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MATHEMATICS -CORE

TOPIC- Vectors

01 $\mathbf{p} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$ $\mathbf{q} = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$

Work out $\mathbf{p} + \mathbf{q}$.

12-N-13

Answer $\begin{pmatrix} \\ \end{pmatrix}$ [1]

02 $\mathbf{m} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$ $\mathbf{n} = \begin{pmatrix} -3 \\ 6 \end{pmatrix}$

Work out

(a) $\mathbf{m} + \mathbf{n}$,

13-N-14

Answer(a) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) $3\mathbf{n}$.

Answer(b) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

03 Write each of the following as a single vector.

(a) $\begin{pmatrix} 6 \\ 1 \end{pmatrix} + \begin{pmatrix} -4 \\ 2 \end{pmatrix}$

Answer(a) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) $4 \begin{pmatrix} 2 \\ -3 \end{pmatrix}$

Answer(b) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

04 Work out.

11-7-12

(a) $\begin{pmatrix} -2 \\ -3 \end{pmatrix} + \begin{pmatrix} -4 \\ 7 \end{pmatrix}$

$\begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) $5 \begin{pmatrix} 2 \\ -8 \end{pmatrix}$

$\begin{pmatrix} \\ \end{pmatrix}$ [1]

05 Work out

13-7-12

(a) $\begin{pmatrix} 5 \\ 3 \end{pmatrix} - \begin{pmatrix} 6 \\ -2 \end{pmatrix}$

Answer(a) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) $5 \begin{pmatrix} 3 \\ -4 \end{pmatrix}$

Answer(b) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

For
Examiner's
Use



06

$$\mathbf{a} = \begin{pmatrix} 5 \\ -6 \end{pmatrix}$$

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

11-11-18

Work out $2\mathbf{a} - \mathbf{b}$.

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

[2]

07

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

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

11-7-14

Work out $\mathbf{a} - 2\mathbf{b}$.

Answer

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

[2]

12-7-12

08

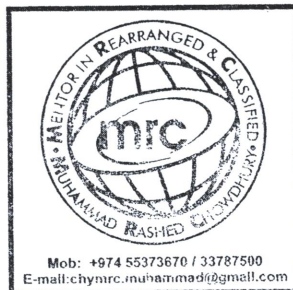
$$\mathbf{a} = \begin{pmatrix} 5 \\ -3 \end{pmatrix} \quad \mathbf{b} = \begin{pmatrix} -2 \\ 7 \end{pmatrix}$$

Work out $3\mathbf{a} + \mathbf{b}$.

Answer

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

[2]



11-15

09 $\mathbf{p} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ $\mathbf{q} = \begin{pmatrix} -1 \\ 3 \end{pmatrix}$

Work out $3\mathbf{p} - \mathbf{q}$.

Answer $\begin{pmatrix} \\ \end{pmatrix}$ [2]

10

12-13

$$\mathbf{a} = \begin{pmatrix} 4 \\ 7 \end{pmatrix} \quad \mathbf{b} = \begin{pmatrix} -5 \\ 2 \end{pmatrix}$$

Write each of the following as a single vector.

(a) $6\mathbf{a}$

Answer(a) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

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

Answer(b) $\begin{pmatrix} \\ \end{pmatrix}$ [1]



11 $m = \begin{pmatrix} 5 \\ -7 \end{pmatrix}$ $n = \begin{pmatrix} 2 \\ 6 \end{pmatrix}$

Work out

(a) $3m$,

$\begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) $m - n$.

$\begin{pmatrix} \\ \end{pmatrix}$ [1]

12 $a = \begin{pmatrix} 4 \\ 3 \end{pmatrix}$ $b = \begin{pmatrix} -2 \\ 0 \end{pmatrix}$ $c = \begin{pmatrix} 1 \\ -5 \end{pmatrix}$

Find

(a) $4a$,

Answer(a) $\begin{pmatrix} \\ \end{pmatrix}$ [2]

(b) $b - c$.

Answer(b) $\begin{pmatrix} \\ \end{pmatrix}$ [2]



12-N-16

13

$$\mathbf{a} = \begin{pmatrix} 3 \\ 5 \end{pmatrix} \quad \mathbf{b} = \begin{pmatrix} -8 \\ 7 \end{pmatrix}$$

Write each of the following as a single vector.

(a) $3\mathbf{a}$

Answer(a) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) $\mathbf{a} - \mathbf{b}$

Answer(b) $\begin{pmatrix} \\ \end{pmatrix}$ [1]



14

(a) Work out.

