CLASS 10

## PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

## ELIMINATION BY EQUATING THE COEFFICIENT

## **Elimination Method**

- **Step–I:** Obtain the two equations
- **Step–II:** First multiply both the equation by some suitable non-zero constant to make the coefficient of one variable (either *x* or y) numerically equal.
- **Step–III:** Add or subtract one equation from the other, then one variable gets eliminated.
- **Step–IV:** Solve the equation in one variable.
- **Step–V:** Substitute the value of *x* (or y) in any one of the given equation and find the value of another variable.
- **Ex.1** Solve the system of linear equations by Elimination method

(i) 4x - y = 5 (ii) 3x + 2y = 12

**Sol.** Equation (i) is multiplied by '2' and adding to the equation (ii) then 8x-2y = 10

3x + 2y = 12

 $11x = 22 \qquad \Rightarrow \qquad x = 2$ 

Putting the value of *x* in equation (ii)

 $3 \times 2 + 2y = 12 \qquad \Rightarrow \qquad 6 + 2y = 12$ 

$$2y = 6$$
  $\Rightarrow y = 3$ 

Hence the solution of the given system if x = 2, y = 3

**Ex.2** Solve 9x - 4y = 8 .....(i)

13x + 7y = 101 ....(ii)

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Sol. Multiply equation (i) by 7 and equation (ii) by 4, we get

Add 
$$63x - 28y = 56$$
  
 $52x + 28y = 404$   
 $115x = 460$   
 $\Rightarrow x = \frac{460}{115}x = 4.$ 

Substitute x = 4 in equation (i)

$$9 (4) - 4y = 8 \qquad \Rightarrow \qquad 36 - 8 = 4y$$

$$\Rightarrow 28 = 4y \qquad \Rightarrow \qquad y = \frac{28}{4} = 7$$

So, solution is x = 4 and y = 7.

**Ex.3** Solve the following system of linear equations by applying the method of elimination by equating the co-efficients :

(i) 
$$4x - 3y = 4$$
  $2x + 4y = 3$   
(ii)  $5x - 6y = 8$   $3x + 2y = 6$ 

Sol. (i) We have,

$$4x - 3y = 4$$
 ....(1)  
 $2x + 4y = 3$  ....(2)

Let us decide to eliminate x from the given equation. Here, the co-efficients of x are 4 and 2 respectively. We find the L.C.M. of 4 and 2 is 4. Then, make the co-efficients of x equal to 4 in the two equations.

Multiplying equation (1) with 1 and equation (2) with 2, we get ;

4x - 3y = 4 ....(3) 4x + 8y = 6 ....(4) Subtracting equation (4) from (3), we get ;

-11y = -2

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$$\Rightarrow$$
 y =  $\frac{2}{11}$ 

Substituting y = 2/11 in equation (1), we get;

$$4x - 3 \times \frac{2}{11} = 4$$
$$\Rightarrow 4x - \frac{6}{11} = 4$$
$$\Rightarrow 4x = 4 + \frac{6}{11}$$
$$\Rightarrow 4x = \frac{50}{11}$$
$$\Rightarrow x = \frac{50}{44} = \frac{25}{22}$$

Hence, solution of the given system of equation is :

$$x = \frac{25}{22}, \quad y = \frac{2}{11}$$

(ii) We have;

$$5x - 6y = 8$$
 ....(1)

$$3x + 2y = 6$$
 ....(2)

Let us eliminate y from the given system of equations. The co-efficients of y in the given equations are 6 and 2 respectively. The L.C.M. of 6 and 2 is 6. We have to make the both coefficients equal to 6. So, multiplying both sides of equation (1) with 1 and equation (2) with 3, we get ;

$$5x - 6y = 8$$
 ....(3)

$$9x + 6y = 18$$
 ....(4)

Adding equation (3) and (4), we get;

$$14x = 26 \qquad \qquad \Rightarrow \quad x = \frac{26}{14} = \frac{13}{7}$$

Putting x = 13/7 in equation (1), we get ;

$$5 \times \frac{13}{7} - 6y = 8 \qquad \Rightarrow \quad \frac{65}{7} - 6y = 8$$

$$\Rightarrow 6y = \frac{65}{7} - 8 = \frac{65 - 56}{7} = \frac{9}{7}$$
$$\Rightarrow y = \frac{9}{42} = \frac{3}{14}$$

Hence, the solution of the system of equations is  $x = \frac{13}{7}$ ,  $y = \frac{3}{14}$