

Write your name here

Surname

Other names

In the style of:
Pearson Edexcel
Level 1/Level 2 GCSE (9 - 1)

Centre Number

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Candidate Number

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Mathematics

Vectors

Higher Tier

GCSE style questions arranged by topic

Paper Reference

1MA1/3H

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**



Information

- The total mark for this paper is
- 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.

Turn over ►



1

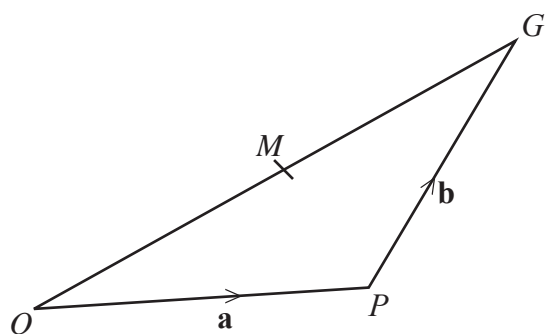


Diagram **NOT**
accurately drawn

OGP is a triangle.

M is the midpoint of OG .

$$\vec{OP} = \mathbf{a}$$

$$\vec{PG} = \mathbf{b}$$

(a) Express \vec{OM} in terms of \mathbf{a} and \mathbf{b} .

$$\vec{OM} = \dots\dots\dots (2)$$

(b) Express \vec{PM} in terms of \mathbf{a} and \mathbf{b}
Give your answer in its simplest form.

$$\vec{PM} = \dots\dots\dots (2)$$

(Total for Question 1 is 4 marks)

2

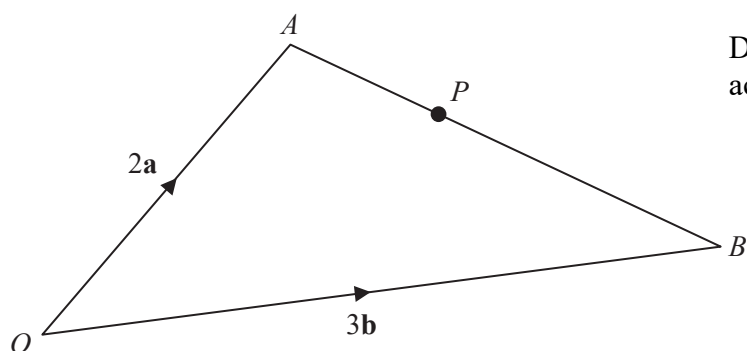


Diagram **NOT**
accurately drawn

OAB is a triangle.

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

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

(a) Find \overrightarrow{AB} in terms of \mathbf{a} and \mathbf{b} .

$$\overrightarrow{AB} = \dots\dots\dots$$

(1)

P is the point on AB such that $AP : PB = 2 : 3$

(b) Show that \overrightarrow{OP} is parallel to the vector $\mathbf{a} + \mathbf{b}$.

(3)

(Total for Question 2 is 4 marks)

3

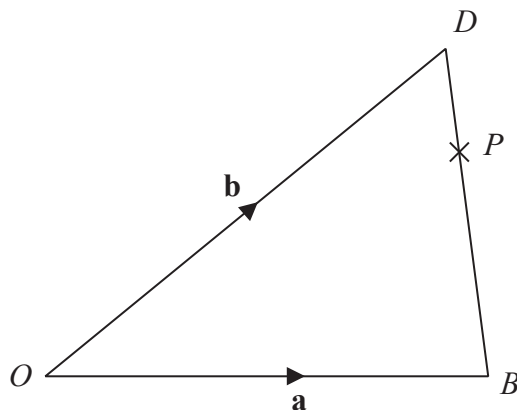


Diagram **NOT**
accurately drawn

ODB is a triangle.

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

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

(a) Find \overrightarrow{BD} in terms of \mathbf{a} and \mathbf{b} .

.....

(1)

P is the point on DB such that $DP : PB = 1 : 3$

(b) Find \overrightarrow{OP} in terms of \mathbf{a} and \mathbf{b} .