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

$$\begin{pmatrix} \\ \end{pmatrix} [1]$$

(b) A is the point $(3, 6)$ and B is the point $(5, 10)$.

Work out \overrightarrow{AB} .

$$\overrightarrow{AB} = \begin{pmatrix} \\ \end{pmatrix} [1]$$

(c) C is the point $(5, 8)$ and $\overrightarrow{CD} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$.

Find the co-ordinates of the point D .

$$(\dots\dots\dots, \dots\dots\dots) [1]$$



15

$$\mathbf{a} = \begin{pmatrix} -3 \\ 4 \end{pmatrix} \quad \mathbf{b} = \begin{pmatrix} 2 \\ 6 \end{pmatrix}$$

Write each of the following as a single vector.

(a) $2\mathbf{a}$

$$\text{Answer(a)} \quad \begin{pmatrix} \\ \end{pmatrix} [1]$$

(b) $\mathbf{a} - \mathbf{b}$

$$\text{Answer(b)} \quad \begin{pmatrix} \\ \end{pmatrix} [1]$$

16 (a) Work out.

(i) $5 \begin{pmatrix} 2 \\ -3 \end{pmatrix}$

Answer(a)(i) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

(ii) $\begin{pmatrix} 4 \\ -5 \end{pmatrix} + \begin{pmatrix} 3 \\ -1 \end{pmatrix}$

Answer(a)(ii) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) A translation moves the point (6, 3) to the point (2, 8).

Work out the vector which represents this translation.

Answer(b) $\begin{pmatrix} \\ \end{pmatrix}$ [1]



(c) A point P is translated by the vector $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$ to the point $(7, -2)$.

Find the co-ordinates of P .

You may use the grid below to help you.

Answer(c) (.....,) [1]



Question 9 is printed on the next page.

17 (a) $\vec{GH} = \begin{pmatrix} 6 \\ -4 \end{pmatrix}$

J-13-17

Find

(i) $5\vec{GH}$,

$\begin{pmatrix} \\ \end{pmatrix}$ [1]

(ii) \vec{HG} .

$\begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) $\begin{pmatrix} 6 \\ 7 \end{pmatrix} + \begin{pmatrix} 2 \\ y \end{pmatrix} = \begin{pmatrix} 8 \\ 3 \end{pmatrix}$

Find the value of y .

$y = \dots\dots\dots$ [1]

14 These are the weights, in kilograms, of 10 babies.

J-13-17

3.7 2.7 3.5 3.8 3.1 3.0 3.8 2.8 4.1 3.7

(a) Find the range.

$\dots\dots\dots$ kg [1]

(b) Calculate the mean.

$\dots\dots\dots$ kg [2]



18 (a) $\mathbf{p} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ $\mathbf{q} = \begin{pmatrix} -3 \\ 0 \end{pmatrix}$

Work out

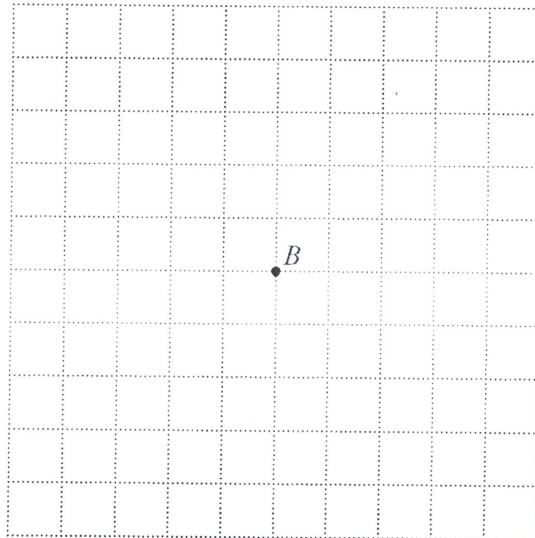
(i) $3\mathbf{p}$,

$$\begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

(ii) $\mathbf{p} - \mathbf{q}$.

$$\begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

(b)

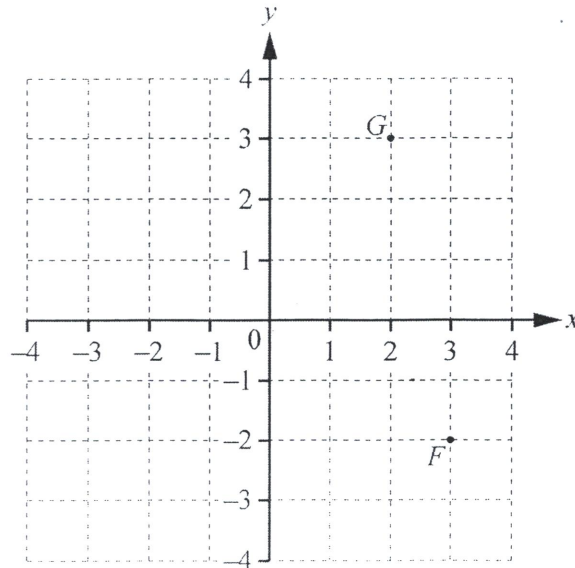


Point B is marked on the grid and $\overrightarrow{AB} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$.

