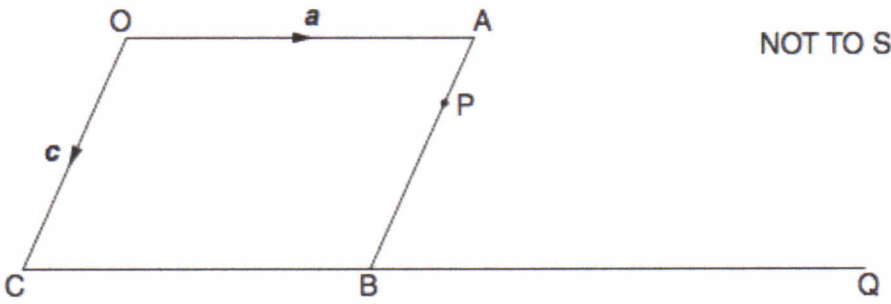
Geometry - Vectors

Q1

OABC is a parallelogram.

$\overrightarrow{OA} = \boldsymbol{a}$ $\overrightarrow{OC} = \boldsymbol{c}$



NOT TO SCALE

P is the point on AB such that $\overrightarrow{AP} = \frac{1}{4}\overrightarrow{AB}$.

CBQ is a straight line such that CB : BQ = 1 : 3.

(a) Write down, in terms of ***a*** and ***c***, the vectors

(i) $\overrightarrow{AP}$,

(a)(i) _____ **[1]**

(ii) $\overrightarrow{OP}$,

(ii) _____ **[1]**

(iii) $\overrightarrow{BQ}$,

(iii) _____ **[1]**

(iv) $\overrightarrow{OQ}$.

(iv) _____ **[1]**

(b) Explain, using vectors, why O, P and Q lie on a straight line.

.....

.....

.....

(b) _____ **[1]**

Geometry - Vectors

Q2

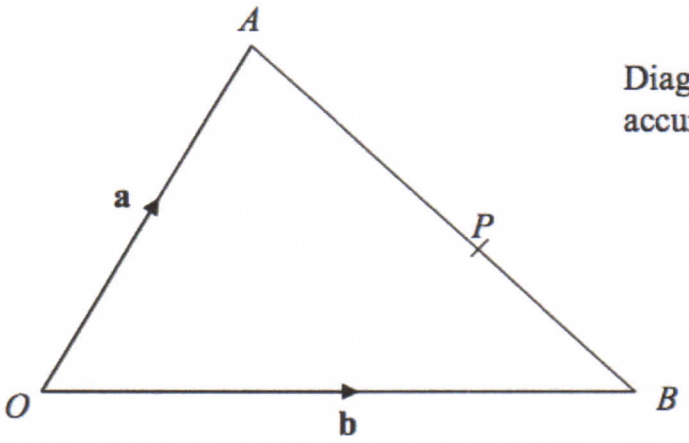


Diagram **NOT** accurately drawn

OAB is a triangle.

$\overrightarrow{OA} = \mathbf{a}$

$\overrightarrow{OB} = \mathbf{b}$

(a) Find the vector $\overrightarrow{AB}$ in terms of **a** and **b**.

$\overrightarrow{AB}$ = ...

(1)

P is the point on *AB* such that *AP* : *PB* = 3 : 2

(b) Show that $\overrightarrow{OP} = \frac{1}{5}(2\mathbf{a} + 3\mathbf{b})$

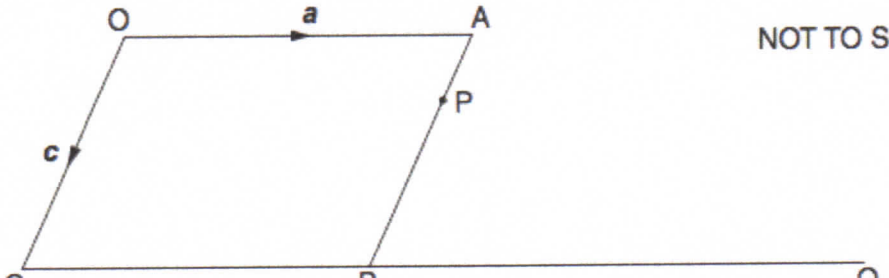
(3)

Geometry - Vectors

Q1

OABC is a parallelogram.

