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

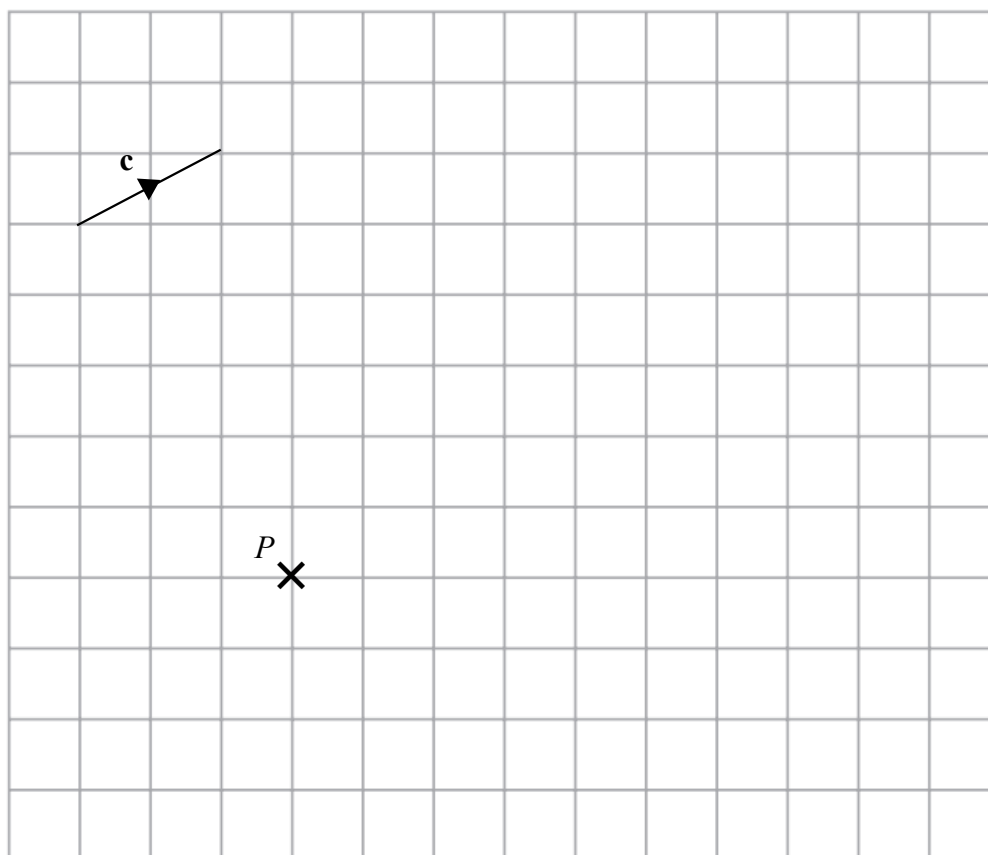(a) Write down as a column vector

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

…..........................
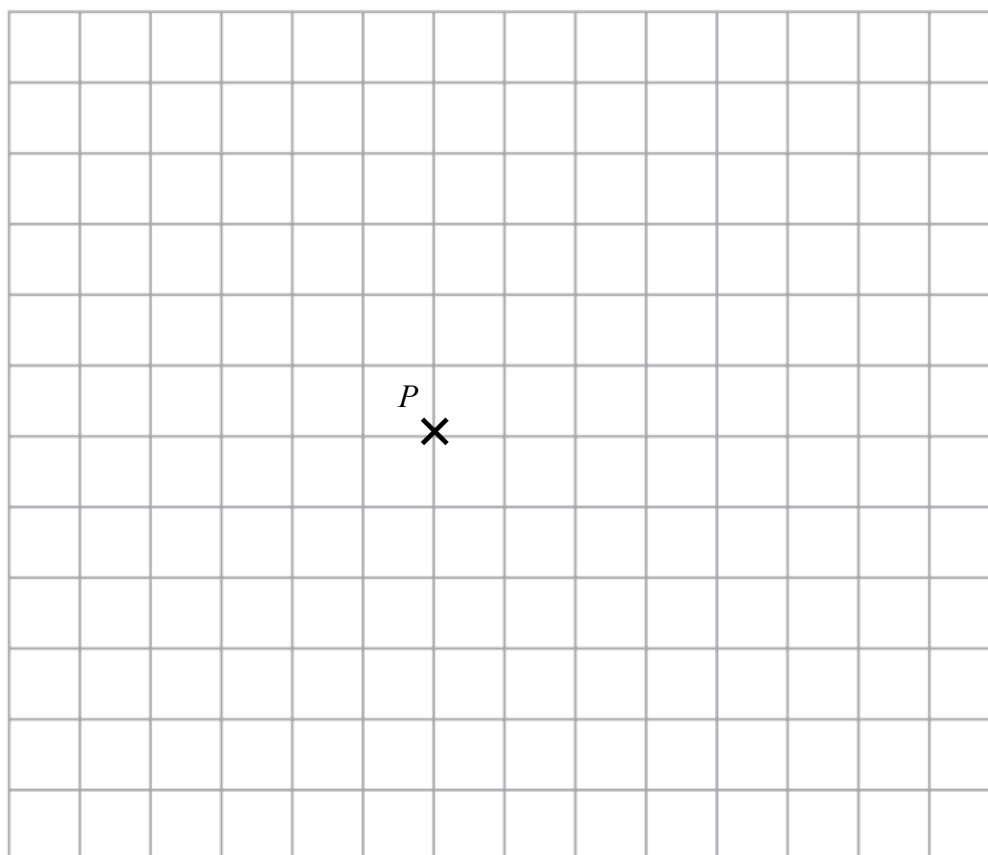
(1)

(ii) $2\mathbf{a} + 3\mathbf{b}$

…..........................

(2)

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

(b) From the point P, draw the vector $4\mathbf{c}$

(1)

(Total for question 1 is 4 marks)

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

