2.6.9

AI25BTECH11003 - Bhavesh Gaikwad

Question: The area of a triangle with vertices A(3,0), B(7,0) and C(8,4) is

Solution:

Given: $A(3,0)$, $B(7,0)$, $C(8,4)$.

$$\mathbf{B} - \mathbf{A} = \begin{pmatrix} 7-3 \\ 0-0 \end{pmatrix} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}, \qquad \mathbf{C} - \mathbf{A} = \begin{pmatrix} 8-3 \\ 4-0 \end{pmatrix} = \begin{pmatrix} 5 \\ 4 \end{pmatrix}.$$

$$|(\mathbf{B} - \mathbf{A}) \times (\mathbf{C} - \mathbf{A})| = \left| \begin{pmatrix} |\mathbf{A_{23}} & \mathbf{B_{23}}| \\ |\mathbf{A_{31}} & \mathbf{B_{31}}| \\ |\mathbf{A_{12}} & \mathbf{B_{12}}| \end{pmatrix} \right| = 16$$

Area $= \frac{1}{2}\|(\mathbf{B} - \mathbf{A}) \times (\mathbf{C} - \mathbf{A})\| = 8$
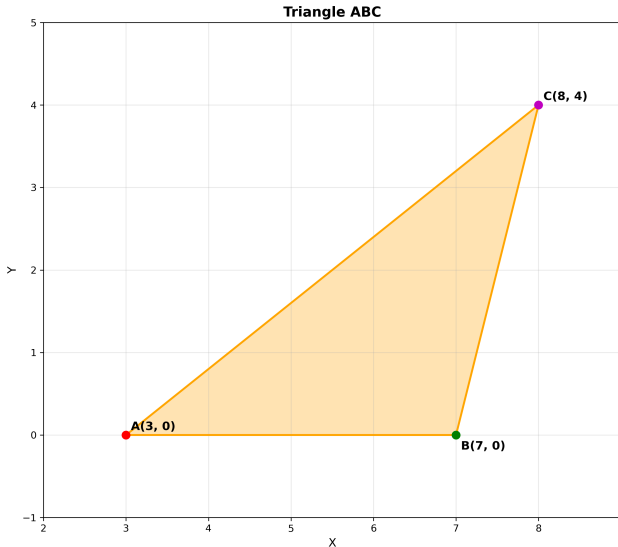
$$\boxed{Area\,of\,Triangle\,ABC \;=\; 8\; sq.units} \tag{0.1}$$

Fig. 0.1: Vector Representation