# Topic 18 Vectors and transformations (Post-TT) [27]

1.

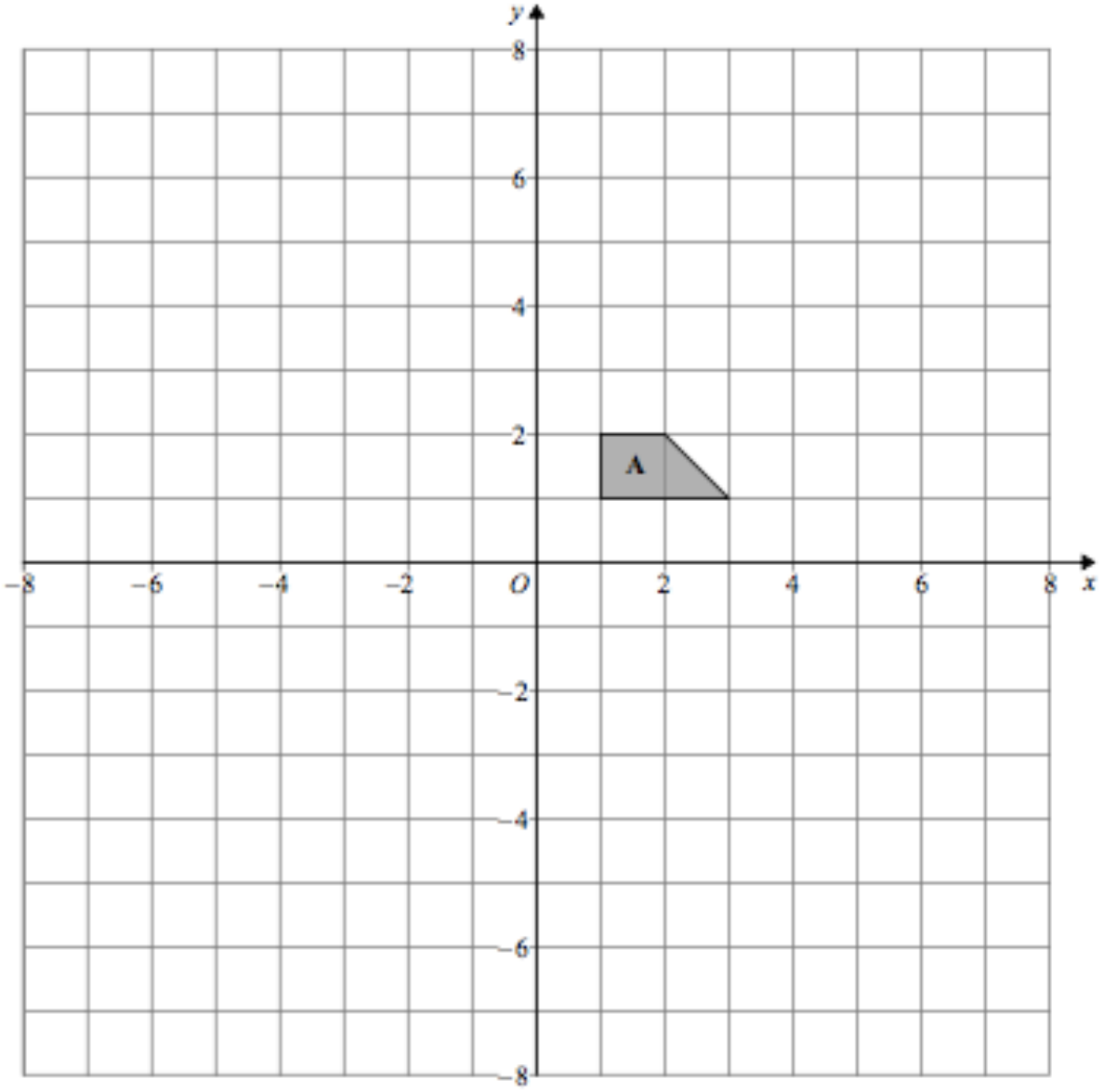
$\mathbf{a} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$

Circle the vector $\mathbf{a} - \mathbf{b}$

**[1 mark]**

$\begin{pmatrix} -3 \\ -5 \end{pmatrix}$ $\begin{pmatrix} 7 \\ 1 \end{pmatrix}$ $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$ $\begin{pmatrix} 7 \\ -5 \end{pmatrix}$

2. **N.B. Draw the shape on a set of axes in your book.**




(a) Enlarge shape **A** by scale factor −2, centre (0, 0)
Label your image **B**.

