

VECTORS (Q 2, PAPER 2)

1997

- 2 (a) $oabc$ is a parallelogram where o is the origin.
If $\vec{a} = 6\vec{i} - 2\vec{j}$ and $\vec{b} = 2\vec{i} - 5\vec{j}$, express \vec{c} in terms of \vec{i} and \vec{j} .
- (b) $\vec{p} = 2\vec{i} + 3\vec{j}$ and \vec{p}^\perp is its related vector $-3\vec{i} + 2\vec{j}$.
Let $\vec{q} = \vec{p}^\perp - \vec{p}$ and $\vec{r} = \vec{q} + \vec{q}^\perp$.
- (i) Express \vec{q} and \vec{r} in terms of \vec{i} and \vec{j} .
- (ii) Find the measure of the angle between \vec{q} and \vec{r} .
- (c) \vec{o}, \vec{x} and \vec{y} are non-collinear vectors where o is the origin.
- (i) Show $\vec{x} \cdot \vec{x} = |\vec{x}|^2$ and $\vec{x} \cdot \vec{y} = \vec{y} \cdot \vec{x}$.
- (ii) If $|\vec{x} + \vec{y}| = |\vec{x} - \vec{y}|$, prove that $\vec{x} \perp \vec{y}$.

ANSWERS

- 2 (a) $-4\vec{i} - 3\vec{j}$
(b) (i) $\vec{q} = -5\vec{i} - \vec{j}$, $\vec{r} = -4\vec{i} - 6\vec{j}$ (ii) 45°