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PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

PPT7

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

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PREVIOUS KNOWLEDGE TEST

Relationship between coeff. or the pair of equations	**Graph**	**Number of Solutions**	**Consistency of System**
$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$	Intersecting lines	Unique solution	Consistent
$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$	Parallel lines	No solution	Inconsistent
$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$	Co-incident lines	Infinite solutions	Consistent

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Learning outcome

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

Form the pair of linear equations in the following problems, and find their solutions (if they exist) by the elimination method : (i) If we add 1 to the numerator and subtract 1 from the denominator, a fraction reduces to 1. It becomes 1 /2 if we only add 1 to the denominator. What is the fraction?
https://youtu.be/Mae1ZgX4FuY(6.43)

Form the pair of linear equations in the following problems, and find their solutions (if they exist) by the elimination method : (i) If we add 1 to the numerator and subtract 1 from the denominator, a fraction reduces to 1. It becomes 1 /2 if we only add 1 to the denominator. What is the fraction?

Let numerator be x and denominator be y.

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

A.T.Q.

Ist Condition:

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

$$\Rightarrow \quad x - y = -2 \qquad \ldots (i)$$

2nd Condition:

$$\frac{x}{y+1} = \frac{1}{2} \Rightarrow 2x = y + 1$$

$$2x - y = 1 \qquad \ldots (ii)$$

Subtracting equation (ii) from equation (i), we get

$$\begin{array}{rcl} x - y & = & -2 \\ 2x - y & = & 1 \\ - \quad + & & - \\ \hline -x & = & -3 \\ \hline \end{array}$$

$$\Rightarrow \quad \boxed{x = 3}$$

Putting $x = 3$ in equation (i),

$$3 - y = -2$$

$$3 + 2 = y \Rightarrow \boxed{y = 5}$$

Hence, the fraction $= \frac{x}{y} = \frac{3}{5}$

The sum of the digits of a two-digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digits. Find the number.

https://youtu.be/Z4oXRcLtEsc

The sum of the digits of a two-digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digits. Find the number.

Let digit at unit place $= x$ and digit at ten's place $= y$.

$\therefore$ Two digit number is $10y + x$

A.T.Q.

Ist Condition:

$$x + y = 9 \qquad \ldots (i)$$

2nd Condition:

$$9(10y + x) = 2(10x + y)$$

$$\Rightarrow \quad 90y + 9x = 20x + 2y$$

$$\Rightarrow \quad 88y - 11x = 0 \Rightarrow -11x + 88y = 0$$

$$\Rightarrow \quad -x + 8y = 0 \qquad \ldots (ii)$$

Adding equation (i) and (ii), we get

$$\begin{array}{rcl} x + y & = & 9 \\ -x + 8y & = & 0 \\ \hline 9y & = & 9 \end{array}$$

$$\Rightarrow \quad \boxed{y = 1}$$

Putting $y = 1$ in equation (i),

$$x + 1 = 9 \quad \Rightarrow \quad \boxed{x = 8}$$

Number is

$$10y + x = 10(1) + 8 = 10 + 8 = 18$$

Ex. Find the values of a and b so that the following system of linear equations has infinite number of solutions : $2x-3y=7,\ (a+b)x-(a+b-3)y=4a+b$

[CBSE 02, 10]

Solution. Here, $\frac{a_1}{a_2}=\frac{2}{a+b},\ \frac{b_1}{b_2}=\frac{-3}{-(a+b-3)},\ \frac{c_1}{c_2}=\frac{7}{4a+b}$

For infinite number of solutions, we have

$$\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2} \quad \Rightarrow \quad \frac{2}{a+b}=\frac{3}{a+b-3}=\frac{7}{4a+b}$$

Taking 1st two terms :

$$\Rightarrow \quad \frac{2}{a+b}=\frac{3}{a+b-3}$$

$$\Rightarrow \quad 3a+3b=2a+2b-6$$

$$\Rightarrow \quad a+b=-6$$

$$\Rightarrow \quad a=-6-b$$

Taking 2nd two terms :

$$\frac{3}{a+b-3}=\frac{7}{4a+b}$$

$$12a+3b=7a+7b-21$$

$$5a-4b=-21$$

$$\therefore \quad 5(-6-b)-4b=-21 \qquad [\because\ a=-6-b]$$

$$\Rightarrow \quad -9b=30-21=9$$

$$\Rightarrow \quad b=-1$$

$$\therefore \quad a=-6-(-1)=-6+1=-5$$

Hence, the given linear pair will have infinite number of solutions when $a=-5$ and $b=-1$.

Home assignment

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- **Ex. 3.4Q. 2 & AHA**

1 Dorion was given two equations $5m-2n=17$, and $3m+n=8$, and asked to find the value of mm and nn. Can you help him in finding the value of m and n using the elimination method?

2. The sum of a two-digit number and the number obtained by reversing the digits is 88. If the digits of the number differ by 2, find the number. How many such numbers are there?

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