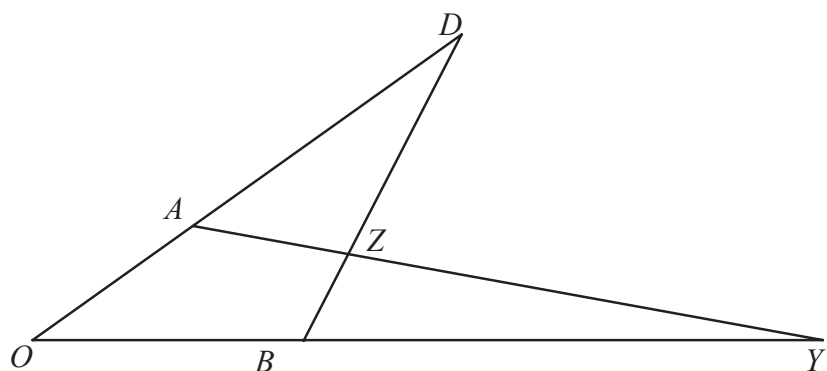
Give your answer in its simplest form.

.....

(3)

(Total for Question 3 is 4 marks)

4

Diagram **NOT**
accurately drawn

In the diagram,

$$\overrightarrow{OA} = 4\mathbf{a} \quad \text{and} \quad \overrightarrow{OB} = 4\mathbf{b}$$

 OAD , OBY and BZD are all straight lines

$$AD = 2OA \quad \text{and} \quad BZ : ZD = 1 : 3$$

(a) Find, in terms of \mathbf{a} and \mathbf{b} , the vectors which represent

(i) \overrightarrow{BD}

.....
(2)

(ii) \overrightarrow{AZ}

.....
(2)

Given that $\overrightarrow{BY} = 8\mathbf{b}$

(b) Show that AZY is a straight line.

(3)

(Total for Question 4 is 7 marks)

5

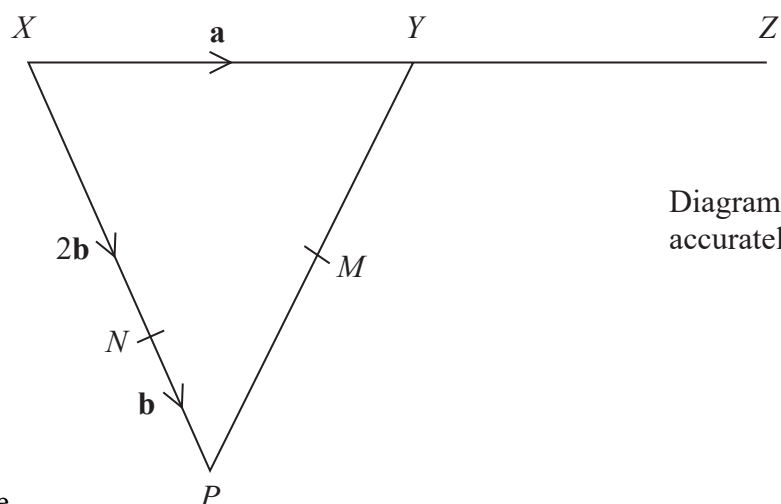


Diagram **NOT**
accurately drawn

XYP is a triangle
 N is a point on XP

$$\vec{XY} = \mathbf{a} \quad \vec{XN} = 2\mathbf{b} \quad \vec{NP} = \mathbf{b}$$

(a) Find the vector \vec{PX} , in terms of \mathbf{a} and \mathbf{b} .

.....

(1)

Y is the midpoint of XZ
 M is the midpoint of PY

(b) Show that NMZ is a straight line.

(4)

(Total for Question 5 is 5 marks)

6

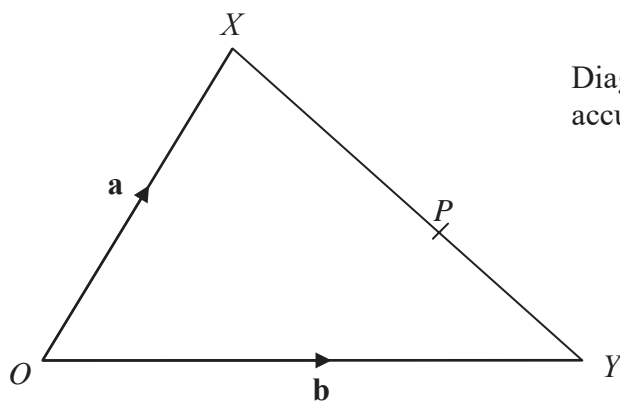


Diagram **NOT**
accurately drawn

OXY is a triangle.

$\vec{OX} = \mathbf{a}$

$\vec{OY} = \mathbf{b}$

(a) Find the vector \vec{XY} in terms of \mathbf{a} and \mathbf{b} .

