

VECTORS (Q 2, PAPER 2)

2003

2 (a) $oabc$ is a parallelogram where o is the origin, $\vec{a} = 3\vec{i} - \vec{j}$ and $\vec{b} = 4\vec{i} + 3\vec{j}$. Express \vec{c} in terms of \vec{i} and \vec{j} .

2 (b) $\vec{p} = 2\vec{i} + \vec{j}$, $\vec{q} = 3\vec{i} + k\vec{j}$, $\vec{r} = 3\vec{i} + t\vec{j}$ where $k, t \in \mathbf{R}$ and o is the origin.

(i) Given that $\vec{p} \perp \vec{q}$, calculate the value of k .

(ii) Given that $|\angle por| = 45^\circ$, calculate the two possible values of t .

2 (c) oab is a triangle where o is the origin.

(i) x is a point on $[ab]$ such that $|ax| : |xb| = 1 : 3$.

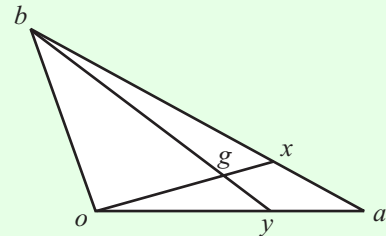
Express \vec{ox} in terms of \vec{a} and \vec{b} .

(ii) y is a point on $[oa]$ such that $|oy| : |ya| = 2 : 1$.

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

(iii) $[ox]$ and $[by]$ intersect at g . Given that

$\vec{og} = m\vec{ox}$ and $\vec{bg} = n\vec{by}$ where $m, n \in \mathbf{R}$,
find the value of m and the value of n .



ANSWERS

2 (a) $\vec{c} = \vec{i} + 4\vec{j}$

2 (b) (i) $k = -6$ (ii) $t = -1, 9$

2 (c) (i) $\vec{ox} = \frac{3}{4}\vec{a} + \frac{1}{4}\vec{b}$ (ii) $\vec{by} = \frac{2}{3}\vec{a} - \vec{b}$ (iii) $n = \frac{9}{11}$, $m = \frac{8}{11}$