

CO – ORDINATE GEOMETRY-Area of triangle

DIFFERENT METHODS

Question:

Find the area triangle whose vertices are (1, 2), (-3, 4) and (-5, -6)

$$A = \frac{1}{2} [4 + 18 - 10] - (-6 - 20 - 6)$$

$$A = 22 \text{ Sq. Unit}$$

Method 1:

$$x_1 = 1, x_2 = -3, x_3 = -5 \text{ and } y_1 = 2, y_2 = 4, y_3 = -6$$

$$A = \frac{1}{2} [x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$$

$$A = \frac{1}{2} [1(4 + 6) + (-3)(-6 - 2) + (-5)(2 - 4)]$$

$$A = \frac{1}{2} [10 + 24 + 10]$$

$$A = 22 \text{ Sq. Unit}$$

Method 2:

$$A = \frac{1}{2} \left(\begin{array}{cccc} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{array} \right)$$

$$A = \frac{1}{2} \left(\begin{array}{cccc} 1 & -3 & -5 & 1 \\ 2 & 4 & -6 & 2 \end{array} \right)$$

Method 3:

$$A = \frac{1}{2} \left| \begin{array}{cc} x_1 & y_1 \\ x_2 & y_2 \\ x_3 & y_3 \\ x_1 & y_1 \end{array} \right|$$

$$A = \frac{1}{2} \left| \begin{array}{cc} 1 & 2 \\ -3 & 4 \\ -5 & -6 \\ 1 & 2 \end{array} \right|$$

$$A = \frac{1}{2} [(4 + 8 - 10) - (-6 - 20 - 6)]$$

$$A = \frac{1}{2} [12 + 32]$$

$$A = 22 \text{ Sq. Unit}$$

Method 4:

$$A = \frac{1}{2} [(x_1y_2 + x_2y_3 + x_3y_1) - (x_2y_1 + x_3y_2 + x_1y_1)]$$

$$A = \frac{1}{2} [(4 + 18 - 10) - (-6 - 20 - 6)]$$

$$A = \frac{1}{2} [(12 + 32)]$$

$$A = 22 \text{ Sq. Unit}$$

Method 5: (Determinant Method)

$$A = \frac{1}{2} \begin{vmatrix} 1 & x_1 & y_1 \\ 1 & x_2 & y_2 \\ 1 & x_3 & y_3 \end{vmatrix}$$

$$A = \frac{1}{2} \begin{vmatrix} 1 & 1 & 2 \\ 1 & -3 & 4 \\ 1 & -5 & -6 \end{vmatrix} \text{ (Expanding)}$$

$$A = \frac{1}{2} \times 44$$

$$A = 22 \text{ Aq. Unit}$$

$$A = \frac{1}{2} [(4 + 18 - 10) - 6 - 20 - 6]$$

$$A = \frac{1}{2} [12 + 32]$$

$$A = 22 \text{ Sq. Unit}$$

Method 7: (Easy Method -Cross Product Method)

$$\Delta = \frac{1}{2} \begin{vmatrix} x_2 - x_1 & y_2 - y_1 \\ x_3 - x_1 & y_3 - y_1 \end{vmatrix}$$

$$\Delta = \frac{1}{2} \begin{vmatrix} -3 - 1 & 4 - 2 \\ -5 - 1 & -6 - 2 \end{vmatrix}$$

$$\Delta = \frac{1}{2} \begin{vmatrix} -4 & 2 \\ -6 & -8 \end{vmatrix}$$

$$\Delta = 22 \text{ Sq. Unit}$$

Method 6: (Vedic Method)

