1 The vector **a** and the vector **b** are shown on the grid.
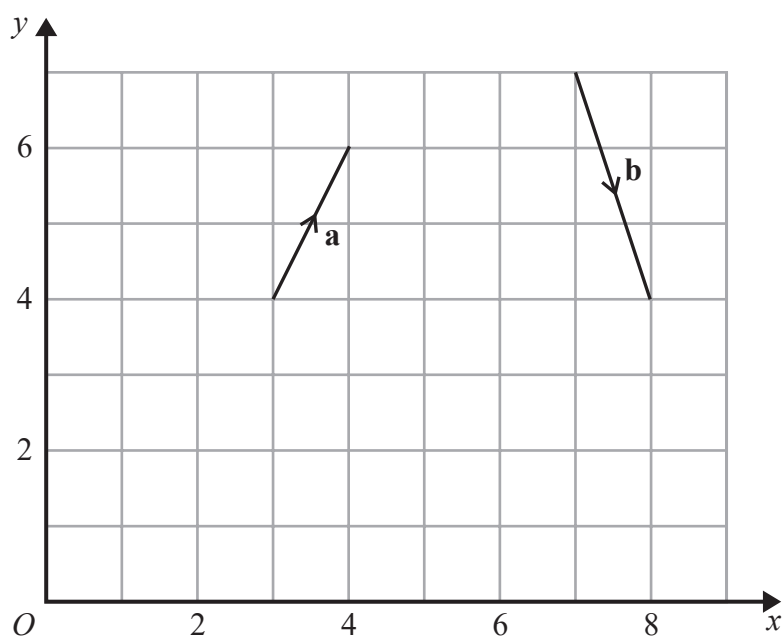

(a) On the grid, draw and label vector –2**a**

(1)

(b) Work out **a** + 2**b** as a column vector.

$$\begin{pmatrix} \rule{1cm}{0.4pt} \\ \rule{1cm}{0.4pt} \end{pmatrix}$$

(2)

(Total for Question 1 is 3 marks)

2 $\mathbf{a} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$

Find $2\mathbf{a} - 3\mathbf{b}$ as a column vector.

$\begin{pmatrix} \dots \\ \dots \end{pmatrix}$

(Total for Question 2 is 2 marks)

3 Here are two vectors.

$$\overrightarrow{AB} = \begin{pmatrix} 5 \\ 3 \end{pmatrix} \qquad \overrightarrow{CB} = \begin{pmatrix} -2 \\ 4 \end{pmatrix}$$

Find, as a column vector, $\overrightarrow{AC}$

....

(Total for Question 3 is 2 marks)

4 a and **b** are vectors such that

$$\mathbf{a} = \begin{pmatrix} 2 \\ -3 \end{pmatrix} \qquad \text{and} \qquad 3\mathbf{a} - 2\mathbf{b} = \begin{pmatrix} 8 \\ -17 \end{pmatrix}$$

Find **b** as a column vector.

$$\begin{pmatrix} \text{..............} \\ \text{..............} \end{pmatrix}$$

(Total for Question 4 is 3 marks)

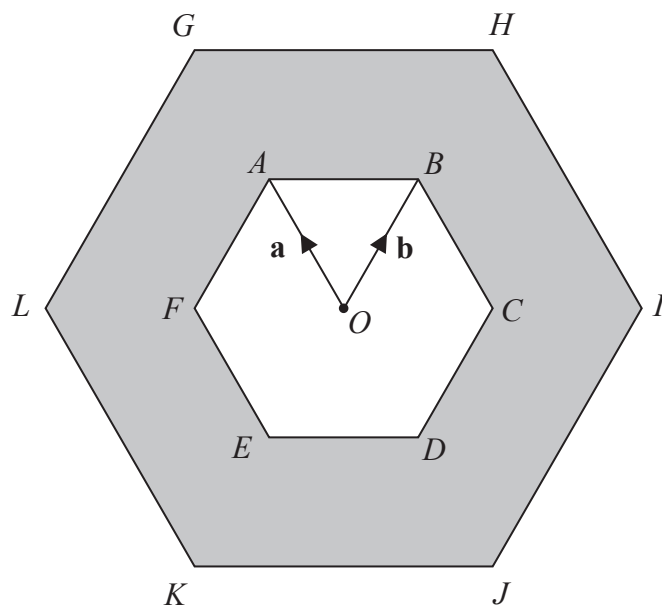**5** *ABCDEF* and *GHIJKL* are regular hexagons each with centre *O*.

Diagram **NOT** accurately drawn

GHIJKL is an enlargement of *ABCDEF*, with centre *O* and scale factor 2

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

(a) Write the following vectors, in terms of **a** and **b**.
Simplify your answers.

(i) $\overrightarrow{AB}$

....

(1)

(ii) $\overrightarrow{KI}$

....

(2)

(iii) $\overrightarrow{LD}$

....

(2)

(Total for Question 5 is 5 marks)

6 Here are two vectors.

$$\overrightarrow{BA} = \begin{pmatrix} -5 \\ 4 \end{pmatrix} \quad \overrightarrow{BC} = \begin{pmatrix} 9 \\ 1 \end{pmatrix}$$

Find $\overrightarrow{AC}$ as a column vector.

$$\overrightarrow{AC} = \begin{pmatrix} \text{.............} \\ \text{.............} \end{pmatrix}$$

(Total for Question 6 is 2 marks)

7 Here are two vectors.

$$\overrightarrow{AB} = \begin{pmatrix} 6 \\ -9 \end{pmatrix} \qquad \overrightarrow{CB} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$$

Find the magnitude of $\overrightarrow{AC}$.

....

(Total for Question 7 is 3 marks)