# LINEAR EQUATION IN TWO VARIABLES

### SOLUTION OF LINEAR EQUATION IN TWO VARIABLES

#### Solution of a Linear Equation in Two Variables

The solution of an equation in two variables are ordered pairs (x,y) which satisfy the equation. The solution is a pair of values, one for x and the other for y which when substituted in the given equation, make the two sides of the equation equal.

For example, (1,3) (2,2) and (5, -1) are three solutions of x + y = 4

**Note:** A linear equation in two variables has infinitely many solutions.

#### **Obtaining the Solution of a Linear Equation in Two Variables**

We can obtain solutions of linear equation in two variables by choosing a value for one variable, and then substituting and computing to find the value of the other variable.

For example, to obtain a solution of 2x + 7y + 3 = 0, we choose y = 1.

Substituting this in 2x + 7y + 3 = 0, we get 2x + 7(1) + 3 = 0

 $\Rightarrow$  2x = -10 or x = -5. Thus, x = -5 and y = 1 is a solution of 2x + 7y +3 = 0 or (-5,1) is one of the solutions of 2x + 7y +3 = 0.

**Ex.1** Find three solutions of 2x + 5y = 13.

**Sol.** When x = -1, we get

2(-1) + 5y = 13  $\Rightarrow -2 + 5y = 13 \qquad \Rightarrow 5y = 13 + 2 = 15 \Rightarrow y = 3$   $\therefore x = -1, y = 3 \text{ or } (-1,3) \text{ is a solution of } 2x + 5y = 13$ When x = 0, we get  $2(0) + 5y = 13 \qquad \Rightarrow 5y = 13 \text{ or } y = \frac{13}{5} = 2.6$ 

thus, x = 0, y = 2.6 or (0,2.6) is a solution of 2x + 5y = 13

MATHS

When x = 1, we get

2 (1) + 5y = 13 
$$\Rightarrow 5y = 11$$
 or  $y = \frac{11}{5} = 2.2$ 

Thus, the solution of linear equation 2x + 5y = 13 can be recorded as

Х	-1	0	1
У	3	2.6	2.2

**Ex.2** Prove that x = 3, y = 2 is a solution of 3x - 2y = 5.

Sol. x = 3, y = 2 is a solution of 3x - 2y = 5, because L.H.S.  $= 3x - 2y = 3 \times 3 - 2 \times 2 = 9 - 4 = 5 = R.H.S.$ 

i.e. x = 3, y = 2 satisfied the equation 3x - 2y = 5.

 $\therefore$  it is solution of the given equation.

- **Ex.3** Prove that x = 1, y = 1 as well as x = 2, y = 5 is a solution of 4x y 3 = 0.
- **Sol.** Given eq. is 4x y 3 = 0 ....(i)

First we put x = 1, y = 1 in L.H.S. of eq...(i)

Here L.H.S. =  $4x - y - 3 = 4 \times 1 - 1 - 3 = 4 - 4 = 0 = R.H.S.$ 

Now we put x = 2, y = 5 in eq. (i)

L.H.S. =  $4x - y - 3 = 4 \times 2 - 5 - 3 = 8 - 8 = 0 = R.H.S.$ 

Since, x = 1, y = 1 and x = 2, y = 5 both pair satisfied in given equation therefore they are the solution of given equation.

- **Ex.4** Determine whether the x = 2, y = -1 is a solution of equation 3x + 5y 2 = 0.
- **Sol.** Given eq, is 3x + 5y 2 = 0 ....(i)

Taking L.H.S. =  $3x + 5y - 2 = 3 \times 2 + 5 \times (-1) - 2 = 6 - 5 - 2 = 1 \neq 0$ 

Here L.H.S.  $\neq$  R.H.S. therefore x = 2, y = - is not a solution of given equations.

## CLASS 9

**Ex.5** Find the value of a if (a, -3a) is a solution of 14x + 3y = 35.

**Sol.** Put x = a and y = -3a in given equation

14(a) + 3(-3a) = 3514a - 9a = 355a = 35a = 7

**Ex.6** Find the value of k in equation 2x + ky = 6 if (-2, 2) is a solution.

**Sol.** (-2, 2) is a solution of 2x + ky = 5

$$\therefore 2(-2) + k(2) = 6$$
$$-4 + 2k = 6 \Rightarrow 2k = 6 + 4$$
$$k = \frac{10}{2} = 5$$