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Changing your Tomorrow

PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

PPT6

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 03
CHAPTER NAME : PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

Website: www.odmegroup.org
Email: info@odmps.org
Toll Free: 1800 120 2316
Sishu Vihar, Infocity Road, Patia, Bhubaneswar- 751024

PREVIOUS KNOWLEDGE TEST

Substitution method

If we have a pair of Linear Equations with two variables x and y, then we have to follow these steps to solve them with the substitution method-

Step 1: We have to choose any one equation and find the value of one variable in terms of other variable i.e. y in terms of x.

Step 2: Then substitute the calculated value of y in terms of x in the other equation.

Step 3: Now solve this Linear Equation in terms of x as it is in one variable only i.e. x.

Step 4: Substitute the calculate value of x in the given equations and find the value of y.

Learning outcome

- Students will be able to find solution of a pair of linear equations algebraically by Substitution method.

- Students will be able to apply it to solve real life situations.

•**Solution Using Elimination with Two Variables**

•Arrange both equations in standard form, placing like variables and constants one above the other.

•Choose a variable to eliminate, and with a proper choice of multiplication, arrange so that the coefficients of that variable are opposites of one another.

•Add the equations, leaving one equation with one variable

•Solve for the remaining variable.

•Substitute the value found in Step 4 into any equation involving both variables and solve for the other variable.

•Check the solution in both original equations

Discussion on solving a pair of linear equations using Elimination method.

https://youtu.be/Dm1rrr6ROVU

Solve the following pair of linear equations by the elimination method d and the substitution method : 3x – 5y – 4 = 0 and 9x = 2y + 7

(*iii*) By Elimination Method:

Equations are

$$3x - 5y = 4 \quad \ldots(i)$$

and $$9x - 2y = 7 \quad \ldots(ii)$$

Multiplying equation (*i*) by 3 and subtracting from equation (*ii*),

$$\begin{array}{rrr} 9x & - 2y & = 7 \\ 9x & - 15y & = 12 \\ - & + & - \\ \hline & 13y & = -5 \end{array}$$

$$\Rightarrow \quad \boxed{y = \frac{-5}{13}}$$

Putting this value of y in equation (*i*), we get

$$3x - 5\left(\frac{-5}{13}\right) = 4 \Rightarrow 3x + \frac{25}{13} = 4$$

$$\Rightarrow \quad 3x = 4 - \frac{25}{13} = \frac{52 - 25}{13}$$

$$\Rightarrow \quad 3x = \frac{27}{13} \Rightarrow \boxed{x = \frac{9}{13}}$$

By Substitution Method:

We have $$3x - 5y = 4 \quad \ldots(i)$$

and $$9x - 2y = 7 \quad \ldots(ii)$$

From equation (*i*), $x = \dfrac{4 + 5y}{3}$

Putting this value in equation (*ii*), we get

$$9\left[\frac{4 + 5y}{3}\right] - 2y = 7 \Rightarrow 3[4 + 5y] - 2y = 7$$

$$\Rightarrow \quad 12 + 15y - 2y = 7 \Rightarrow 12 + 13y = 7$$

$$\Rightarrow \quad 13y = -5 \Rightarrow \boxed{y = \frac{-5}{13}}$$

Putting this value of y in equation (*ii*), we get

$$9x - 2\left(\frac{-5}{13}\right) = 7 \Rightarrow 9x + \frac{10}{13} = 7$$

$$9x = 7 - \frac{10}{13}$$

$$\Rightarrow \quad 9x = \frac{81}{13} \Rightarrow \boxed{x = \frac{9}{13}}$$

Solve for x and y by the method of elimination:
$4x - 3y = 1$; $5x - 7y = -2$

Sol. Given equations are

$$4x - 3y = 1 \quad \ldots(i)$$

$$5x - 7y = -2 \quad \ldots(ii)$$

For making coefficient of y equal in both the equations multiplying equation (i) with 7, we get

$$7 \times (4x - 3y) = 7 \times 1$$

$$\Rightarrow \quad 28x - 21y = 7 \quad \ldots(iii)$$

Multiplying equation (ii) with 3, we get

$$3 \times (5x - 7y) = 3 \times -2$$

$$\Rightarrow \quad 15x - 21y = -6 \quad \ldots(iv)$$

Subtracting equation (iv) from (iii), we get

$$\begin{array}{r} 28x - 21y = 7 \\ 15x - 21y = -6 \\ - \quad + \quad + \\ \hline 13x = 13 \\ \hline \end{array}$$

$$\Rightarrow \quad x = 1$$

when $x = 1$, equation (i) becomes

$$4 \times 1 - 3y = 1$$

$$\Rightarrow \quad -3y = -3 \Rightarrow y = 1$$

$\therefore\ x = 1, y = 1$

Solve the following pair of linear equations for x and y:

$2(ax - by) + (a + 4b) = 0$; $2(bx + ay) + (b - 4a) = 0$

Sol. Consider equations:

$$2(ax - by) + (a + 4b) = 0$$

and $\quad 2(bx + ay) + (b - 4a) = 0$

$\Rightarrow \quad 2ax - 2by = -a - 4b \qquad ...(i)$

and $\quad 2bx + 2ay = 4a - b \qquad ...(ii)$

Multiply (i) by a and (ii) by b and adding, we get

$$2(a^2 + b^2)x = (-a - 4b)a + b(4a - b)$$
$$= -a^2 - 4ab + 4ab - b^2$$
$$= -(a^2 + b^2)$$

$\Rightarrow \quad x = -\frac{1}{2}$

Substituting in (i), we get

$$-a - 2by = -a - 4b$$

$\Rightarrow \quad -2by = -4b \Rightarrow y = 2$

$\therefore$ solution is $\quad x = -\frac{1}{2}$ and $y = 2$.

Home assignment

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- **Ex. 3.34Q. 1 & AHA**

1. Solve the system of equation 2x + y = -4 and 5x – 3y = 1 by the method of elimination.
2. Solve the system of equation 2x + 3y = 11, x + 2y = 7 by the method of elimination..

THANKING YOU

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