On the grid, mark point A .

[1]





Points F and G are marked on the grid.

(a) Write \vec{FG} as a column vector.

$$\vec{FG} = \begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

(b) $\vec{GH} = \begin{pmatrix} -5 \\ -6 \end{pmatrix}$

Mark the point H on the grid.

[1]

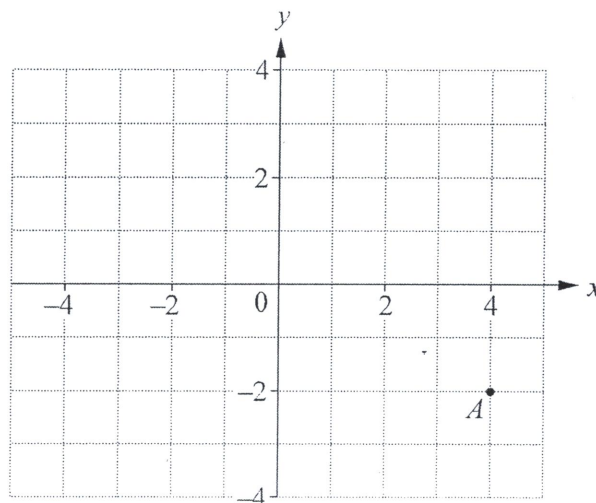


20 (a) Write $3\begin{pmatrix} -2 \\ 1 \end{pmatrix}$ as a single vector.

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

[1]

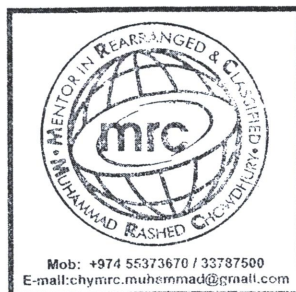
(b)



Point A is marked on the grid and $\vec{AB} = \begin{pmatrix} -7 \\ 4 \end{pmatrix}$.

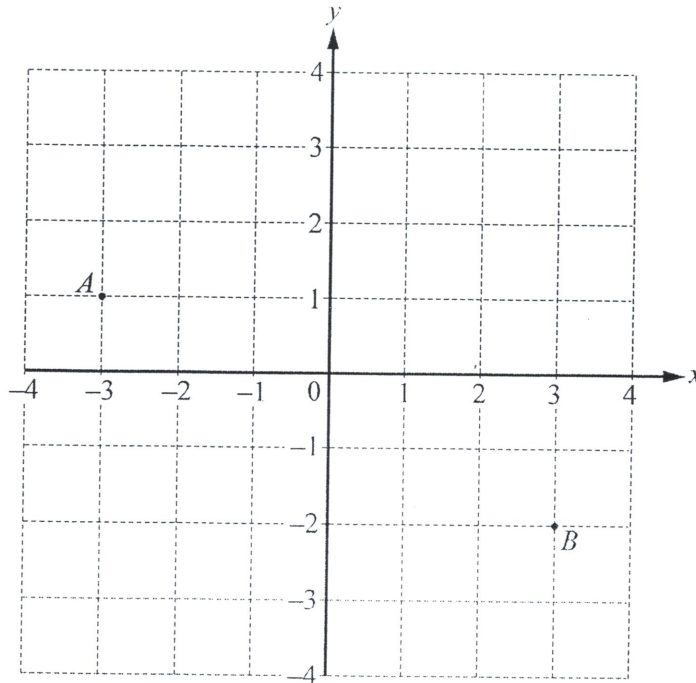
On the grid, mark the point B .

[1]



21 (a)

12-11-15



Points A and B are shown on the grid.

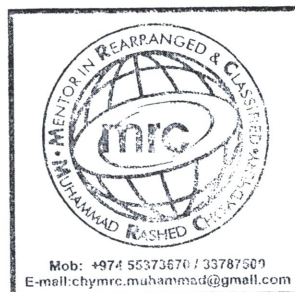
Write \vec{AB} as a column vector.

