1 $\mathbf{a} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$ $\mathbf{c} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$

(a) Work out as a column vector

(i) $\mathbf{a} + \mathbf{b}$

$\begin{pmatrix} 2 \\ 3 \end{pmatrix} + \begin{pmatrix} -1 \\ 2 \end{pmatrix} = \begin{pmatrix} 1 \\ 5 \end{pmatrix}$

$\begin{pmatrix} 1 \\ 5 \end{pmatrix}$

(1) ✓

(ii) $2\mathbf{a} - \mathbf{c}$

multiply inside

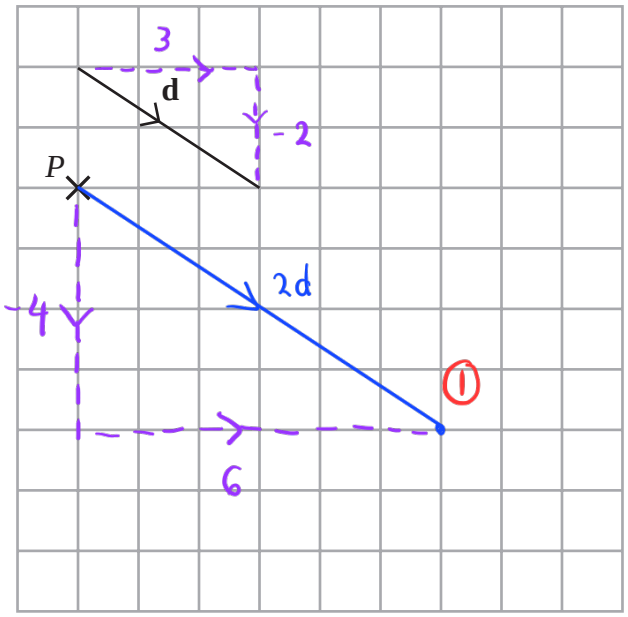
$2\begin{pmatrix} 2 \\ 3 \end{pmatrix} - \begin{pmatrix} 4 \\ 1 \end{pmatrix}$ ①

$= \begin{pmatrix} 4 \\ 6 \end{pmatrix} - \begin{pmatrix} 4 \\ 1 \end{pmatrix} = \begin{pmatrix} 0 \\ 5 \end{pmatrix}$ ①

$\begin{pmatrix} 0 \\ 5 \end{pmatrix}$

(2)

The vector **d** is drawn on the grid.



$\mathbf{d} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$

$2\mathbf{d} = \begin{pmatrix} 6 \\ -4 \end{pmatrix}$

(b) From the point *P*, draw the vector 2**d**

(1)

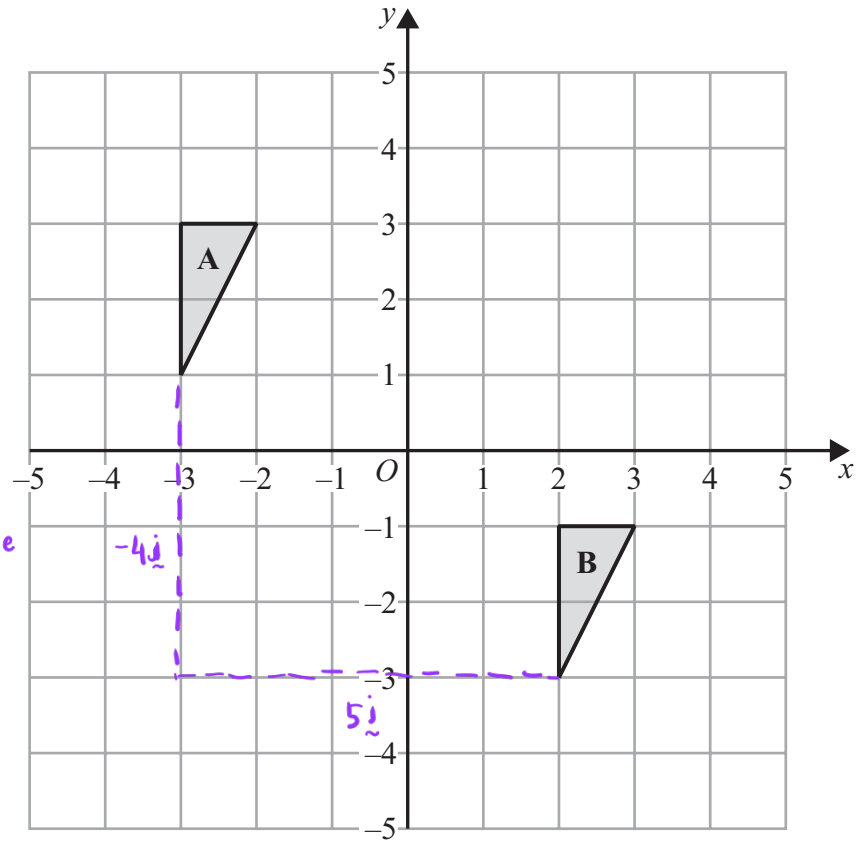
(Total for Question 1 is 4 marks)

2

Translation :

the object and image are of the same size and shape.

Only position have changed.



Describe fully the **single** transformation that maps triangle **A** onto triangle **B**.

Translation of $\begin{pmatrix} 5 \\ -4 \end{pmatrix}$ (1)

(1)

(Total for Question 2 is 2 marks)