Name: _____

GCSE (1 – 9)

Vectors

Instructions

• Use **black** ink or ball-point pen.
• Answer all questions.
• Answer the questions in the spaces provided
– *there may be more space than you need.*
• Diagrams are **NOT** accurately drawn, unless otherwise indicated.
• You must **show all your working out.**

Information

• The marks for each question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

• Read each question carefully before you start to answer it.
• Keep an eye on the time.
• Try to answer every question.
• Check your answers if you have time at the end

1 $\boldsymbol{a} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and $\boldsymbol{b} = \begin{pmatrix} 1 \\ 5 \end{pmatrix}$

(a) Write down as a column vector

(i) **a** + **b**

…….....

(1)

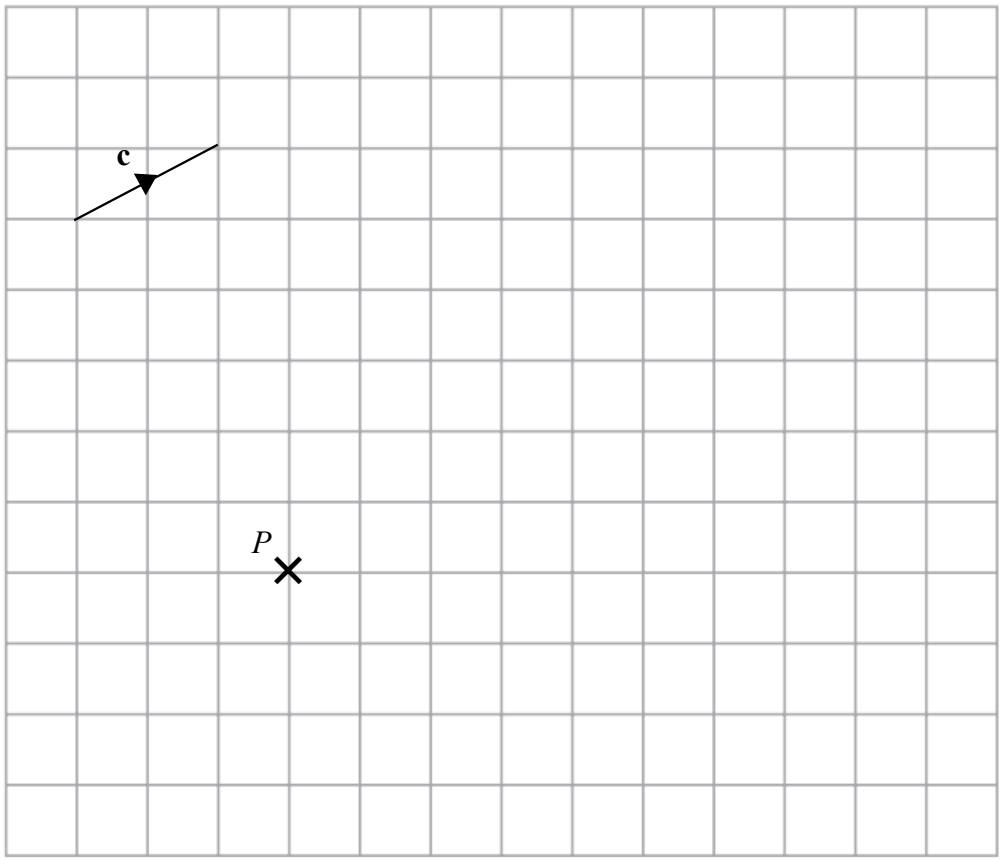
(ii) 2**a** + 3**b**

…….....

(2)

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

(b) From the point *P*, draw the vector 4**c**



(1)

(Total for question 1 is 4 marks)

2 $\boldsymbol{a} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$ and $\boldsymbol{b} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$

(a) Write down as a column vector

(i) **a** + **b**

…….....

(1)