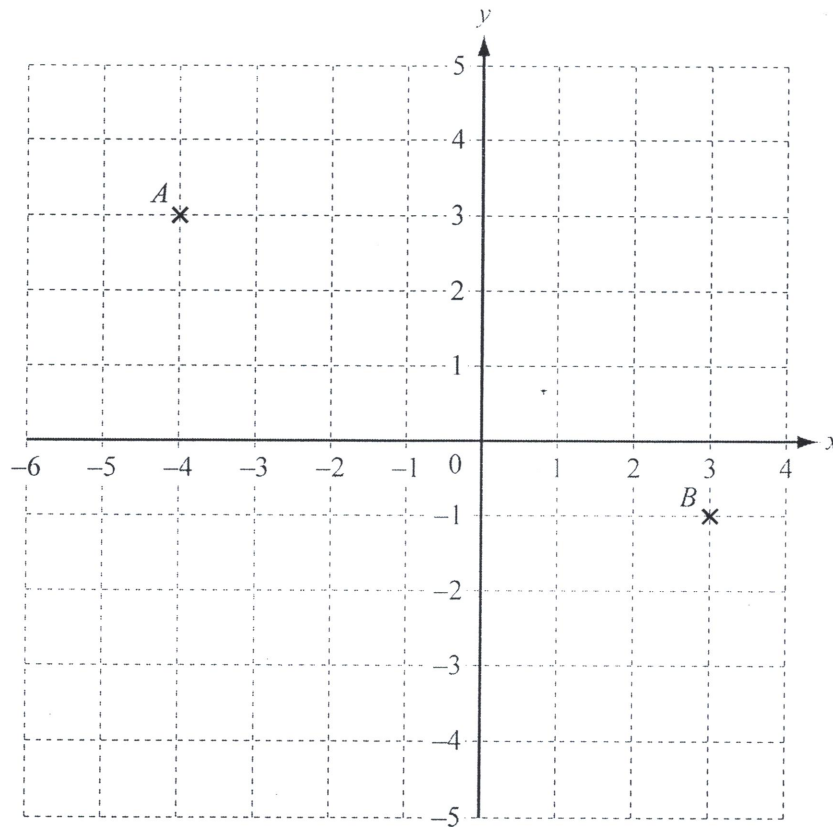
Answer(a) $\vec{AB} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) $\vec{CD} = \begin{pmatrix} 5 \\ -7 \end{pmatrix}$

Write \vec{DC} as a column vector.

Answer(b) $\vec{DC} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

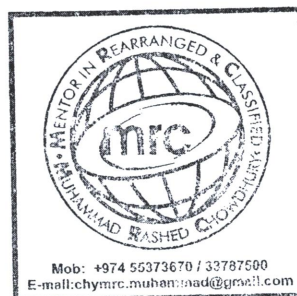




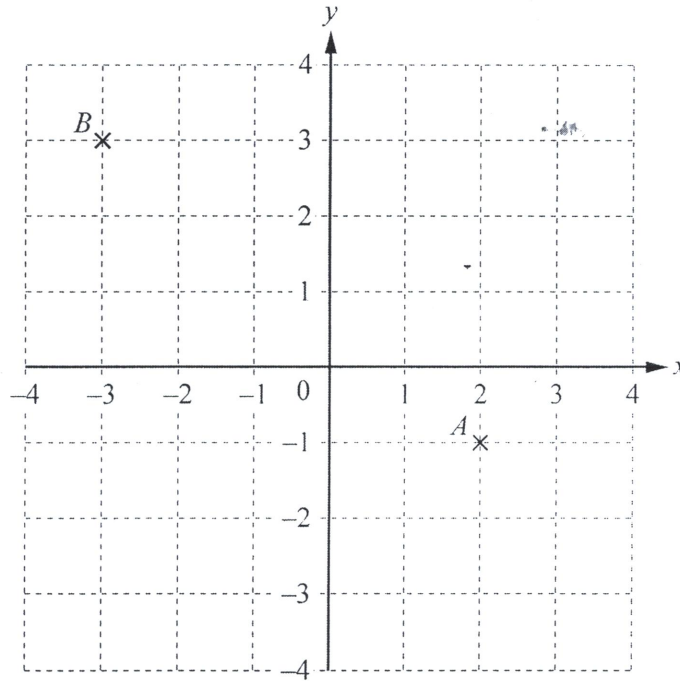
Points A and B are shown on the grid.

Write \vec{AB} as a column vector.

