

Further Pure 1 Vectors

A is the point $(1,3,-2)$. B is the point $(2,1,4)$. C is the point $(-1,4,3)$.

Find the area of triangle ABC .

$$\begin{aligned}\overrightarrow{AB} \times \overrightarrow{AC} &= \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ 1 & -2 & 6 \\ -2 & 1 & 5 \end{vmatrix} = \mathbf{i} \begin{vmatrix} -2 & 6 \\ 1 & 5 \end{vmatrix} - \mathbf{j} \begin{vmatrix} 1 & 6 \\ -2 & 5 \end{vmatrix} + \mathbf{k} \begin{vmatrix} 1 & -2 \\ -2 & 1 \end{vmatrix} \\ &= -16\mathbf{i} - 17\mathbf{j} - 3\mathbf{k}\end{aligned}$$

$$\text{Area} = \frac{1}{2} |\overrightarrow{AB} \times \overrightarrow{AC}| = \frac{1}{2} \sqrt{256 + 289 + 9} = \frac{1}{2} \sqrt{554} \text{ units}^2$$

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