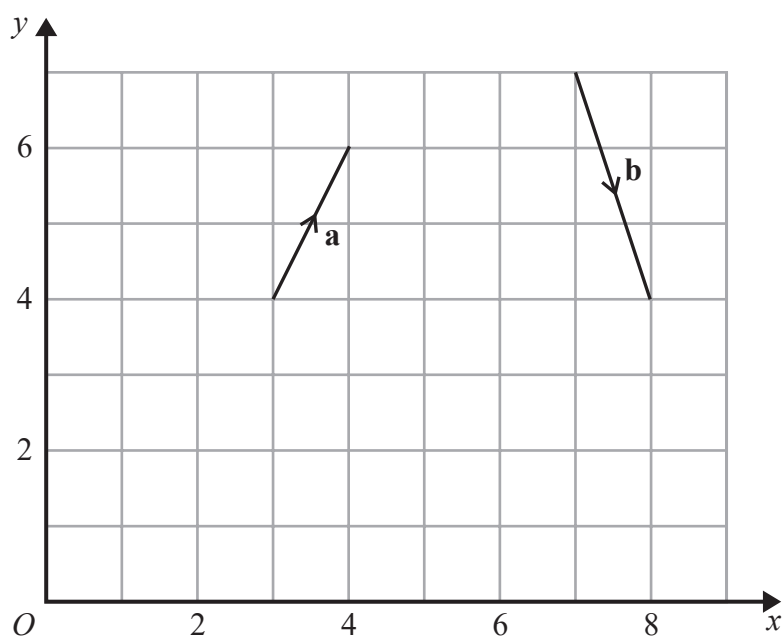


1 The vector **a** and the vector **b** are shown on the grid.



(a) On the grid, draw and label vector $-2\mathbf{a}$

(1)

(b) Work out $\mathbf{a} + 2\mathbf{b}$ as a column vector.

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

(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.

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

(Total for Question 2 is 2 marks)

3 Here are two vectors.

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

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

(Total for Question 3 is 2 marks)

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

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

Find **b** as a column vector.

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

(Total for Question 4 is 3 marks)

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

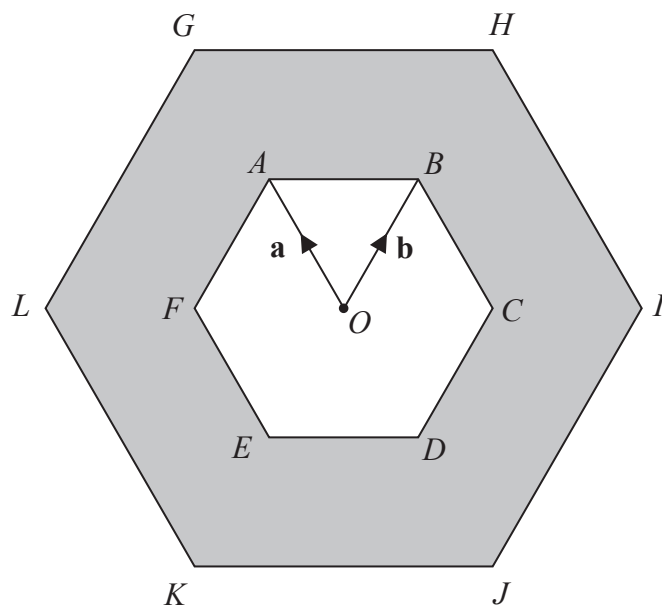


Diagram **NOT**
accurately drawn

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

$$\vec{OA} = \mathbf{a} \quad \vec{OB} = \mathbf{b}$$

(a) Write the following vectors, in terms of \mathbf{a} and \mathbf{b} .
Simplify your answers.

(i) \vec{AB}

.....
(1)

(ii) \vec{KI}

.....
(2)

(iii) \vec{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.

$$\overrightarrow{AC} = \begin{pmatrix} \\ \dots\dots\dots \\ \dots\dots\dots \end{pmatrix}$$

(Total for Question 6 is 2 marks)

7 Here are two vectors.

$$\vec{AB} = \begin{pmatrix} 6 \\ -9 \end{pmatrix} \quad \vec{CB} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$$

Find the magnitude of \vec{AC} .

(Total for Question 7 is 3 marks)

8 A , B and C are three points such that

$$\overrightarrow{AB} = 3\mathbf{a} + 4\mathbf{b}$$

$$\overrightarrow{AC} = 15\mathbf{a} + 20\mathbf{b}$$

(a) Prove that A , B and C lie on a straight line.

(2)

D , E and F are three points on a straight line such that

$$\overrightarrow{DE} = 3\mathbf{e} + 6\mathbf{f}$$

$$\overrightarrow{EF} = -10.5\mathbf{e} - 21\mathbf{f}$$

(b) Find the ratio

length of DF : length of DE

(3)

(Total for Question 8 is 5 marks)

9 The diagram shows parallelogram $ABCD$.

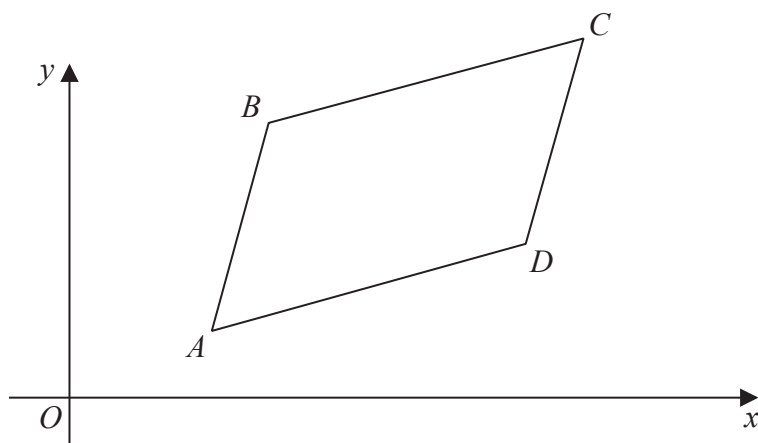


Diagram **NOT**
accurately drawn

$$\vec{AB} = \begin{pmatrix} 2 \\ 7 \end{pmatrix} \quad \vec{AC} = \begin{pmatrix} 10 \\ 11 \end{pmatrix}$$

The point B has coordinates $(5, 8)$

(a) Work out the coordinates of the point C .

(.....,)
(3)

The point E has coordinates $(63, 211)$

(b) Use a vector method to prove that ABE is a straight line.

(2)

(Total for Question 9 is 5 marks)

- 10** Given that the vector $a\begin{pmatrix} 2 \\ 6 \end{pmatrix} + b\begin{pmatrix} 8 \\ 2 \end{pmatrix}$ is parallel to the vector $\begin{pmatrix} 13 \\ 6 \end{pmatrix}$
find an expression for b in terms of a .

(Total for Question 10 is 3 marks)