Answer $\begin{pmatrix} \\ \end{pmatrix}$ [1]



23



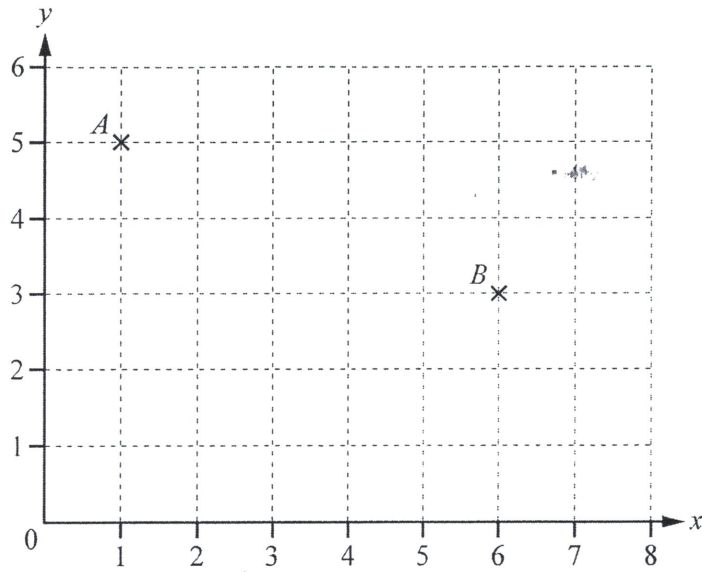
Points A and B are shown on the grid.

(a) Write \vec{AB} as a column vector.

$$\text{Answer(a) } \vec{AB} = \begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

(b) Write $3\vec{AB}$ as a column vector.

$$\text{Answer(b) } 3\vec{AB} = \begin{pmatrix} \\ \end{pmatrix} \quad [1]$$



(a) Write down the co-ordinates of A.

Answer(a) (.....,) [1]

(b) Write down the vector \vec{AB} .

Answer(b) $\vec{AB} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

(c) Work out.

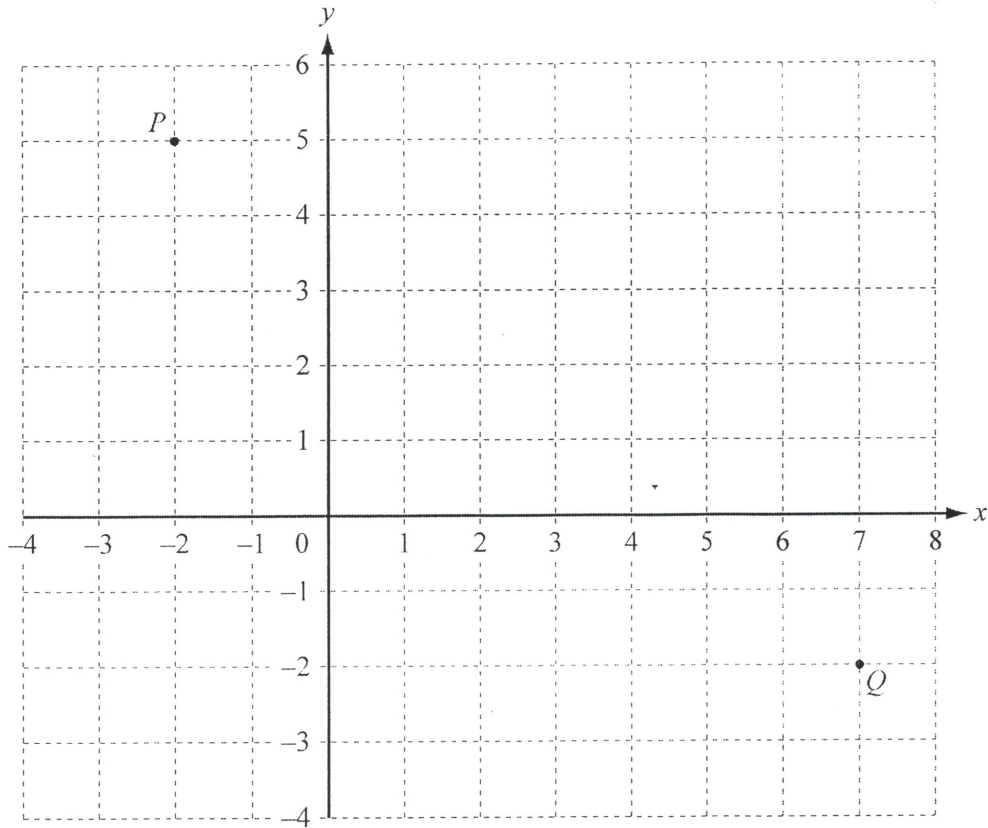
$$\begin{pmatrix} 4 \\ -6 \end{pmatrix} + \begin{pmatrix} 2 \\ 5 \end{pmatrix}$$

Answer(c) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

(d) Work out.

$$6 \begin{pmatrix} -3 \\ 7 \end{pmatrix}$$

Answer(d) $\begin{pmatrix} \\ \end{pmatrix}$ [1]



The points P and Q are marked on the grid.

