G175 Vectors 1

Q1.

$\mathbf{a} = \begin{pmatrix} 3 \\ -7 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$

Work out **b** − 2**a** as a column vector.

.....

(Total for question = 2 marks)

Q2.

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

Work out **a** − **2b** as a column vector.

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

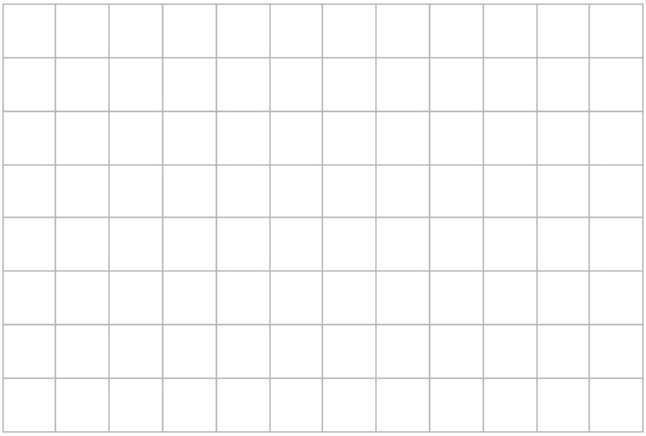
(Total for question = 2 marks)

Q3.

Here are two column vectors.

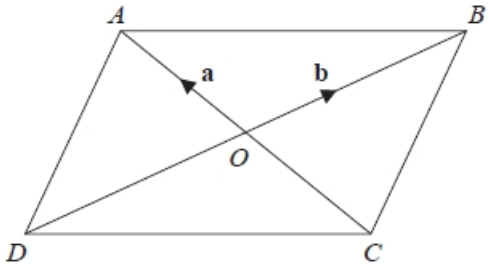
$\mathbf{a} = \begin{pmatrix} 5 \\ 2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$

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



(Total for question = 3 marks)

Q4.



ABCD is a parallelogram.
The diagonals of the parallelogram intersect at *O*.

$\overrightarrow{OA}$ = **a** and $\overrightarrow{OB}$ = **b**

(a) Find, in terms of **b**, the vector $\overrightarrow{DB}$.

.....

(1)

(b) Find, in terms of **a** and **b**, the vector $\overrightarrow{AB}$.

.....

(1)

(c) Find, in terms of **a** and **b**, the vector $\overrightarrow{AD}$.

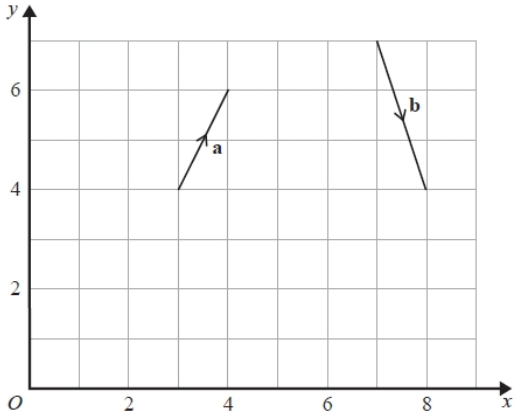
.....

(1)

(Total for question = 3 marks)

Q5.

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.

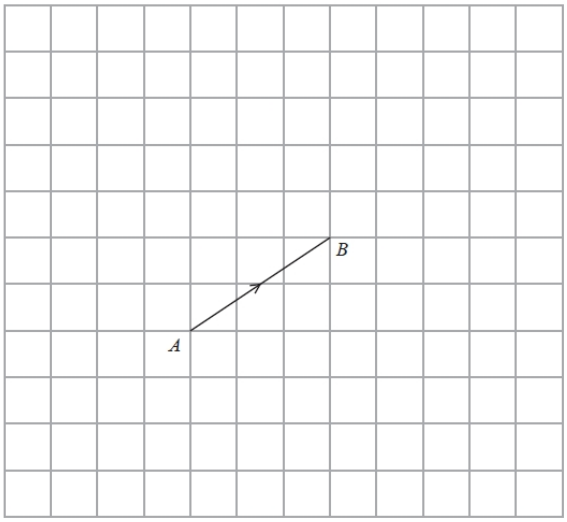
(2)

(Total for question = 3 marks)

Q6.

