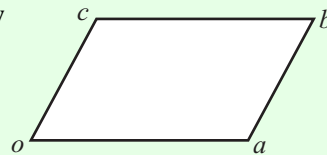


VECTORS (Q 2, PAPER 2)

2005

2 (a) Copy the parallelogram $oabc$ in your answerbook. Show your work, construct the point d such that

$$\vec{d} = \frac{1}{2}\vec{a} + \frac{1}{2}\vec{b} - \vec{c}, \text{ where } o \text{ is the origin.}$$



2 (b) $\vec{p} = 3\vec{i} + 4\vec{j}$. \vec{q} is the unit vector in the direction of \vec{p} .

(i) Express \vec{q} and \vec{q}^\perp in terms of \vec{i} and \vec{j} .

(ii) Express $11\vec{i} - 2\vec{j}$ in the form $k\vec{q} + l\vec{q}^\perp$, where $k, l \in \mathbf{R}$.

2 (c) $\vec{u} = \vec{i} + 5\vec{j}$ and $\vec{v} = 4\vec{i} + 4\vec{j}$.

(i) Find $\cos \angle uov$, where o is the origin.

(ii) $\vec{r} = (1-k)\vec{u} + k\vec{v}$, where $k \in \mathbf{R}$ and $k \neq 0$. Find the value of k for which

$$|\angle uov| = |\angle vor|.$$

ANSWERS

2 (b) (i) $\vec{q} = \frac{3}{5}\vec{i} + \frac{4}{5}\vec{j}$, $\vec{q}^\perp = -\frac{4}{5}\vec{i} + \frac{3}{5}\vec{j}$

(ii) $5\vec{q} - 10\vec{q}^\perp$

2 (c) (i) $\frac{3}{\sqrt{13}}$

(ii) $k = 3$