- (a) Work out the vector \vec{PQ} .

Answer(a) $\vec{PQ} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

- (b) $\vec{QR} = \begin{pmatrix} -8 \\ -1 \end{pmatrix}$

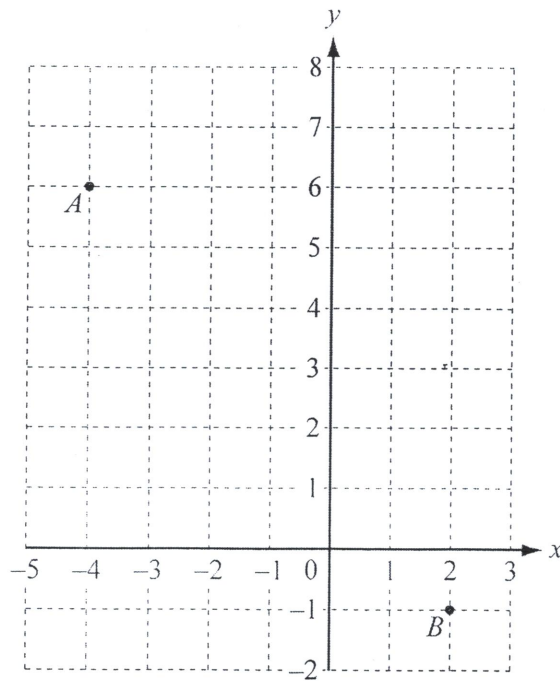
Find the co-ordinates of the point R .

Answer(b) (.....,) [1]

13-11-13

26 The diagram shows two points, A and B .

For
Examiner's
Use



Write as column vectors

(a) \vec{AB} ,

(b) $3\vec{BA}$.

Answer(a) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

Answer(b) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

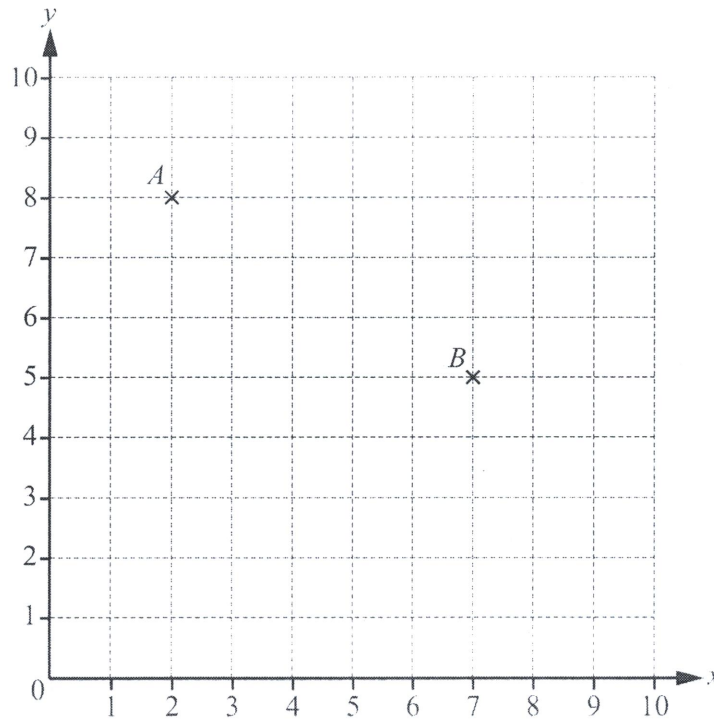
27 (a) Work out.

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

F-12-17

$$\begin{pmatrix} \\ \end{pmatrix} [1]$$

(b)



Points A and B are marked on the grid.

