# CHAPTER-4 LINEAR EQUATIONS IN TWO VARIABLES

Exercise 4.1

**Question 1: The cost of a notebook is twice the cost of a pen. Write a linear equation in two variables to represent this statement.**

**Solution:** Let the cost of a notebook and a pen be $x$ and $y$ respectively.

Cost of notebook = 2 × Cost of pen

$x = 2y$

$x - 2y = 0$

**Question 2: Express the following linear equations in the form $ax + by + c = 0$ and indicate the values of $a$, $b$, $c$ in each case:**

**(i)** $\mathbf{2x + 3y = 9.3\overline{5}}$

**(ij)** $\mathbf{x - \frac{y}{5} - 10 = 0}$

**(iii)** $\mathbf{-2x + 3y = 6}$

**(iv)** $\mathbf{x = 3y}$

**(v)** $\mathbf{2x = -5y}$

**(vi)** $\mathbf{3x + 2 = 0}$

**(vii)** $\mathbf{y - 2 = 0}$

**(viii)** $\mathbf{5 = 2x}$

Solution: (i) $2x + 3y = 9.3\overline{5}$

$2x + 3y - 9.3\overline{5} = 0$

Comparing this equation with $ax + by + c = 0$,

$a = 2, b = 3, c = -9.3\overline{5}$

$(ii)\ x - \frac{y}{5} - 10 = 0$

Comparing this equation with $ax + by + c = 0$,

$a = 1, b = -\frac{1}{5}, c = -10$

(iii) $-2x + 3y = 6$

Comparing this equation with $ax + by + c = 0$,

$a = -2, b = 3, c = -6$

(iv) $x = 3y$

$1x - 3y + 0 = 0$

Comparing this equation with $ax + by + c = 0$,

$a = 1, b = -3, c = 0$

(v) $2x = -5y$

$2x + 5y + 0 = 0$

Comparing this equation with $ax + by + c = 0$,

$a = 2, b = 5, c = 0$

(vi) $3x + 2 = 0$

$3x + 0.y + 2 = 0$

Comparing this equation with $ax + by + c = 0$,

$a = 3, b = 0, c = 2$

(vii) $y - 2 = 0$

$0x + 1.y - 2 = 0$

Comparing this equation with $ax + by + c = 0$,

$a = 0, b = 1, c = -2$

(viii) $5 = 2x$

$-2x + 0.y + 5 = 0$

Comparing this equation with $ax + by + c = 0$,

## 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**

**Solution:** $y = 3x + 5$ is a linear equation in two variables and it has infinite possible solutions. As for every value of $x$, there will be a value of $y$ satisfying the above equation and vice-versa.

Hence, the correct answer is (iii).

**Question 2: Write four solutions for each of the following equations:**

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

**Solution:** (i) $2x + y = 7$

For $x = 0$,

$2(0) + y = 7$

$\Rightarrow y = 7$

Therefore, (0, 7) is a solution of this equation.

For $x = 1$,

$2(1) + y = 7$

$\Rightarrow y = 5$

Therefore, (1, 5) is a solution of this equation.

For $x = -1$,

$2(-1) + y = 7$

$\Rightarrow y = 9$

Therefore, (−1, 9) is a solution of this equation.

For $x = 2$,

$2(2) + y = 7$

$\Rightarrow y = 3$

Therefore, (2, 3) is a solution of this equation.

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

For $x = 0$,

$\pi(0) + y = 9$

$\Rightarrow y = 9$

Therefore, (0, 9) is a solution of this equation.

For $x = 1$,

$\pi(1) + y = 9$

$\Rightarrow y = 9 - \pi$

Therefore, $(1, 9 - \pi)$ is a solution of this equation.

For $x = 2$,

$\pi(2) + y = 9$

$\Rightarrow y = 9 - 2\pi$

Therefore, $(2, 9 - 2\pi)$ is a solution of this equation.

For $x = -1$,

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

$\Rightarrow y = 9 + \pi$

$\Rightarrow (-1, 9 + \pi)$ is a solution of this equation.

