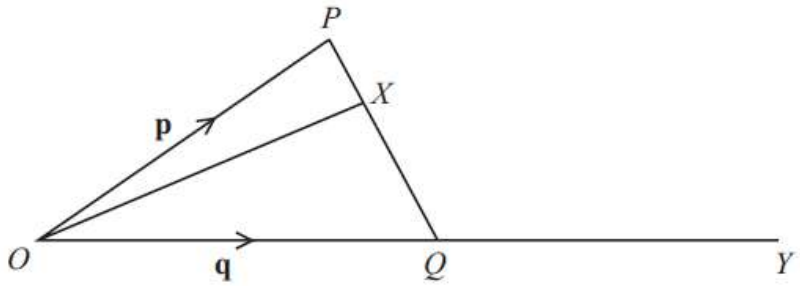
# 5.1 – Vectors

Student name: _____ Score: _____

**1.**




NOT TO SCALE

The diagram shows a triangle $OPQ$.
The point $X$ is on $PQ$ so that $PX:XQ = 1:2$.
$\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OQ} = \mathbf{q}$.

**(a)** Find $\overrightarrow{OX}$ in terms of $\mathbf{p}$ and $\mathbf{q}$.
Give your answer in its simplest form.

*Answer(a)* $\overrightarrow{OX}$ ..... [2]

**(b)** $OQY$ is a straight line and $OY = 2OQ$.

Find $\overrightarrow{XY}$ in terms of $\mathbf{p}$ and $\mathbf{q}$.
Give your answer in its simplest form.

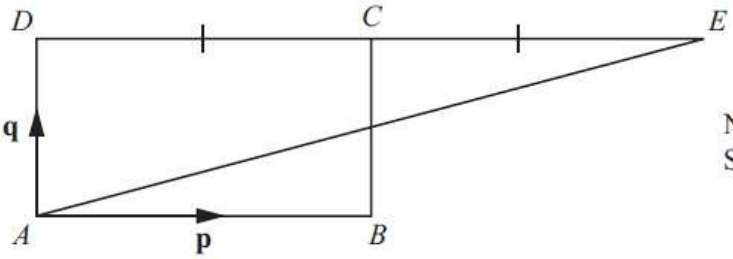
*Answer(b)* $\overrightarrow{XY}$ ..... [3]

**(c)** $\mathbf{p} = \begin{pmatrix} 3 \\ k \end{pmatrix}$ and $|\mathbf{p}| = 5$.

Find the two possible values of $k$.

*Answer(c)* $k =$ ..... or $k =$ ..... [2]

**2.**




NOT TO SCALE

$ABCD$ is a rectangle, $DCE$ is a straight line and $DC = CE$.
$\overrightarrow{AB} = \mathbf{p}$ and $\overrightarrow{AD} = \mathbf{q}$.

**(a)** Find, in terms of $\mathbf{p}$ and $\mathbf{q}$,

**(i)** $\overrightarrow{BD}$,

*Answer(a)*(i) ..... [1]

**(ii)** $\overrightarrow{AE}$.

*Answer(a)*(ii) ..... [1]

**(b)** In the diagram above, $A$ is the point (3, 3), $B$ is the point (6, 3) and $C$ is the point (6, 5).

**(i)** Find the co-ordinates of $E$.

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

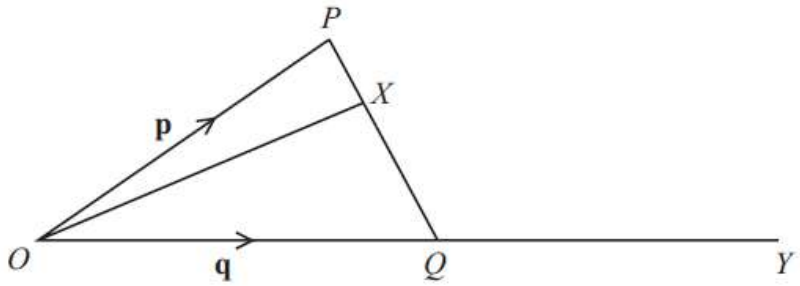
**(ii)** Find the equation of the straight line which passes through $A$ and $E$.
Give your answer in the form $ax + by = d$ where $a$, $b$ and $d$ are integers.

*Answer(b)*(ii) ..... [4]

# 5.1 – Vectors

Student name: Answers Score: _____

**1.**




NOT TO SCALE

The diagram shows a triangle $OPQ$.
The point $X$ is on $PQ$ so that $PX:XQ = 1:2$.
$\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OQ} = \mathbf{q}$.

**(a)** Find $\overrightarrow{OX}$ in terms of $\mathbf{p}$ and $\mathbf{q}$.
Give your answer in its simplest form.

*Answer(a)* $\overrightarrow{OX}$ $\frac{2}{3}\mathbf{p} + \frac{1}{3}\mathbf{q}$ [2]

**(b)** $OQY$ is a straight line and $OY = 2OQ$.

Find $\overrightarrow{XY}$ in terms of $\mathbf{p}$ and $\mathbf{q}$.
Give your answer in its simplest form.

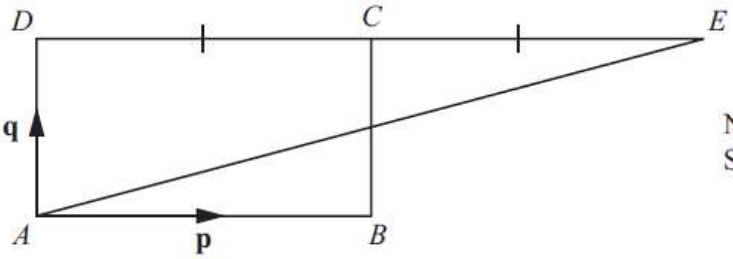
*Answer(b)* $\overrightarrow{XY}$ $-\frac{2}{3}\mathbf{p} + \frac{5}{3}\mathbf{q}$ [3]

**(c)** $\mathbf{p} = \begin{pmatrix} 3 \\ k \end{pmatrix}$ and $|\mathbf{p}| = 5$.

Find the two possible values of $k$.

*Answer(c)* $k =$ $-4$ or $k =$ $4$ [2]

**2.**




NOT TO SCALE

$ABCD$ is a rectangle, $DCE$ is a straight line and $DC = CE$.
$\overrightarrow{AB} = \mathbf{p}$ and $\overrightarrow{AD} = \mathbf{q}$.

**(a)** Find, in terms of $\mathbf{p}$ and $\mathbf{q}$,

**(i)** $\overrightarrow{BD}$,

*Answer(a)*(i) $-\mathbf{p} + \mathbf{q}$ [1]

(ii) $\overrightarrow{AE}$.

*Answer(a)*(ii) q + 2p [1]

**(b)** In the diagram above, $A$ is the point (3, 3), $B$ is the point (6, 3) and $C$ is the point (6, 5).

**(i)** Find the co-ordinates of $E$.

*Answer(b)*(i) ( 9 , 5 ) [2]

**(ii)** Find the equation of the straight line which passes through $A$ and $E$.
Give your answer in the form $ax + by = d$ where $a$, $b$ and $d$ are integers.

*Answer(b)*(ii) $x - 3y = -6$ or $-x + 3y = 6$ [4]