VECTORS (Q 2, PAPER 2)

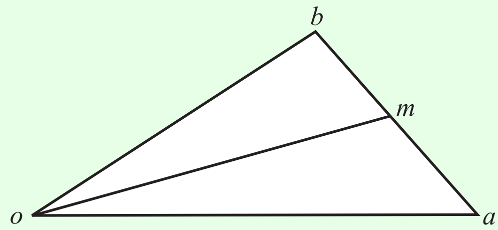
1999

2 (a) $\vec{p} = 3\vec{i} + 2\vec{j}$, $\vec{q} = 5\vec{i} - 6\vec{j}$ and $\vec{p} = \overrightarrow{rq}$.

Express $\vec{r}$ in terms of $\vec{i}$ and $\vec{j}$.

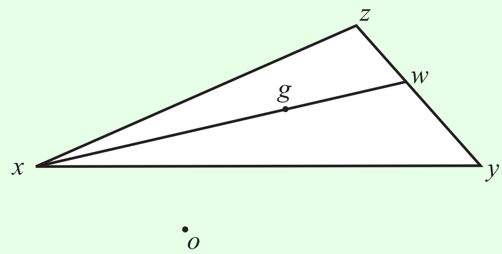
(b) (i) *oab* is a triangle where *o* is the origin. *m* is the midpoint of [*ab*].

Express $\vec{m}$ in terms of $\vec{a}$ and $\vec{b}$.



(ii) In the triangle *xyz*, *w* is the midpoint of [*yz*], *g* is a point in [*xw*] such that $|xg| = \frac{2}{3}|xw|$ and *o* is the origin.

Express $\vec{g}$ in terms of $\vec{x}$, $\vec{y}$ and $\vec{z}$.



(c) (i) Show for all vectors $\vec{r}$ and $\vec{s}$ that $\vec{r}.\vec{s}^{\perp} = -\vec{r}^{\perp}.\vec{s}$.

(ii) *a*, *b* and *c* are distinct points. If $\overrightarrow{ad} = t\left(\frac{\overrightarrow{ab}^{\perp}}{|\overrightarrow{ab}|} - \frac{\overrightarrow{ac}^{\perp}}{|\overrightarrow{ac}|}\right)$, where $t \in \mathbf{R}$ and $t \neq 0$, show that $|\angle bad| = |\angle cad|$.

ANSWERS

2 (a) $2\vec{i} - 8\vec{j}$

2 (b) (i) $\vec{m} = \frac{1}{2}(\vec{a} + \vec{b})$ (ii) $\vec{g} = \frac{1}{3}(\vec{x} + \vec{y} + \vec{z})$