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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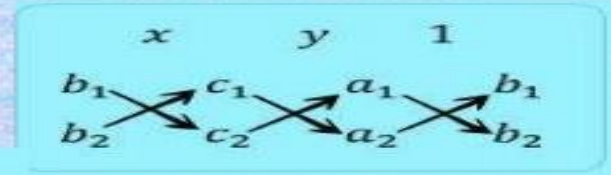
PREVIOUS KNOWLEDGE TEST

CROSS- MULTIPLICATION METHOD

$a_1x + b_1y + c_1 = 0$ $\qquad$ $a_2x + b_2y + c_2 = 0$

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



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

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

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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

. 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

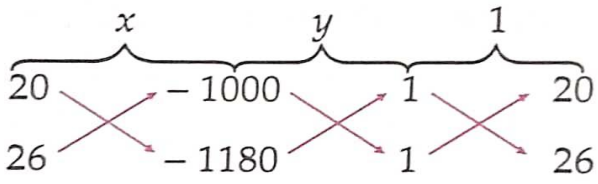
. A part of monthly hostel charges is fixed and the remaining depends on the number of days one has taken food in the mess. When a student A takes food for 20 days she has to pay ` 1000 as hostel charges whereas a student B, who takes food for 26 days, pays ` 1180 as hostel charges. Find the fixed charges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

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



$$\therefore \quad \frac{x}{-20\times1180+26\times1000}=\frac{y}{-1000+1180}=\frac{1}{26-20}$$

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

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?

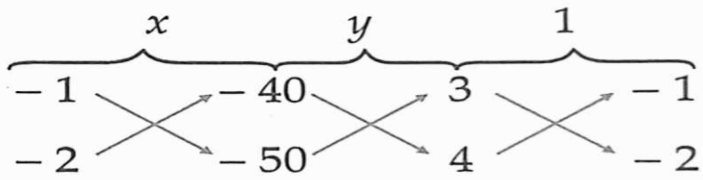
(*iii*) Let the number of questions having correct answer $= x$

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



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

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

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

A fraction becomes 1/3 when 1 is subtracted from the numerator and it becomes1/4 when 8 is added to its denominator. Find the fraction.

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

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

A.T.Q.

Ist Condition:

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

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

2nd Condition:

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

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

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

By cross multiplication method

$$\begin{array}{ccccc} x & & y & & -1 \\ -1 & \times & 3 & \times & -1 \\ -1 & & 8 & & 4 \end{array} \qquad \begin{array}{c} 3 \\ -1 \end{array}$$

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

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

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

$\therefore$ 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 ΔABC, $\angle C = 3 \angle B = 2 (\angle A + \angle B)$. Find the three angles.

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THANKING YOU

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