**DAY 4**

**ਤਿਰਛੀ ਗੁਣਾ ਵਿਧੀ (CROSS MULTIPLICATION METHOD)**

$a_1x + b_1y + c_1 = 0 \ldots\ldots\ldots$ i)

$a_2x + b_2y + c_2 = 0 \ldots\ldots\ldots$ ii)

(ਪਹਿਲੀ ਸ਼ਰਤ ਸਮੀਕਰਨਾਂ ਦਾ ਸੱਜਾ ਪਾਸਾ 0 ਹੋਵੇ)

$$\frac{x}{x \text{ ਦੇ ਗੁਣਾਂਕ ਛੱਡ ਕੇ ਬਾਕੀ ਲਿਖੋ}} = \frac{-y}{y \text{ ਦੇ ਗੁਣਾਂਕ ਛੱਡ ਕੇ ਬਾਕੀ ਲਿਖੋ}} = \frac{1}{x \text{ ਅਤੇ } y \text{ ਦੇ ਗੁਣਾਂਕ ਲਿਖੋ}}$$

$$\frac{x}{\begin{matrix} b_1 & c_1 \\ b_2 & c_2 \end{matrix}} = \frac{-y}{\begin{matrix} a_1 & c_1 \\ a_2 & c_2 \end{matrix}} = \frac{1}{\begin{matrix} a_1 & b_1 \\ a_2 & b_2 \end{matrix}}$$

$$\frac{x}{b_1c_2 - b_2c_1} = \frac{-y}{a_1c_2 - a_2c_1} = \frac{1}{a_1b_2 - a_2b_1}$$

- $\frac{x}{b_1c_2 - b_2c_1} = \frac{1}{a_1b_2 - a_2b_1} \quad \Rightarrow x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1}$
- $\frac{-y}{a_1c_2 - a_2c_1} = \frac{1}{a_2b_1 - a_1b_2} \quad \Rightarrow y = \frac{a_1c_2 - a_2c_1}{a_2b_1 - a_1b_2}$

**ਉਦਾਹਰਨਾਂ**

**1. ਸਮੀਕਰਨ ਪ੍ਰਣਾਲੀ $2x - 3y = -1$ ਅਤੇ $3x + 4y = 5$ ਨੂੰ ਤਿਰਛੀ ਗੁਣਾ ਵਿਧੀ ਨਾਲ ਹੱਲ ਕਰੋ।**

ਹੱਲ : $2x - 3y = -1 \quad \Rightarrow 2x - 3y + 1 = 0$

ਅਤੇ $3x + 4y = 5 \quad \Rightarrow 3x + 4y - 5 = 0$

$$\frac{x}{\begin{matrix} -3 & 1 \\ 4 & -5 \end{matrix}} = \frac{-y}{\begin{matrix} 2 & 1 \\ 3 & -5 \end{matrix}} = \frac{1}{\begin{matrix} 2 & -3 \\ 3 & 4 \end{matrix}}$$

$$\Rightarrow \frac{x}{(-3\times-5)-(1\times4)} = \frac{-y}{(2\times-5)-(1\times3)} = \frac{1}{(2\times4)-(-3\times3)}$$

$$\Rightarrow \frac{x}{(15)-(4)} = \frac{-y}{(-10)-(3)} = \frac{1}{(8)-(-9)}$$

$$\Rightarrow \frac{x}{15-4} = \frac{-y}{-10-3} = \frac{1}{8+9} \quad \Rightarrow \frac{x}{11} = \frac{-y}{-13} = \frac{1}{17}$$

$$\Rightarrow \frac{x}{11} = \frac{1}{17} \quad \Rightarrow x = \mathbf{\frac{11}{17}}$$

$$\Rightarrow \frac{-y}{-13} = \frac{1}{17} \quad \Rightarrow y = \mathbf{\frac{13}{17}}.$$

