

# PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

PPT9

**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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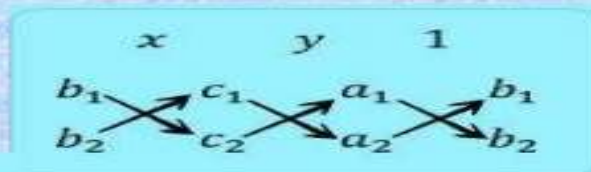
## PREVIOUS KNOWLEDGE TEST

### 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  $c_2$



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

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

## 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.
- . Students will be able to express given situation in two variables and hence find solution
  
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. A part of monthly hostel charges is fixed and the remaining depends on the number of days one has taken food in the mess. When a student A takes food for 20 days she has to pay ` 1000 as hostel charges whereas a student B, who takes food for 26 days, pays ` 1180 as hostel charges. Find the fixed charges and the cost of food per day.

<https://youtu.be/XNq-CLyEaeM>

. A part of monthly hostel charges is fixed and the remaining depends on the number of days one has taken food in the mess. When a student A takes food for 20 days she has to pay ₹ 1000 as hostel charges whereas a student B, who takes food for 26 days, pays ₹ 1180 as hostel charges. Find the fixed charges and the cost of food per day.

**Solution.** (i) Let monthly fixed mess charges = ₹  $x$  and per day mess charge = ₹  $y$

1st condition :  $x + 20y = 1000 \Rightarrow x + 20y - 1000 = 0$

2nd condition :  $x + 26y = 1180 \Rightarrow x + 26y - 1180 = 0$

By cross-multiplication, we have

$$\begin{array}{ccccccc} & x & & y & & 1 & \\ \hline 20 & & -1000 & & 1 & & 20 \\ & \nearrow & & \searrow & \nearrow & & \searrow \\ 26 & & -1180 & & 1 & & 26 \end{array}$$

$$\therefore \frac{x}{-20 \times 1180 + 26 \times 1000} = \frac{y}{-1000 + 1180} = \frac{1}{26 - 20}$$

$$\Rightarrow \frac{x}{2400} = \frac{y}{180} = \frac{1}{6} \quad \Rightarrow \quad x = \frac{2400}{6} = 400, \quad y = \frac{180}{6} = 30$$

Hence, fixed monthly charges = ₹ 400 and mess charges per day = ₹ 30.

Yash scored 40 marks in a test, getting 3 marks for each right answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks been deducted for each incorrect answer, then Yash would have scored 50 marks. How many questions were there in the test?

(iii) Let the number of questions having correct answer =  $x$   
and the number of questions having incorrect answer =  $y$

1st condition :  $3x - y = 40 \Rightarrow 3x - y - 40 = 0$

2nd condition :  $4x - 2y = 50 \Rightarrow 4x - 2y - 50 = 0$

By cross-multiplication, we have

$$\begin{array}{ccccccc} & x & & y & & 1 & \\ \hline -1 & & -40 & & 3 & & -1 \\ & \swarrow & \searrow & \swarrow & \searrow & \swarrow & \searrow \\ -2 & & -50 & & 4 & & -2 \end{array}$$

$$\therefore \frac{x}{50 - 80} = \frac{y}{-160 + 150} = \frac{1}{-6 + 4}$$

$$\Rightarrow \frac{x}{-30} = \frac{y}{-10} = \frac{1}{-2} \Rightarrow \frac{x}{15} = \frac{y}{5} = \frac{1}{1} \Rightarrow x = 15, y = 5$$

Hence, total number of questions in the test =  $x + y = 15 + 5 = 20$ .

A fraction becomes  $\frac{1}{3}$  when 1 is subtracted from the numerator and it becomes  $\frac{1}{4}$  when 8 is added to its denominator. Find the fraction.

Let numerator =  $x$  and denominator =  $y$

$$\therefore \text{Fraction} = \frac{x}{y}$$

A.T.Q.

Ist Condition:

$$\frac{x-1}{y} = \frac{1}{3} \Rightarrow 3x - 3 = y$$

$$\Rightarrow 3x - y = 3 \quad \dots (i)$$

2nd Condition:

$$\frac{x}{y+8} = \frac{1}{4} \Rightarrow 4x = y + 8$$

$$\Rightarrow 4x - y = 8 \quad \dots (ii)$$

Solving (i) and (ii) for  $x$  and  $y$

By cross multiplication method

$$\begin{array}{ccc} x & y & -1 \\ -1 & 3 & 3 \\ -1 & 8 & 4 \\ -1 & & -1 \end{array}$$

$$\Rightarrow \frac{x}{-8+3} = \frac{y}{12-24} = \frac{-1}{-3+4}$$

$$\Rightarrow \frac{x}{-5} = \frac{y}{-12} = \frac{-1}{1}$$

$$\Rightarrow \boxed{x=5} \text{ and } \boxed{y=12}$$

$$\therefore \text{Fraction} = \frac{5}{12}$$

## Home assignment

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- **Ex. 3.5 Q. 4 & AHA**

1.. One says, “Give me a hundred, friend! I shall then become twice as rich as you”. The other replies, “If you give me ten, I shall be six times as rich as you”. Tell me what is the amount of their (respective) capital? [From the Bijaganita of Bhaskara II]

2. In a  $\Delta ABC$ ,  $\angle C = 3 \angle B = 2 (\angle A + \angle B)$ . Find the three angles.



**THANKING YOU**  
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