

# PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

PPT8

**SUBJECT : MATHEMATICS**

**CHAPTER NUMBER: 03**

**CHAPTER NAME : PAIR OF LINEAR EQUATIONS IN TWO VARIABLES**

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**CHANGING YOUR TOMORROW**

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Website: [www.odmegroup.org](http://www.odmegroup.org)

Email: [info@odmps.org](mailto:info@odmps.org)

Toll Free: **1800 120 2316**

Sishu Vihar, Infocity Road, Patia, Bhubaneswar- 751024

## PREVIOUS KNOWLEDGE TEST

### • **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

## Learning outcome

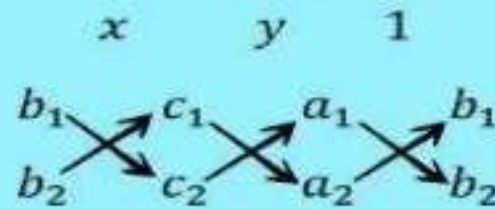
- Students will be able to find solution of a pair of linear equations algebraically by cross multiplication method.
- Students will be able to apply it to solve real life situations.
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# CROSS- MULTIPLICATION METHOD

$$a_1x + b_1y + c_1 = 0$$

$$a_2x + b_2y + c_2 = 0$$

To solve this pair of equations for  $x$  and  $y$  using cross-multiplication, we'll arrange the variables and their coefficients  $a_1, a_2$  and  $b_1, b_2$  and the constants  $c_1$  and  $c_2$



$$\Rightarrow x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1}$$

$$\Rightarrow y = \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1}$$

Discussion on solving a pair of linear equations using Cross-multiplication method.

[https://youtu.be/oyDdsh121AA\(5.2\)](https://youtu.be/oyDdsh121AA(5.2))

$$3x + 2y + 25 = 0$$

$$2x + y + 10 = 0$$

Here,

$$a_1 = 3, b_1 = 2, c_1 = 25$$

$$a_2 = 2, b_2 = 1 \text{ and } c_2 = 10$$

By cross-multiplication, we have

$$\Rightarrow \frac{x}{2 \times 10 - 25 \times 1} = \frac{-y}{3 \times 10 - 25 \times 2} = \frac{1}{3 \times 1 - 2 \times 2}$$

$$\Rightarrow \frac{x}{20 - 25} = \frac{-y}{30 - 50} = \frac{1}{3 - 4}$$

$$\Rightarrow \frac{x}{-5} = \frac{-y}{-20} = \frac{1}{-1}$$

$$\text{Now, } \frac{x}{-5} = \frac{1}{-1}$$

$$\Rightarrow x = \frac{-5}{-1} = 5$$

And,

$$\frac{-y}{-20} = \frac{1}{-1}$$

$$\Rightarrow \frac{y}{20} = 1$$

$$\Rightarrow y = -20$$

Solve the following pair of linear equations by cross-multiplication method :

$$8x + 5y = 9; \quad 3x + 2y = 4$$

[MCTBT]

The given equations can be written as

$$8x + 5y - 9 = 0$$

$$3x + 2y - 4 = 0$$

By cross-multiplication, we have

$$\begin{array}{ccccc} & x & & y & & 1 \\ & \underbrace{\hspace{1.5cm}} & & \underbrace{\hspace{1.5cm}} & & \underbrace{\hspace{1.5cm}} \\ b_1 & & c_1 & & a_1 & & b_1 \\ & \nearrow & \searrow & \nearrow & \searrow & \nearrow & \searrow \\ b_2 & & c_2 & & a_2 & & b_2 \end{array}$$

or

$$\begin{array}{ccccc} & x & & y & & 1 \\ & \underbrace{\hspace{1.5cm}} & & \underbrace{\hspace{1.5cm}} & & \underbrace{\hspace{1.5cm}} \\ 5 & & -9 & & 8 & & 5 \\ & \nearrow & \searrow & \nearrow & \searrow & \nearrow & \searrow \\ 2 & & -4 & & 3 & & 2 \end{array}$$

$$\Rightarrow \frac{x}{5(-4) - 2(-9)} = \frac{y}{-9 \times 3 - (-4)8} = \frac{1}{8 \times 2 - 3 \times 5} \Rightarrow \frac{x}{-20 + 18} = \frac{y}{-27 + 32} = \frac{1}{16 - 15}$$

$$\Rightarrow \frac{x}{-2} = \frac{y}{5} = \frac{1}{1} = 1 \Rightarrow x = 1(-2) = -2 \text{ and } y = 1 \times 5 = 5$$

Hence,  $x = -2$  and  $y = 5$  is the required solution.

For which values of a and b does the following pair of linear equations have an infinite number of solutions?

$$2x + 3y = 7$$

$$(a - b)x + (a + b)y = 3a + b - 2$$

<https://youtu.be/NxExdapLZ5o> (8.05)



For which values of a and b does the following pair of linear equations have an infinite number of solutions?

$$2x + 3y = 7$$

$$(a - b)x + (a + b)y = 3a + b - 2$$

For infinitely many solutions,

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \quad \Rightarrow \quad \frac{2}{a-b} = \frac{3}{a+b} = \frac{7}{3a+b-2}$$

$$\frac{2}{a-b} = \frac{3}{a+b} \quad \text{and} \quad \frac{3}{a+b} = \frac{7}{3a+b-2}$$

$$\Rightarrow \quad 3a - 3b = 2a + 2b \quad \text{and} \quad 9a + 3b - 6 = 7a + 7b$$

$$\Rightarrow \quad a = 5b \quad \text{and} \quad 2a - 4b = 6$$

$$\Rightarrow \quad 2(5b) - 4b = 6$$

$$\Rightarrow \quad 6b = 6$$

$$\Rightarrow \quad b = 1$$

Hence,  $a = 5 \times 1 = 5$  and  $b = 1$

## Home assignment

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- **Ex. 3.34Q. 1 to 3 & AHA**

**Solve for x and y**

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

$$a + b)(x + y) = a^2 + b^2..$$

**THANKING YOU**  
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