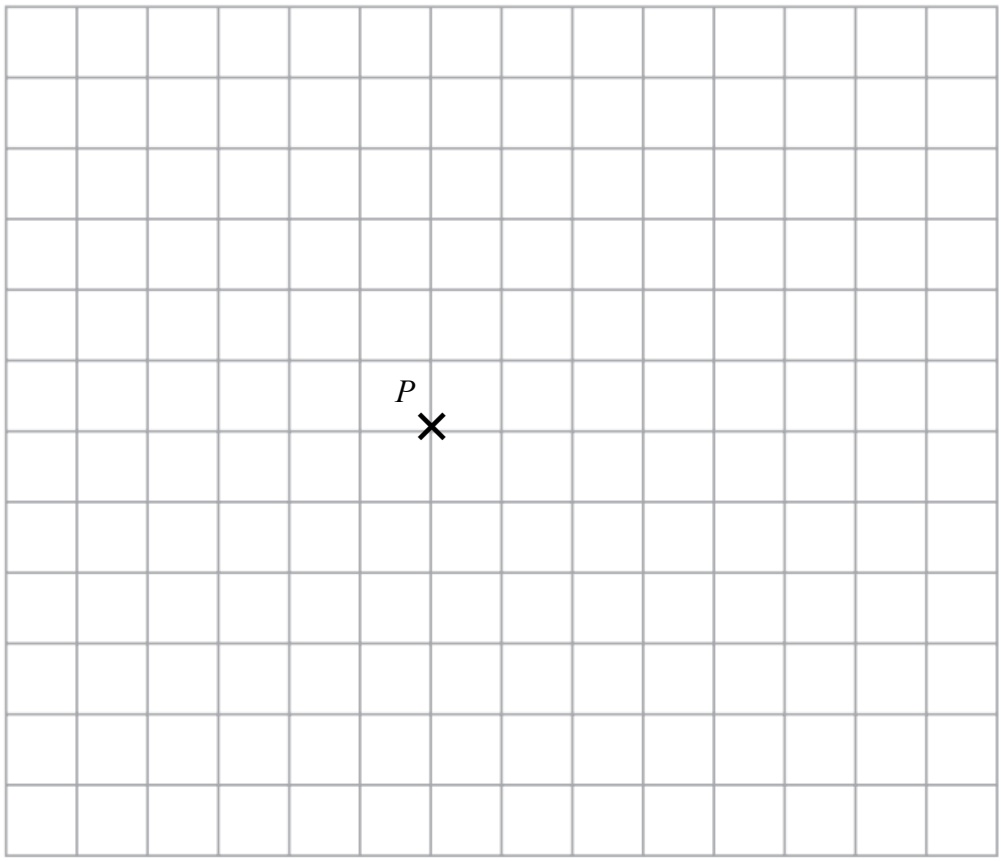
(ii) 2**a** – **b**

…….....

(2)

$\boldsymbol{c} = \begin{pmatrix} 5 \\ -4 \end{pmatrix}$

(b) From the point *P*, draw the vector **c**



(1)

(Total for question 2 is 4 marks)

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

(a) Write down as a column vector

(i) **a** + **b**

.....

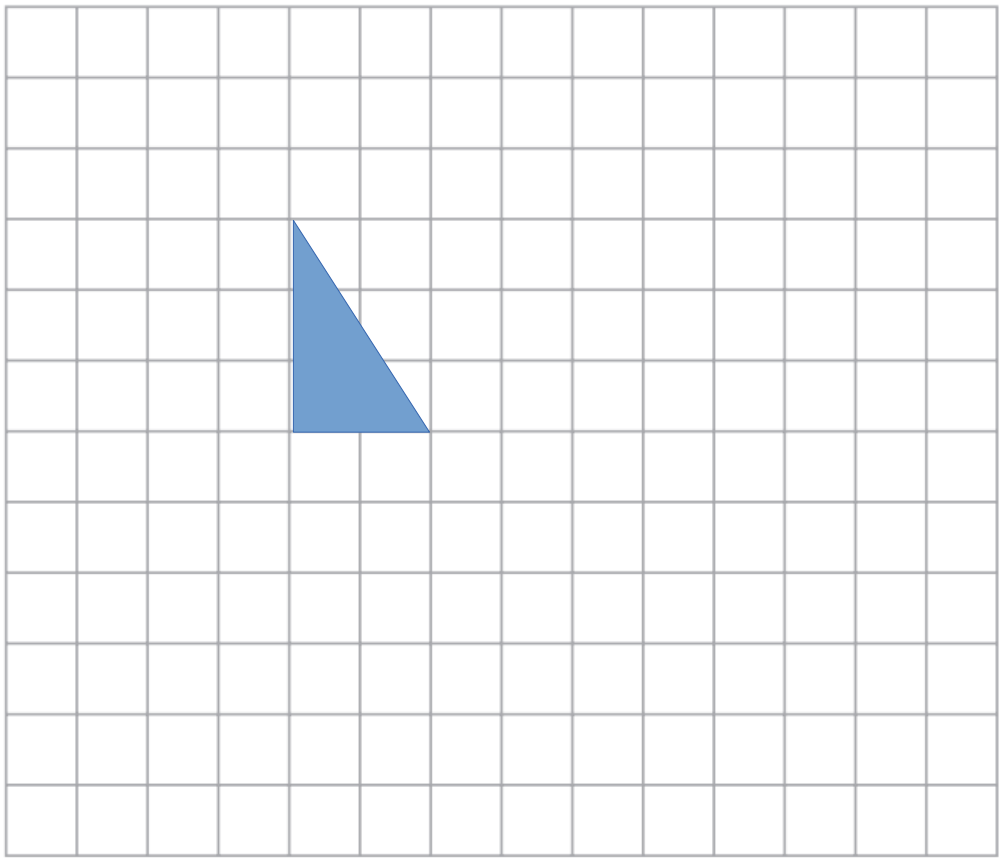
(1)

(ii) 2**a** – **b**

.....