(2)

(b) Describe fully the single transformation that will map shape **B** onto shape **A**.

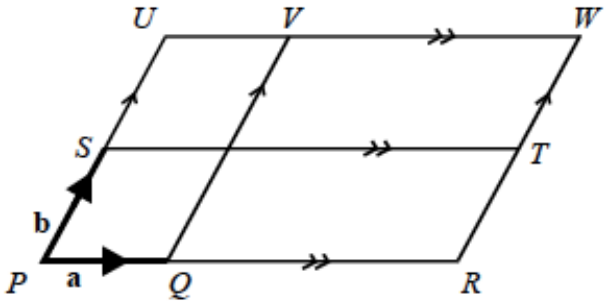
(Total 3 marks)

3.

The diagram shows two sets of parallel lines.

Vector $\overrightarrow{PQ}$ = **a** and vector $\overrightarrow{PS}$ = **b**

$\overrightarrow{PR} = 3\overrightarrow{PQ}$ and $\overrightarrow{PU} = 2\overrightarrow{PS}$




Not to scale

(a) Write the vector $\overrightarrow{PV}$ in terms of **a** and **b**

**(1)**

(b) Write the vector $\overrightarrow{RU}$ in terms of **a** and **b**

**(1)**

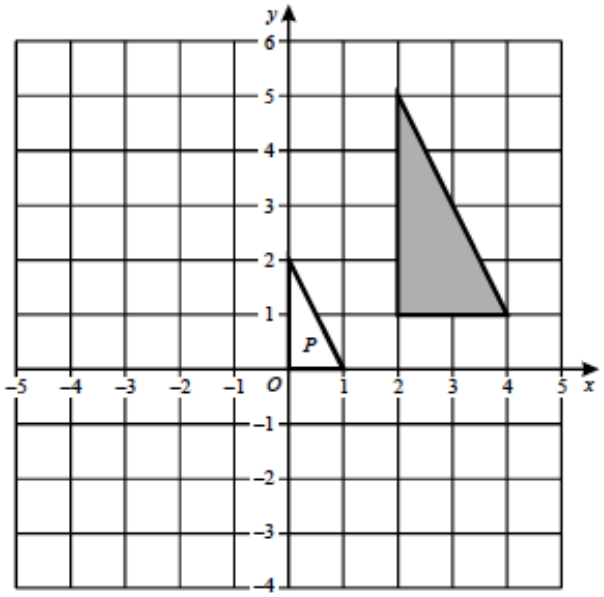
(c) Find **two** vectors that can be written as 3**a** – **b**

**(2)**

**(Total 4 marks)**

4.

Triangle *P* is an enlargement of the shaded triangle.




(a) What is the scale factor of the enlargement?

**(1)**

(b) What is the centre of enlargement?

**(1)**

**(Total 2 marks)**

5.

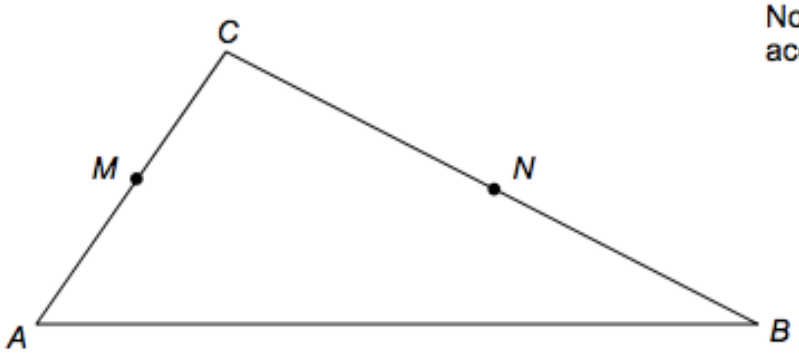
In triangle $ABC$

$M$ is the midpoint of $AC$

$N$ is the point on $BC$ where $BN : NC = 2 : 3$

$\overrightarrow{AC} = \mathbf{2a}$

$\overrightarrow{AB} = \mathbf{3b}$




Not drawn accurately

**(a)** Work out $\overrightarrow{MN}$ in terms of **a** and **b**.

Give your answer in its simplest form.