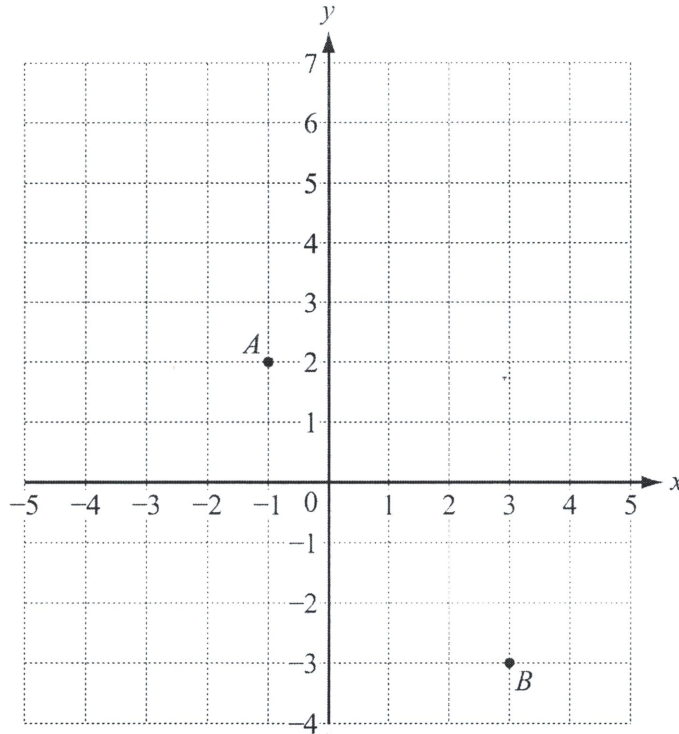
$$\overrightarrow{BC} = \begin{pmatrix} -4 \\ 0 \end{pmatrix}$$

(i) On the grid, plot the point C .

[1]

(ii) Write \overrightarrow{AC} as a column vector.

$$\begin{pmatrix} \\ \end{pmatrix} [1]$$



(a) Write down the co-ordinates of point A.

Answer(a) (..... ,) [1]

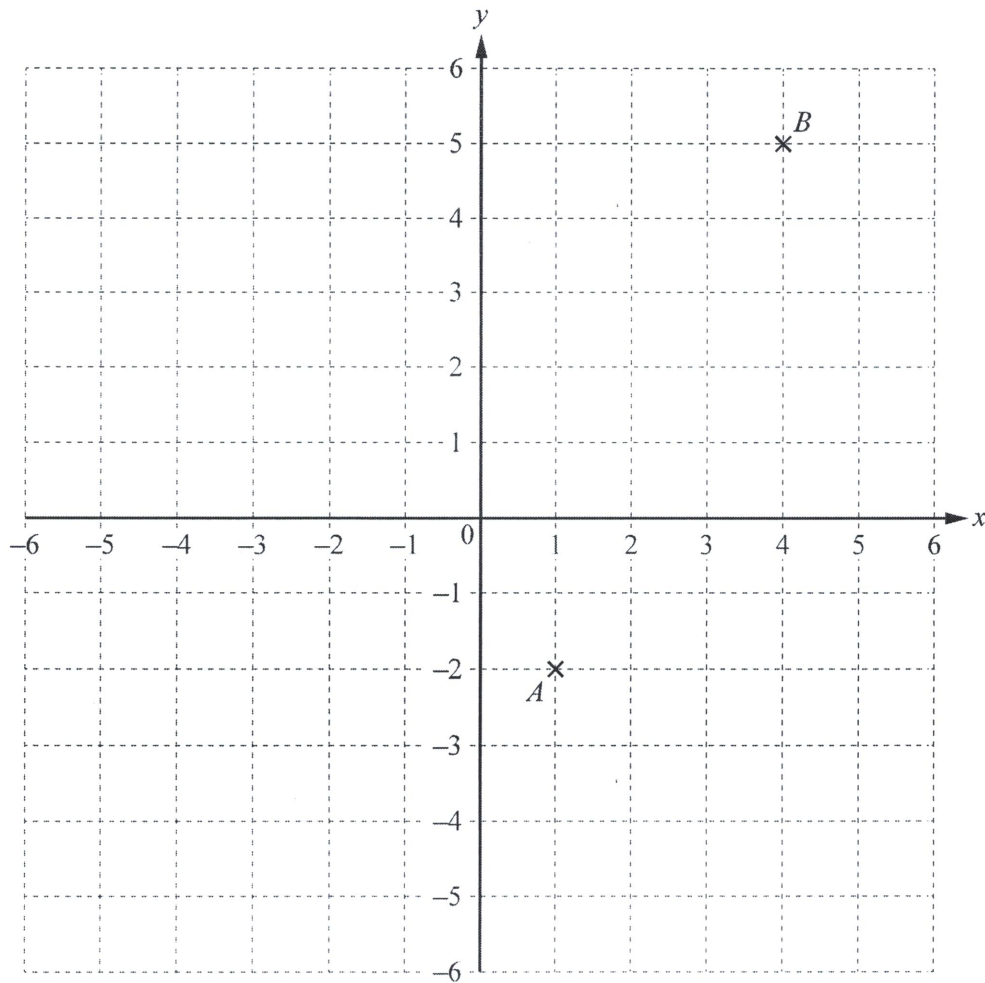
(b) Write \vec{AB} as a column vector.

