VECTORS WORKSHEET

1. **(a)** $\mathbf{p} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ and $\mathbf{q} = \begin{pmatrix} 6 \\ 3 \end{pmatrix}$.

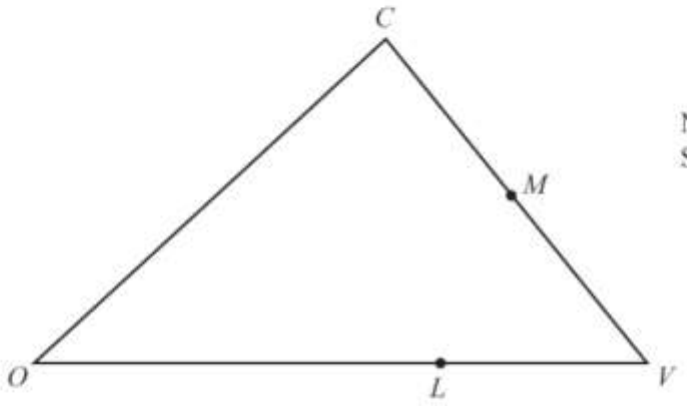
(i) Find, as a single column vector, $\mathbf{p} + 2\mathbf{q}$.

Answer(a)(i) $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

(ii) Calculate the value of $|\mathbf{p} + 2\mathbf{q}|$.

Answer(a)(ii) ..... [2]

(b)



NOT TO SCALE

In the diagram, $CM = MV$ and $OL = 2LV$.
O is the origin. $\overrightarrow{OC} = \mathbf{c}$ and $\overrightarrow{OV} = \mathbf{v}$.

Find, in terms of $\mathbf{c}$ and $\mathbf{v}$, in their simplest forms

(i) $\overrightarrow{CM}$,

Answer(b)(i) ..... [2]

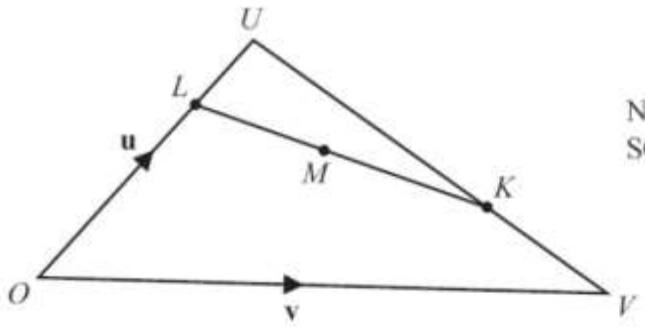
(ii) the position vector of M,

Answer(b)(ii) ..... [2]

(iii) $\overrightarrow{ML}$.

Answer(b)(iii) ..... [2]

2.



NOT TO SCALE

In the diagram, $\overrightarrow{OU} = \mathbf{u}$ and $\overrightarrow{OV} = \mathbf{v}$.

K is on UV so that $\overrightarrow{UK} = \frac{2}{3}\overrightarrow{UV}$ and L is on OU so that $\overrightarrow{OL} = \frac{3}{4}\overrightarrow{OU}$.

M is the midpoint of KL.

Find the following in terms of **u** and **v**, giving your answers in their simplest form.

(i) $\overrightarrow{LK}$

Answer(b)(i) $\overrightarrow{LK}$ = ... [4]

(ii) $\overrightarrow{OM}$

Answer(b)(ii) $\overrightarrow{OM}$ = ... [2]

3.

NOT TO SCALE

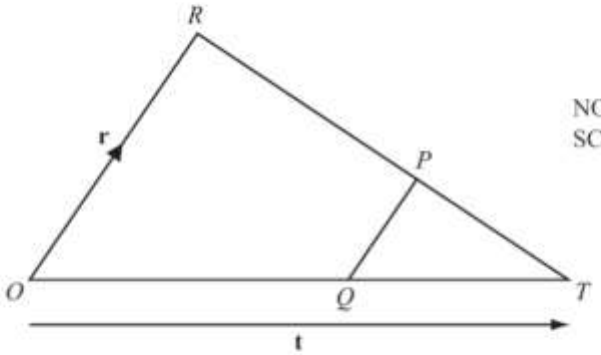
(i) Write down $\overrightarrow{AB}$ as a column vector.

(ii) $\overrightarrow{AC} = \begin{pmatrix} 0 \\ 7 \end{pmatrix}$.

Work out $\overrightarrow{BC}$ as a column vector.

Answer(b)(ii) $\overrightarrow{BC} =$ ( ) [2]

(c)



NOT TO SCALE

$\overrightarrow{OR} = \mathbf{r}$ and $\overrightarrow{OT} = \mathbf{t}$.
P is on RT such that $RP : PT = 2 : 1$.
Q is on OT such that $OQ = \frac{2}{3}OT$.

Write the following in terms of **r** and/or **t**.
Simplify your answers where possible.

(i) $\overrightarrow{QT}$

Answer(c)(i) $\overrightarrow{QT} =$ ..... [1]

(ii) $\overrightarrow{TP}$

Answer(c)(ii) $\overrightarrow{TP} =$ ..... [2]

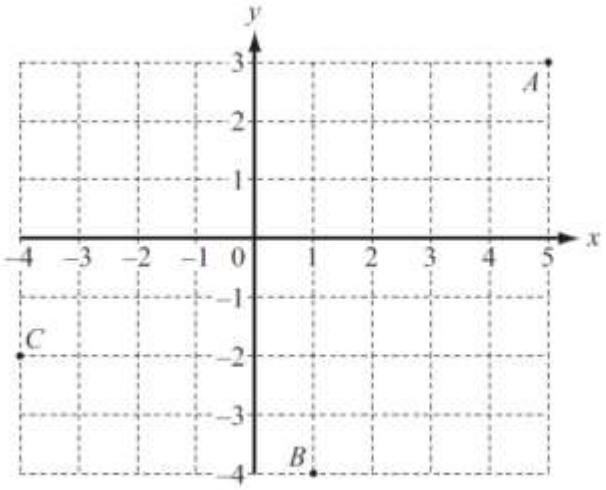
(iii) $\overrightarrow{QP}$

Answer(c)(iii) $\overrightarrow{QP} =$ ..... [2]

(iv) Write down two conclusions you can make about the line segment QP.

4.

(a)



The points A (5, 3), B (1, –4) and C (–4, –2) are shown in the diagram.

(i) Write $\overrightarrow{CA}$ as a column vector.

Answer(a)(i) $\overrightarrow{CA}$ = $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(ii) Find $\overrightarrow{CA} - \overrightarrow{CB}$ as a single column vector.

Answer(a)(ii) $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

(iii) Complete the following statement.

$\overrightarrow{CA} - \overrightarrow{CB}$ = ... [1]

(iv) Calculate $|\overrightarrow{CA}|$.

Answer(a)(iv) ..... [2]