(2)

(b) Translate the triangle by the vector $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$



(1)

(Total for question 3 is 4 marks)

4 A is the point (3, 2) and B is the point (4, –1).

(a) Write down as a column vector $\overrightarrow{AB}$

…….....
(1)

C is the point (5, –2) and D is the point (2, 1).

(b) Write down as a column vector $\overrightarrow{CD}$

…….....
(1)

(Total for question 4 is 2 marks)

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5 A is the point (5, –1) and B is the point (4, –3).

(a) Write down as a column vector $\overrightarrow{AB}$

…….....
(1)

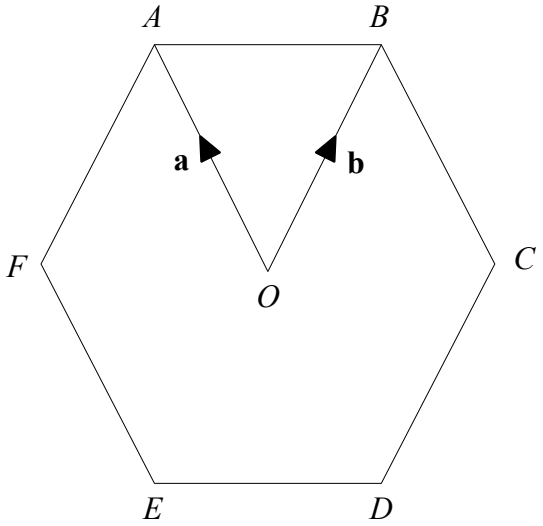
C is the point (1, 6) and D is the point (–3, 9).

(b) Write down as a column vector $\overrightarrow{CD}$

…….....
(1)

(Total for question 5 is 2 marks)

6 *ABCDEF* is a regular hexagon with centre *O*.



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

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

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

…….....

(1)

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

…….....

(1)

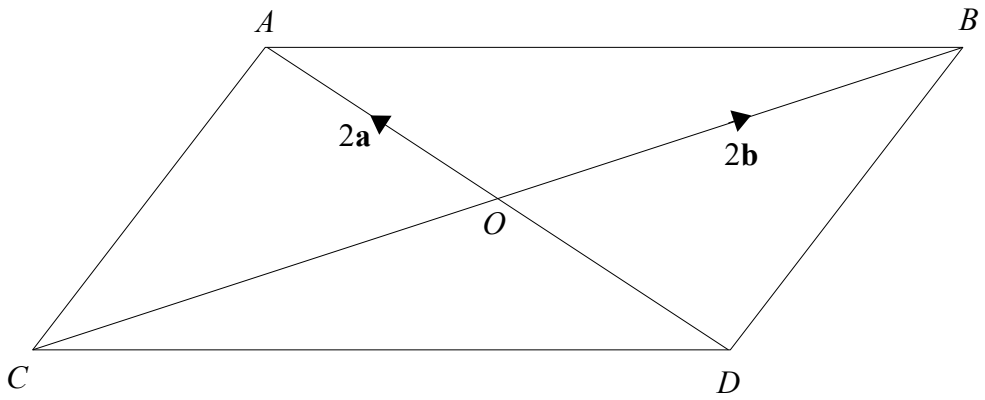
(c) Find, in terms of **b**, the vector $\overrightarrow{AF}$

…….....

(1)

(Total for question 6 is 3 marks)

7 The diagram shows a parallelogram.



$\overrightarrow{OA} = 2\mathbf{a}$

$\overrightarrow{OB} = 2\mathbf{b}$

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

…….....

(1)

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

…….....

(1)

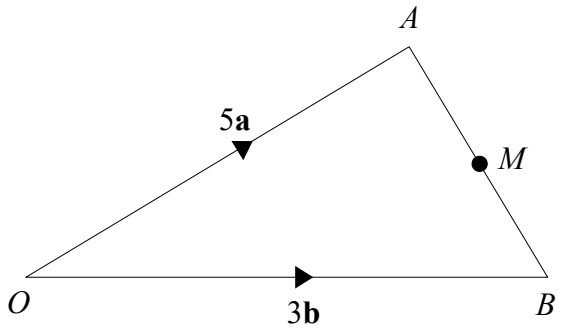
(c) Find, in terms of **a** and **b**, the vector $\overrightarrow{AC}$

…….....

(1)

(Total for question 7 is 3 marks)

8



$\overrightarrow{OA} = 5\mathbf{a}$

$\overrightarrow{OB} = 3\mathbf{b}$

M is the midpoint of AB

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

…….....

(1)

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

…….....

(1)

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

…….....

(1)

(Total for question 8 is 3 marks)

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9 $\mathbf{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} -1 \\ 5 \end{pmatrix}$

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

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

(Total for Question 9 is 2 marks)