$\overrightarrow{AB} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ and $\overrightarrow{BC} = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$

$\overrightarrow{AB}$ is shown on the grid.



(a) On the grid, draw $\overrightarrow{BC}$.

(1)

$\overrightarrow{AD} = \overrightarrow{AB} - \overrightarrow{BC}$

(b) On the grid, mark with a cross (×) the position of *D*. Label this point *D*.

(2)

(Total for question = 3 marks)

Q7.

$\mathbf{a} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 1 \\ 7 \end{pmatrix}$ $\mathbf{c} = \begin{pmatrix} -7 \\ 0 \end{pmatrix}$

(a) Write, as a column vector, 2**a**

( )

.....

(1)

(b) Write, as a column vector, 3**b** − **c**

( )

.....

(2)

(c) Work out the magnitude of **a**
Give your answer as a surd.

.....

(2)

(Total for question = 5 marks)

Q8.

ABCD is a parallelogram.

$\overrightarrow{BC} = \begin{pmatrix} 5 \\ -1 \end{pmatrix}$ $\overrightarrow{DC} = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$

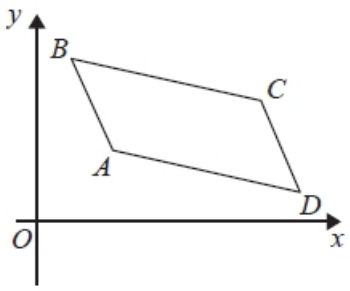


Diagram **NOT** accurately drawn

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

( )

(Total for question = 2 marks)

Q9.

Here are two vectors.

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

Find the magnitude of $\overrightarrow{AC}$

.....

(Total for question = 3 marks)

Q10.

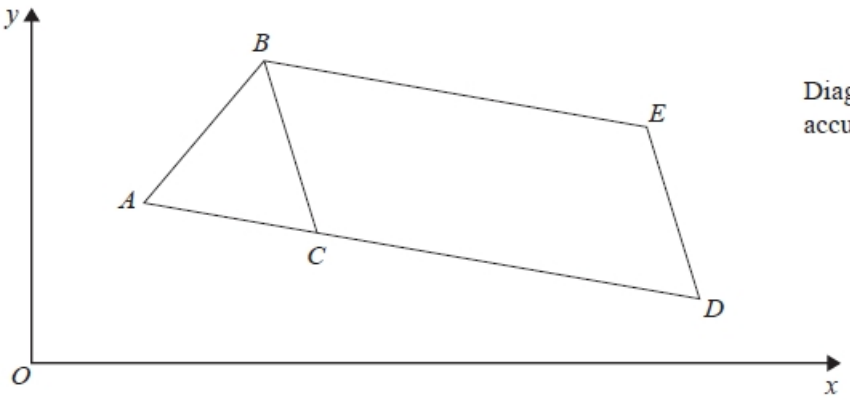


Diagram **NOT** accurately drawn

$\overrightarrow{AB} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ and $\overrightarrow{AC} = \begin{pmatrix} 4 \\ -1 \end{pmatrix}$

(a) Find, as a column vector, $\overrightarrow{BC}$

.....

(2)

BCDE is a parallelogram.

$\overrightarrow{CD} = 2\overrightarrow{AC}$

(b) Find the length of *CE*.

Give your answer correct to 2 decimal places.

