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Subject: - Mathematics

Solution of a Pair of Linear Equations in Two Variables

Word Problems (Use Elimination Method)

Solve for x and y.

(I) $7x - 2y/xy = 5$ _____ (a)

$8x + 7y/xy = 15$ _____ (b)

Solution: Taking eqn. (a)

$$7x - 2y/xy = 5$$

$$\text{? } 7x/xy - 2y/xy = 5$$

$$\text{? } 7/y - 2/x = 5 \dots \text{(i)}$$

Taking eqn. (b)

$$\text{? } 8x + 7y/xy = 15$$

$$\text{? } 8x/xy + 7y/xy = 15$$

$$\text{? } 8/y + 7/x = 15 \dots \text{(ii)}$$

Let $1/x = p$ and $1/y = q$ in (i) and (ii) we get,

$$7q - 2p = 5 \dots \text{(iii)}$$

$$8q + 7p = 15 \dots \text{(iv)}$$

Multiplying equation (iii) by 7 and multiplying equation (iv) by 2 we get,

$$49q - 14p = 35 \dots \text{(v)}$$

$$16q + 14p = 30 \dots \text{(vi)}$$

Now, adding equation (v) and (vi) we get,

$$49q - 14p + 16q + 14p = 35 + 30$$

$$\text{? } 65q = 65$$

$$\text{? } q = 1$$

Putting the value of q in equation (iv)

$$8 + 7p = 15$$

$$\text{? } 7p = 7 \text{ ? } p = 1$$

Now,

$$p = 1/x = 1$$

$$\text{? } 1/x = 1 \text{ ? } x = 1$$

also, $q = 1 = 1/y$

$$\text{? } 1/y = 1$$

$$\text{? } y = 1$$

Hence, $x = 1$ and $y = 1$ is the solution.

Do your Self

(i) $6x + 3y = 6xy$

$$2x + 4y = 5xy$$

(iii) $3(x + 2y) = 7xy$

$$3(x + 3y) = 11xy, (x \neq 0 \text{ and } y \neq 0)$$

(ii) $\frac{7x-2y}{xy} = 5$

$$\frac{8x+7y}{xy} = 15, (x \neq 0 \text{ and } y \neq 0)$$

(iv) $\frac{xy}{x+y} = \frac{6}{5}$

$$\frac{xy}{y-x} = 6 (x \neq 0, y \neq 0 \text{ and } x \neq y)$$