Answer(b) $\vec{AB} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

(c) $\vec{AC} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$

Write down the co-ordinates of C.

Answer(c) (..... ,) [1]



The diagram shows two points, A and B .

(a) Write down the column vector \vec{AB} .

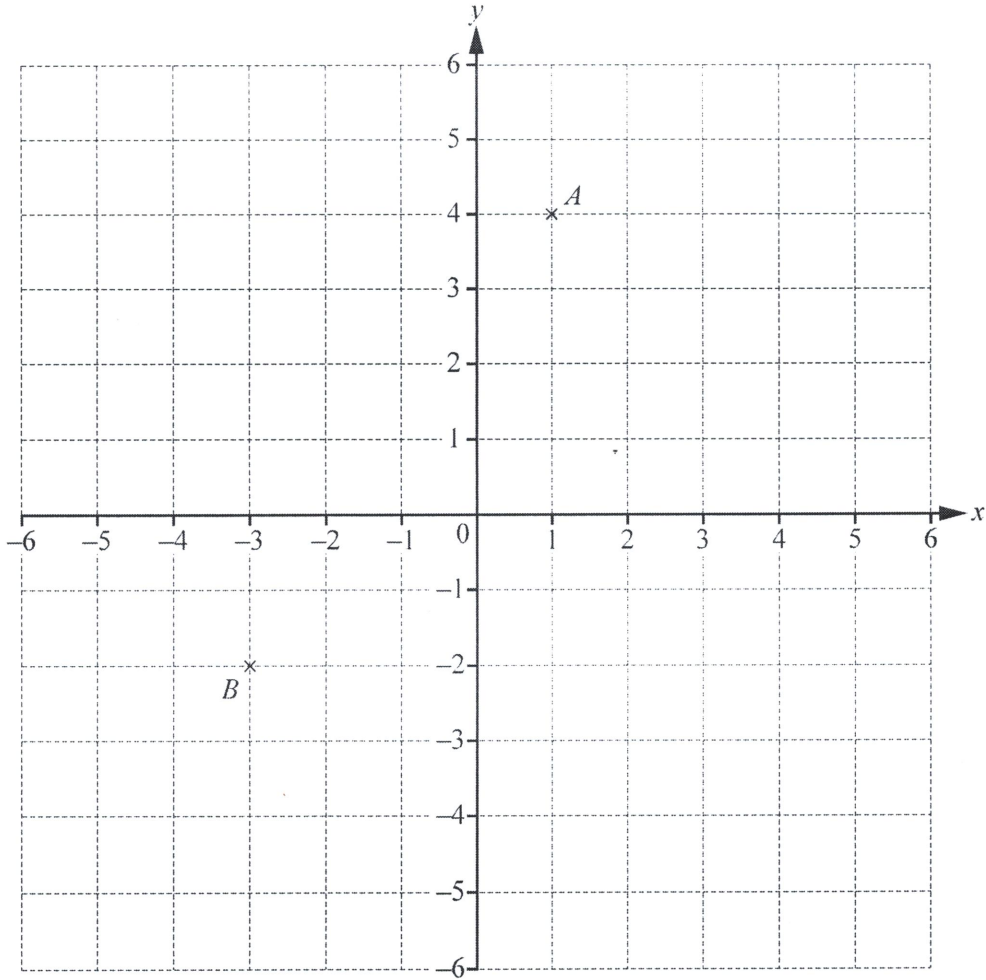
Answer(a) $\vec{AB} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) $\vec{AC} = \begin{pmatrix} -5 \\ 2 \end{pmatrix}$

(i) On the grid, mark the point C . [1]

(ii) Write down the co-ordinates of C .

Answer(b)(ii) (.....,) [1]



(a) Write down the co-ordinates of point *A*.

(..... ,) [1]

(b) Plot the point (5, -2).
Label this point *C*.

[1]

(c) Write down the mathematical name of triangle *ABC*.

..... [1]

(d) Write \vec{AB} as a column vector.

$$\vec{AB} = \begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

(e) $\vec{BD} = \begin{pmatrix} -2 \\ 5 \end{pmatrix}$

Write down the co-ordinates of point *D*.

(..... ,) [1]