(a) Write down as a column vector

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

….........................

(1)

(ii) 2**a** – **b**

….........................

(2)

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

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

P
✗

(1)

(Total for question 2 is 4 marks)

3 $a=\begin{pmatrix} -2 \\ 3 \end{pmatrix}$ and $b=\begin{pmatrix} 5 \\ -1 \end{pmatrix}$
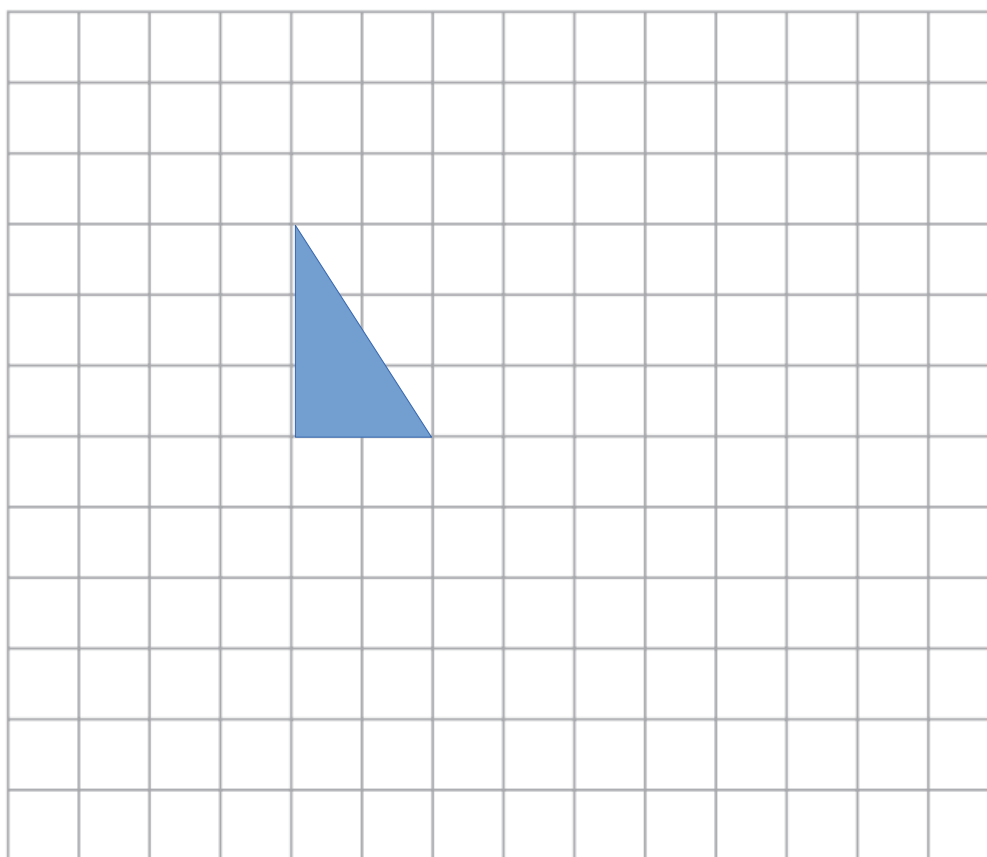
(a) Write down as a column vector

