Board –ICSE	Class – 9th	Topic – Method of Solving Simultaneous Equations

METHOD OF ELIMINATION BY EQUATING COEFFICIENTS

Steps :

1. Multiply one or both of the equations by a suitable number or numbers so that either the coefficients of x or the coefficients of y in both the equations become numerically equal.
2. Add both the equations, as obtained in step 1, or subtract one equation from the other, so that the terms with equal numerical coefficients cancel mutually.
3. Solve the resulting equation to find the value of one of the unknowns.
4. Substitute this value in any of the two given equations and find the value of the other unknown.

METHOD OF CROSS-MULTIPLICATION

When the given simultaneous equations are expressed as:

$$a_1x + b_1y + c_1 = 0$$

and, $a_2x + b_2y + c_2 = 0$

Then,

$$x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1} \text{ and } y = \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1}$$

Steps :

1. Express the two given simultaneous equations as :

$$a_1x + b_1y + c_1 = 0$$

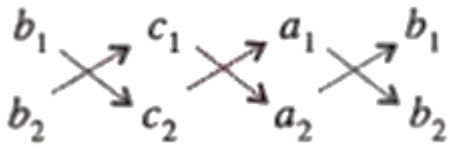
and,

$$a_2x + b_2y + c_2 = 0$$

2. Write the coefficients of x and y and also the constant terms as :

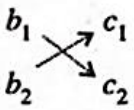
$$\begin{matrix} b_1 & c_1 & a_1 & b_1 \\ b_2 & c_2 & a_2 & b_2 \end{matrix}$$

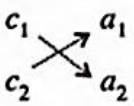
3. Mark arrows as shown below :

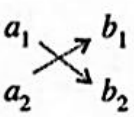


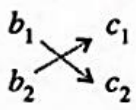
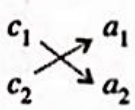
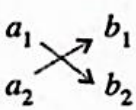
(i) The two numbers connected by an arrow are to be multiplied together.

(ii) Numbers with downward arrow are multiplied first and from this product, the product of numbers with upward arrow is subtracted.

Thus, for  , we get : $b_1c_2 - b_2c_1$

for  , we get : $c_1a_2 - c_2a_1$ and

for  , we get : $a_1b_2 - a_2b_1$

Now, $\frac{x}{}$  $= \frac{y}{}$  $= \frac{1}{}$ 

i.e. $\frac{x}{b_1c_2-b_2c_1} = \frac{y}{c_1a_2-c_2a_1} = \frac{1}{a_1b_1}$

$\Rightarrow x = \frac{b_1c_2-b_2c_1}{a_1b_2-a_2b_1}$ and $y = \frac{c_1a_2-c_2a_1}{a_1b_2-a_2b_1}$

METHOD OF ELIMINATION BY SUBSTITUTION :

Steps:

1. From any of the given two equations, find the value of one variable in terms of the other.
2. Substitute the value of the variable, obtained in step (1), in the other equation and solve it.
3. Substitute the value of the variable obtained in step (2), in the result of step (1) and get the value of the remaining unknown variable.