(iii) $x = 4y$

For $x = 0$,

$0 = 4y$

$\Rightarrow y = 0$

Therefore, (0, 0) is a solution of this equation.

For $y = 1$,

$x = 4(1) = 4$

Therefore, (4, 1) is a solution of this equation.

For $y = -1$,

$x = 4(-1)$

$\Rightarrow x = -4$

Therefore, $(-4, -1)$ is a solution of this equation.

For $x = 2$,

$2 = 4y$

$\Rightarrow y = \frac{2}{4} = \frac{1}{2}$

Therefore, $\left(2, \frac{1}{2}\right)$ is a solution of this equation.

**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)**

**Solution:** (i) (0, 2)

Putting $x = 0$ and $y = 2$ in the L.H.S of the given equation,

$x - 2y = 0 - 2\times2 = -4 \neq 4$

L.H.S ≠ R.H.S

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

(ii) (2, 0)

Putting $x = 2$ and $y = 0$ in the L.H.S of the given equation,

$x - 2y = 2 - 2 \times 0 = 2 \neq 4$

L.H.S ≠ R.H.S

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

(iii) (4, 0)

Putting $x = 4$ and $y = 0$ in the L.H.S of the given equation,

$x - 2y = 4 - 2(0)$

$= 4 =$ R.H.S

Therefore, (4, 0) is a solution of this equation.

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

Putting $x = \sqrt{2}$ and $y = 4\sqrt{2}$ in the L.H.S of the given equation,

$$\begin{aligned} x - 2y &= \sqrt{2} - 2(4\sqrt{2}) \\ &= \sqrt{2} - 8\sqrt{2} = -7\sqrt{2} \neq 4 \end{aligned}$$

L.H.S ≠ R.H.S

Therefore, $(\sqrt{2}, 4\sqrt{2})$ is not a solution of this equation.

(v) (1, 1)

Putting $x = 1$ and $y = 1$ in the L.H.S of the given equation,

$x - 2y = 1 - 2(1) = 1 - 2 = -1 \neq 4$

L.H.S ≠ R.H.S

Therefore, (1, 1) is not a solution of this equation.

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

**Solution:** Putting $x = 2$ and $y = 1$ in the given equation,

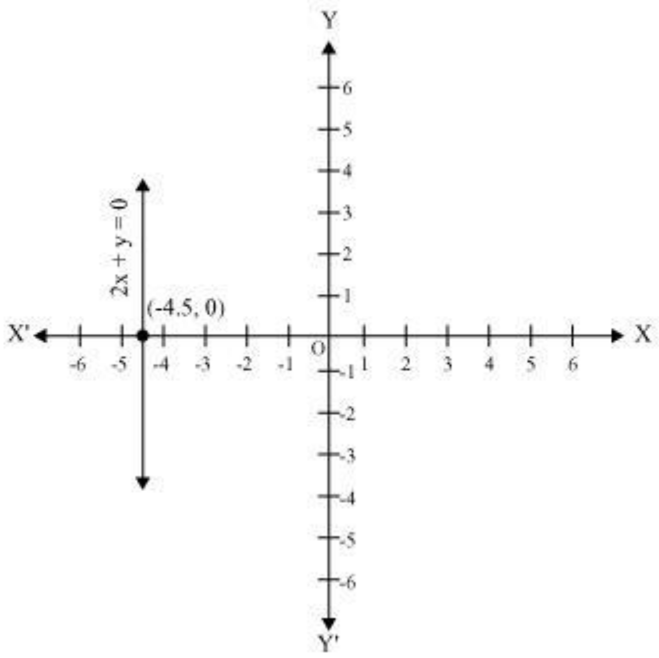
$2x + 3y = k$

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

$\Rightarrow 4 + 3 = k$

$\Rightarrow k = 7$

Therefore, the value of $k$ is 7.


Y
6
5
4
3
2
1
2x + y = 0
(-4.5, 0)
X'
X
O
-6
-5
-4
-3
-2
-1
1
2
3
4
5
6
-1
-2
-3
-4
-5
-6
Y'