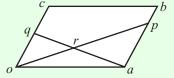## VECTORS (Q 2, PAPER 2)

2002

2 (a) $\vec{s} = 4\vec{i} - 3\vec{j}$ and $\vec{t} = 2\vec{i} - 5\vec{j}$. Find $\left|\overrightarrow{st}\right|$.

2 (b) $oabc$ is a parallelogram, where o is the origin. $p \in [ab]$ such that $\left|ap\right| : \left|pb\right| = 3:1$.
q is the midpoint of $[oc]$.

(i) Using equiangular triangles, or otherwise, find the ratio $\left|or\right| : \left|rp\right|$.

(ii) Express $\vec{p}$, and hence $\vec{r}$, in terms of $\vec{a}$ and $\vec{b}$.

2 (c) $\vec{k} = \vec{i} + 3\vec{j}, \ \vec{n} = 4\vec{i} - 2\vec{j}, \ \vec{u} = 2\vec{i} + \vec{j}$ and $\vec{v} = x\vec{i} + y\vec{j}$ where $x, \ y \in \mathbf{R}$.

(i) Express the value of $\overrightarrow{kn}.\overrightarrow{kv}$ in the form $ax + by + c$ where $a, b, c \in \mathbf{R}$.

(ii) Prove that if $\overrightarrow{kn}.\overrightarrow{kv} = \overrightarrow{kn}.\overrightarrow{ku}$, and $\vec{u} \neq \vec{v}$, then $\overrightarrow{kn} \perp \overrightarrow{uv}$.

ANSWERS

2 (a) $\sqrt{8}$

2 (b) (i) 2:3   (ii) $\vec{p} = \frac{1}{4}\vec{a} + \frac{3}{4}\vec{b}, \ \vec{r} = \frac{1}{10}\vec{a} + \frac{3}{10}\vec{b}$

2 (c) (i) $3x - 5y + 12$