$
Hence, $(\sqrt{2}, 4\sqrt{2})$ is not a solution of the equation.

(v) $(1, 1)$
Given equation: $x - 2y = 4$
In $x - 2y = 4$, putting $x = 1$ and $y = 1$, we have, $1 - 2 \times 1 = -1 \neq 4$
Hence, $(1, 1)$ is not a solution of the equation.

Question 4:

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

Answer 4:

Given equation: $x = 2$, $y = 1$
In $2x + 3y = k$, putting $x = 2$ and $y = 1$, we have,

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

$\Rightarrow k = 7$

Hence, the value of k is 7.