**2. ਹੱਲ ਕਰੋ : $6x - y - 3 = 0$ ਅਤੇ $7x + 4y - 9 = 0$.**

ਹੱਲ : $6x - y - 3 = 0$

ਅਤੇ $7x + 4y - 9 = 0$

$$\frac{x}{\begin{matrix} -1 & -3 \\ 4 & -9 \end{matrix}} = \frac{-y}{\begin{matrix} 6 & -3 \\ 7 & -9 \end{matrix}} = \frac{1}{\begin{matrix} 6 & -1 \\ 7 & 4 \end{matrix}}$$

$$\Rightarrow \frac{x}{(-1\times-9)-(-3\times4)} = \frac{-y}{(6\times-9)-(-3\times7)} = \frac{1}{(6\times4)-(-1\times7)}$$

$$\Rightarrow \frac{x}{(9)-(-12)} = \frac{-y}{(-54)-(-21)} = \frac{1}{(24)-(-7)}$$

$$\Rightarrow \frac{x}{9+12} = \frac{-y}{-54+21} = \frac{1}{24+7} \quad \Rightarrow \frac{x}{21} = \frac{-y}{-33} = \frac{1}{31}$$

$$\Rightarrow \quad \frac{x}{21} = \frac{1}{31} \qquad \Rightarrow \quad x = \frac{\mathbf{21}}{\mathbf{31}}$$
$$\Rightarrow \quad \frac{-y}{-33} = \frac{1}{31} \qquad \Rightarrow \quad y = \frac{\mathbf{33}}{\mathbf{31}}.$$

**3. ਹੱਲ ਕਰੋ : $4x - 5y = 13$ ਅਤੇ $3x + 2y = 4$**

**ਹੱਲ :** $4x - 5y = 13 \quad \Rightarrow \quad 4x - 5y - 13 = 0$

ਅਤੇ $3x + 2y = 4 \quad \Rightarrow \quad 3x + 2y - 4 = 0$

$$\frac{x}{\begin{matrix}-5 & -13\\ 2 & -4\end{matrix}} = \frac{-y}{\begin{matrix}4 & -13\\ 3 & -4\end{matrix}} = \frac{1}{\begin{matrix}4 & -5\\ 3 & 2\end{matrix}}$$

$$\Rightarrow \frac{x}{(-5\times-4)-(-13\times2)} = \frac{-y}{(4\times-4)-(-13\times3)} = \frac{1}{(4\times2)-(-5\times3)}$$

$$\Rightarrow \frac{x}{(20)-(-26)} = \frac{-y}{(-16)-(-39)} = \frac{1}{(8)-(-15)}$$

$$\Rightarrow \frac{x}{20+26} = \frac{-y}{-16+39} = \frac{1}{8+15} \qquad \Rightarrow \frac{x}{46} = \frac{-y}{23} = \frac{1}{23}$$

$$\Rightarrow \frac{x}{46} = \frac{1}{23} \qquad \Rightarrow x = \frac{46}{23} \qquad \Rightarrow \boldsymbol{x = 2}$$

$$\Rightarrow \frac{-y}{23} = \frac{1}{23} \qquad \Rightarrow y = \frac{-23}{23}. \qquad \Rightarrow \boldsymbol{y = -1}$$



**ਅਭਿਆਸ**

**ਹੇਠਾਂ ਦਿੱਤੀਆਂ ਸਮੀਕਰਨਾਂ ਨੂੰ ਤਿਰਛੀ ਗੁਣਾ ਵਿਧੀ ਨਾਲ ਹੱਲ ਕਰੋ :**

**1.** $2x + 3y = 7$ ਅਤੇ $6x - 5y = 11$

**2.** $10x + 7y = 25$ ਅਤੇ $20x - 35y = 50$

**3.** $3x - 5y - 20 = 0$ ਅਤੇ $7x + 2y - 17 = 0$

**4.** $5x - 4y = 9$ ਅਤੇ $3x - 2y = 5$

**5.** $5x + 2y = -8$ ਅਤੇ $4x - 3y = -11$