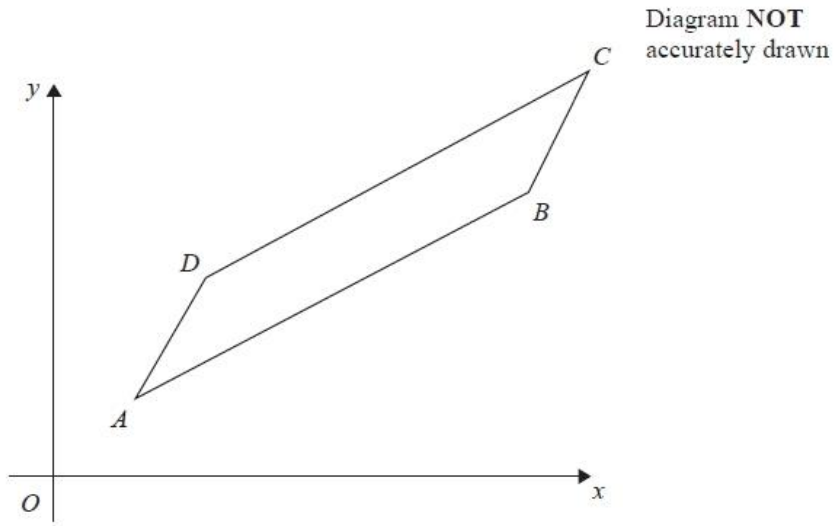
.....

(3)

(Total for question = 5 marks)

Q11.

Here is the parallelogram *ABCD*.



$\overrightarrow{AD} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$, $\overrightarrow{AB} = \begin{pmatrix} 5 \\ 3 \end{pmatrix}$

(a) Find the magnitude of $\overrightarrow{AD}$.

Give your answer correct to 3 significant figures.

.....

(2)

The point *A* has coordinates (4, 2)

(b) Work out the coordinates of the point *C*.

.....

(3)

The diagonals of the parallelogram *ABCD* cross at the point *E*.

(c) Find as a column vector, $\overrightarrow{OE}$

.....

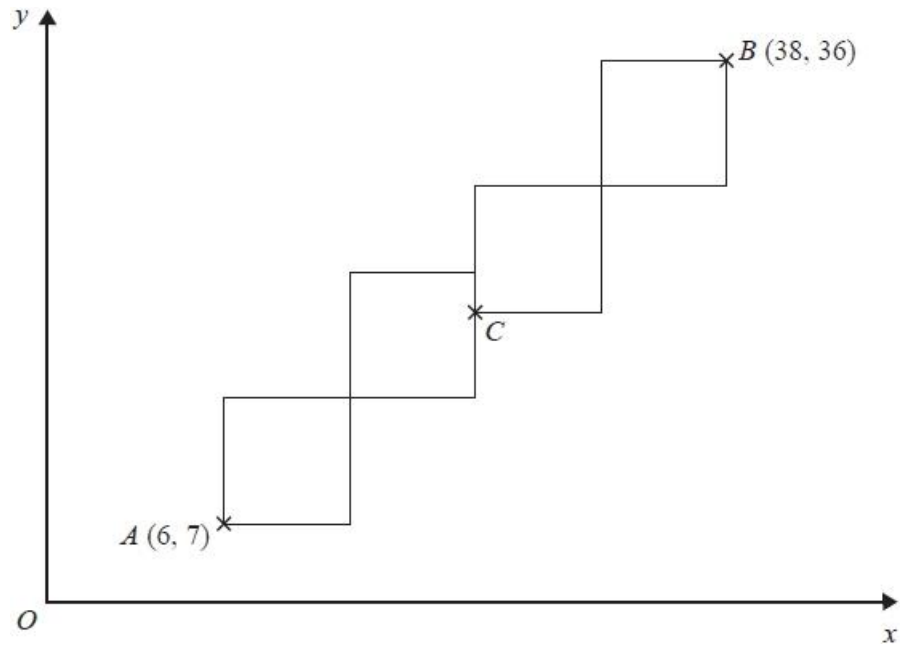
(3)

(Total for question = 8 marks)

Q12.

A pattern is made from four identical squares.

The sides of the squares are parallel to the axes.



Point *A* has coordinates (6,7)
Point *B* has coordinates (38,36)
Point *C* is marked on the diagram.

Work out the coordinates of *C*.

(..... , ...)

(Total for question = 5 marks)