(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)

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

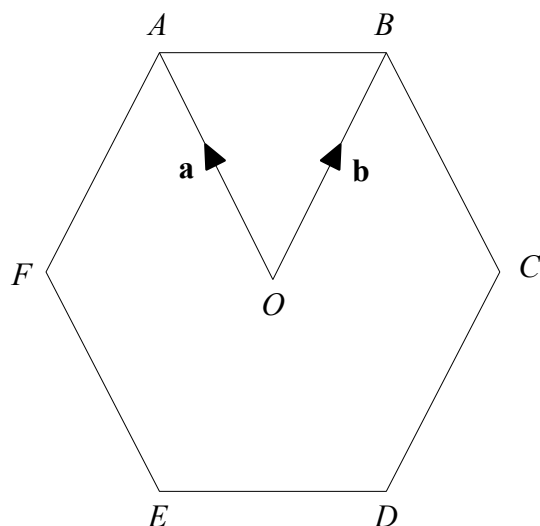(a) Write down as a column vector $\overrightarrow{AB}$

…......................

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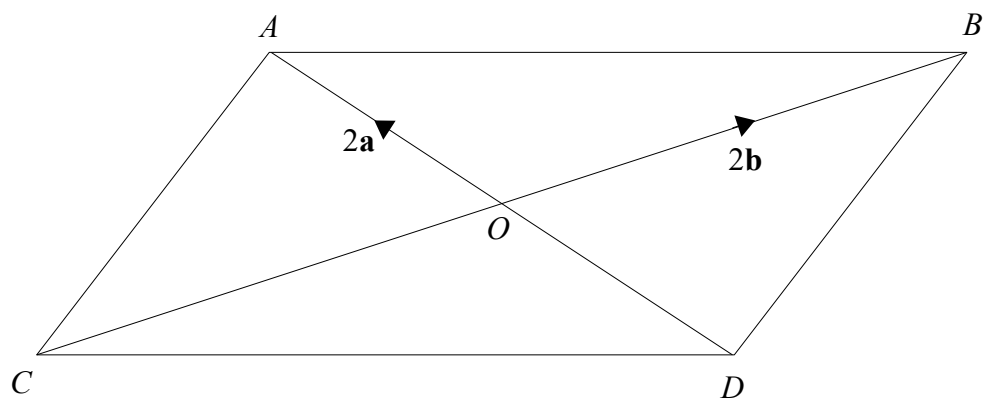
$\overrightarrow{OA} = 2\mathbf{a}$

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

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

…........................

(1)

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

…........................

(1)

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

…........................

(1)

(Total for question 7 is 3 marks)

8
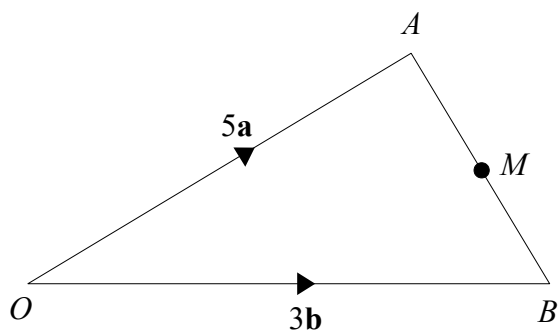
$\overrightarrow{OA} = 5\mathbf{a}$

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

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)

27 $\mathbf{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} -1 \\ 5 \end{pmatrix}$

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

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

(Total for Question 27 is 2 marks)

27 $\mathbf{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} -1 \\ 5 \end{pmatrix}$

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