$\overrightarrow{OA} = \boldsymbol{a}$ $\overrightarrow{OC} = \boldsymbol{c}$



NOT TO SCALE

P is the point on AB such that $\overrightarrow{AP} = \frac{1}{4}\overrightarrow{AB}$.

CBQ is a straight line such that CB : BQ = 1 : 3.

(a) Write down, in terms of ***a*** and ***c***, the vectors

(i) $\overrightarrow{AP}$,

$\frac{1}{4}\underline{c}$

(a)(i) _____ [1]

(ii) $\overrightarrow{OP}$, $= \overrightarrow{OA} + \overrightarrow{AP}$

$= \underline{a} + \frac{1}{4}\underline{c}$

$\underline{a} + \frac{1}{4}\underline{c}$

(ii) _____ [1]

(iii) $\overrightarrow{BQ}$, $= 3\overrightarrow{CB}$

$= 3\overrightarrow{OA}$

$= 3\underline{a}$

$3\underline{a}$

(iii) _____ [1]

(iv) $\overrightarrow{OQ}$. $= \overrightarrow{OC} + \overrightarrow{CB} + \overrightarrow{BQ}$

$= \underline{c} + \underline{a} + 3\underline{a}$

$\underline{c} + 4\underline{a}$

(iv) _____ [1]

(b) Explain, using vectors, why O, P and Q lie on a straight line.

$\overrightarrow{OQ} = \underline{c} + 4\underline{a} = 4\left(\frac{1}{4}\underline{c} + \underline{a}\right) = 4\overrightarrow{OP}$

$\overrightarrow{OQ}$ and $\overrightarrow{OP}$ are therefore parallel vectors

Since they both pass through O, $\overrightarrow{OQ}$ is simply an extension of $\overrightarrow{OP}$ and so O, P, Q lie on a straight line

(b) _____ [1]

Geometry - Vectors

Q2

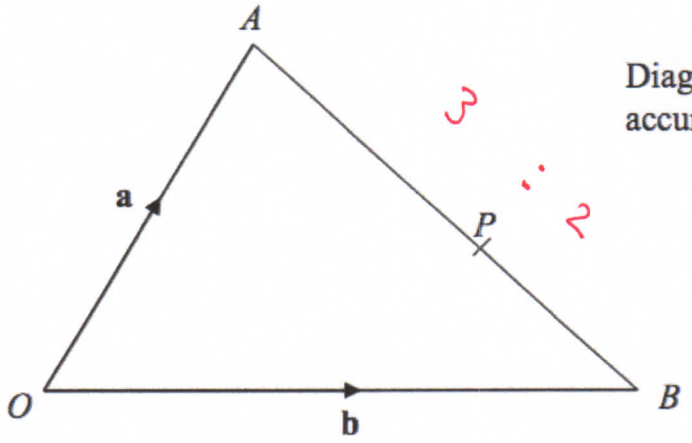


Diagram **NOT** accurately drawn

3 : 2

OAB is a triangle.

$\overrightarrow{OA} = \mathbf{a}$

$\overrightarrow{OB} = \mathbf{b}$

(a) Find the vector $\overrightarrow{AB}$ in terms of **a** and **b**.

$\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$

$= -\underline{a} + \underline{b}$

$\overrightarrow{AB}$ = $-\underline{a} + \underline{b}$

(1)

P is the point on *AB* such that *AP* : *PB* = 3 : 2

(b) Show that $\overrightarrow{OP} = \frac{1}{5}(2\mathbf{a} + 3\mathbf{b})$

$\overrightarrow{AP} = \frac{3}{5}\overrightarrow{AB}$

$= \frac{3}{5}(-\underline{a} + \underline{b})$

$\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$

$= \underline{a} + \frac{3}{5}(-\underline{a} + \underline{b})$

$= \underline{a} - \frac{3}{5}\underline{a} + \frac{3}{5}\underline{b}$

$= \frac{2}{5}\underline{a} + \frac{3}{5}\underline{b}$

$= \frac{1}{5}(2\underline{a} + 3\underline{b})$

(3)