Linear Equations: Exercise 4.2

Q.1 Which one of the following options is true, and why?
$y = 3x + 5$ has
(i) a unique solution
(ii) only two solution
(iii) infinitely many solutions
Sol.
Given: $y = 3x + 5$
For $x = 0$, $y = 0 + 5$
$= 5$
Thus, (0, 5) is another solution of the given equation.
Again for $x = 1$, $y = 3 \times 1 + 5$
$= 8$
Thus, (1, 8) is another solution of the given equation.
For $x = 2$, $y = 3x2 + 5$
$\Rightarrow y = 11$
Thus, (2, 11) is one of solution of the given equation.

From above, for different values of x, we get different value of y. Thus, there is no end to different solutions of a linear equation in two variables.
Thus, this linear equation in two variables has infinitely many solutions.
Correct Option: (iii)

Q.2 Write four solutions for each of the following equations:
(i) $2x + y = 7$
(ii) $\pi x + y = 9$
(iii) $x = 4y$
***Sol.* (i)** Given: $2x + y = 7$
This equation can be written as $y = 7 - 2x$.
For $x = 0$, $y = 7 - 2 \times 0$
$= 7$
For $x = 1$, $y = 7 - 2 \times 1$
$= 5$
For $x = 2$, $y = 7 - 2 \times 2$
$= 3$
For $x = 3$, $y = 7 - 2 \times 3$
$= 1$
Thus, the four solutions of the given equation: (0, 7), (1, 5) , (2, 3) and (3, 1) .

(ii) Given: $\pi x + y = 9$
This equation can be written as $y = 9 - \pi x$
For $x = 0$, $y = 9 - 0$
$= 9$
For $x = 1$, $y = 9 - \pi$
For $x = 2$, $y = 9 - 2\pi$
For $x = 3$, $y = 9 - 3\pi$
Thus, the four solutions of the given equation: (0, 9), (1, $9 - \pi$) , (2, $9 - 2\pi$) and (3, $9 - 3\pi$).

(iii) Given: $x = 4y$
This equation can be written as $x = 4y$
For $x = 0$, $y = 0$
For $x = 1$; $y = \frac{1}{4}$
For $x = 2$; $y = \frac{2}{4} = \frac{1}{2}$

For x = 3 ; y = $\frac{3}{4}$

Thus, the four solutions of the given equation: (0, 0), (1, $\frac{1}{4}$), (2, $\frac{1}{2}$) and (3, $\frac{3}{4}$).

Q.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)

Sol. Given: x – 2y = 4, for checking the following points are solution of given equation. We will put the every point in given equation. If these points are the solution of the equation x - 2y = 4, then these points will satisfy the equation.

(i) By putting x = 0 and y = 2 in L.H.S. of x – 2y = 4,
We get,
L.H.S = 0 – 2 × 2
= – 4 ≠ R.H.S.
Thus, x = 0, y = 2 is not solution of given equation.

(ii) By putting x = 2 and y = 0 in L.H.S. of x – 2y = 4,
We get,
L.H.S. = 2 – 2 × 0
= 2 – 0
= 2 ≠ R.H.S.
Thus, x = 2, y = 0 is not solution of given equation.

(iii) By putting x = 4 and y = 0 in the L.H.S. of x – 2y = 4,
We get,
L.H.S. = 4 – 0
= 4 = R.H.S.
Thus, x = 4, y = 0 is the solution of given equation.

(iv) By putting x = $\sqrt{2}$, y = $4\sqrt{2}$ in the L.H.S. of x – 2y = 4,
We get,
L.H.S. x = $\sqrt{2} - 2\times 4\sqrt{2}$
= $\sqrt{2} - 8\sqrt{2}$
= $-7\sqrt{2}$ ≠ R.H.S.
Thus, x= $\sqrt{2}$, y = $4\sqrt{2}$) is not solution of given equation.

(v) By putting x = 1 and y = 1 in the L.H.S. of x – 2y = 4,
We get,
L.H.S. = 1 – 2 × 1
= 1 – 2
= – 1 ≠ R.H.S.
Thus, x = 1, y = 1 is not solution of given equation.

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

Sol. If values x = 2, y = 1 is a solution of the given equation 2x + 3y = k, then these values will satisfy the equation.
Thus, 2 × 2 + 3 × 1 = k
⇒ k = 4 + 3 = 7.