

VECTORS (Q 2, PAPER 2)

2011

2. (a) Find the value of s and the value of t that satisfy the equation

$$s(\vec{i} - 4\vec{j}) + t(2\vec{i} + 3\vec{j}) = 4\vec{i} - 27\vec{j}.$$

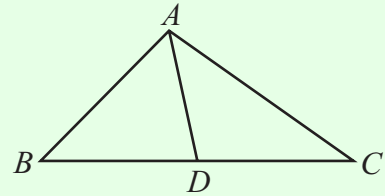
- (b) $\overrightarrow{OP} = 3\vec{i} - 4\vec{j}$ and $\overrightarrow{OQ} = 5(\overrightarrow{OP}^\perp)$, where O is the origin.

(i) Find \overrightarrow{OQ} in terms of \vec{i} and \vec{j} .

(ii) Find $\cos|\angle OQP|$, in surd form.

- (c) ABC is a triangle and D is the mid-point of $[BC]$.

(i) Express \overrightarrow{AB} in terms of \overrightarrow{AD} and \overrightarrow{BC}
and express \overrightarrow{AC} in terms of \overrightarrow{AD} and \overrightarrow{BC} .



(ii) Hence, prove that $|AB|^2 + |AC|^2 = 2|AD|^2 + \frac{1}{2}|BC|^2$.

ANSWERS

2 (a) $t = -1, s = 6$

(b) (i) $20\vec{i} + 15\vec{j}$

(ii) $\frac{5}{\sqrt{26}}$

(c) (i) $\overrightarrow{AB} = \frac{1}{2}\overrightarrow{BC} - \overrightarrow{AD}, \overrightarrow{AC} = \overrightarrow{AD} + \frac{1}{2}\overrightarrow{BC}$