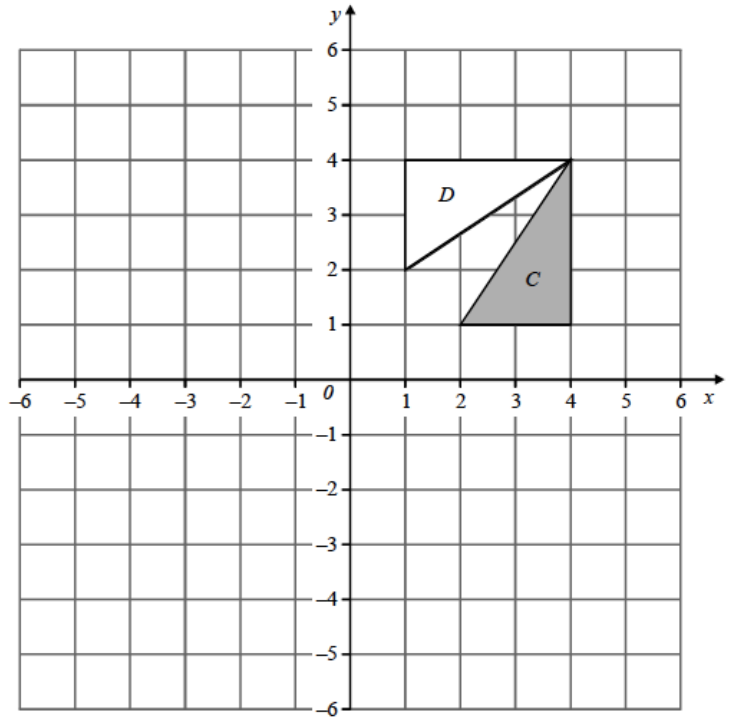
**[3 marks]**

**(b)** Use your answer to part (a) to explain why $MN$ is **not** parallel to $AB$.

**[1 mark]**

6. **N.B. Draw the shapes on a set of axes in your book.**

The diagram shows two triangles, $C$ and $D$.



(a) Describe fully the **single** transformation which maps triangle $C$ to triangle $D$.

**(2)**

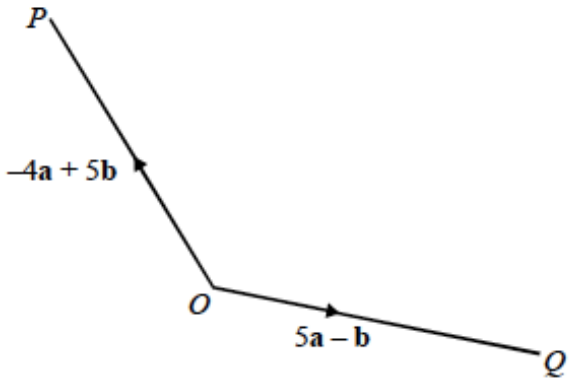
(b) Triangle $C$ is translated by the vector $\begin{pmatrix} -4 \\ -3 \end{pmatrix}$ and then rotated 90° anti-clockwise about the point (0, –2).

Draw the final position of triangle $C$ after these transformations.

**(4)**

**(Total 6 marks)**

7. $\overrightarrow{OP} = -4\mathbf{a} + 5\mathbf{b}$ and $\overrightarrow{OQ} = 5\mathbf{a} - \mathbf{b}$.




$R$ is a point on $\overrightarrow{PQ}$ such that $PR : RQ = 1 : 2$.

(a) Express $\overrightarrow{OR}$ in terms of **a** and **b**.

**(3)**

(b) $\overrightarrow{PS} = \mathbf{a} + 4\mathbf{b}$

Express $\overrightarrow{OS}$ in terms of **a** and **b**.

**(2)**

(c) What **two** facts do $\overrightarrow{OR}$ and $\overrightarrow{OS}$ indicate about the points $O$, $R$ and $S$?

Give a reason for each of your answers.

**(2)**

**(Total 7 marks)**