$\vec{XY} = \dots\dots\dots$

P is the point on XY such that $XP : PY = 3 : 2$

(1)

(b) Show that $\vec{OP} = \frac{1}{5}(2\mathbf{a} + 3\mathbf{b})$

(3)

(Total for Question 6 is 4 marks)

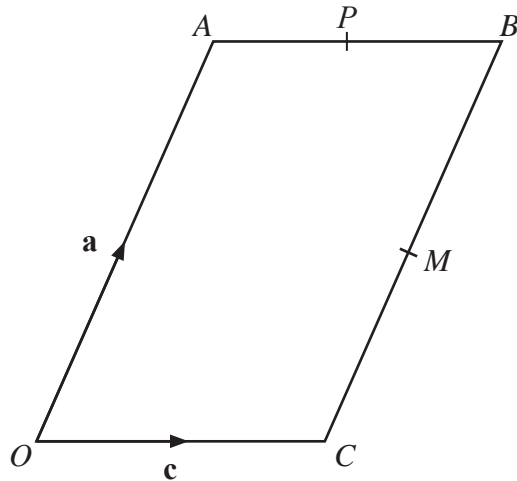


Diagram **NOT**
accurately drawn

$OABC$ is a parallelogram.

M is the midpoint of CB .

P is the midpoint of AB .

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

$$\overrightarrow{OC} = \mathbf{c}$$

(a) Find, in terms of \mathbf{a} and/or \mathbf{c} , the vectors

(i) \overrightarrow{MB} ,

.....

(ii) \overrightarrow{MP} .

.....

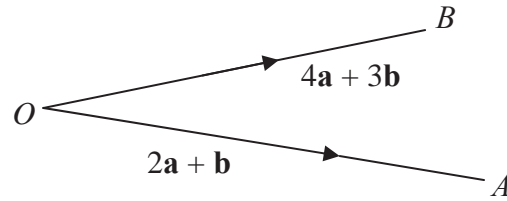
(2)

(b) Show that CA is parallel to MP .

(2)

(Total for Question 7 is 4 marks)

Diagram **NOT**
accurately drawn



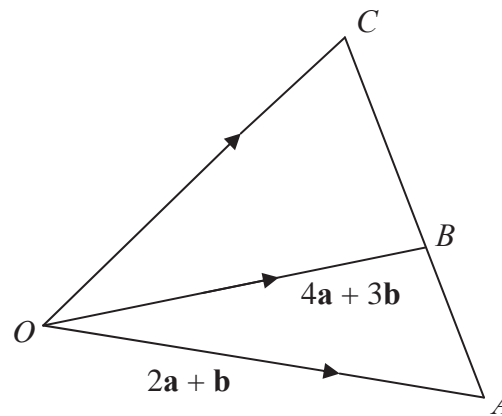
$$\vec{OA} = 2\mathbf{a} + \mathbf{b}$$

$$\vec{OB} = 4\mathbf{a} + 3\mathbf{b}$$

- (a) Express the vector \vec{AB} in terms of \mathbf{a} and \mathbf{b}
Give your answer in its simplest form.

.....
(2)

Diagram **NOT**
accurately drawn



ABC is a straight line.
 $CB : YZ = 2 : 3$

- (b) Express the vector \overrightarrow{OC} in terms of \mathbf{a} and \mathbf{b}
Give your answer in its simplest form.

.....
(3)

(Total for Question 8 is 5 marks)

9

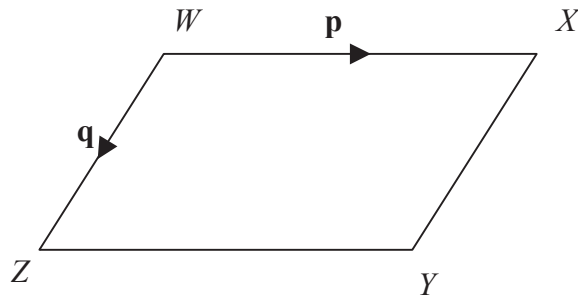


Diagram **NOT**
accurately drawn

$WXYZ$ is a parallelogram.
 WX is parallel to ZY . WZ is parallel to XY .

$$\vec{WX} = \mathbf{p}$$

$$\vec{WZ} = \mathbf{q}$$

(a) Express, in terms of \mathbf{p} and \mathbf{q}

(i) \vec{WY}

(i).....

(ii) \vec{XZ}

(ii).....

(2)

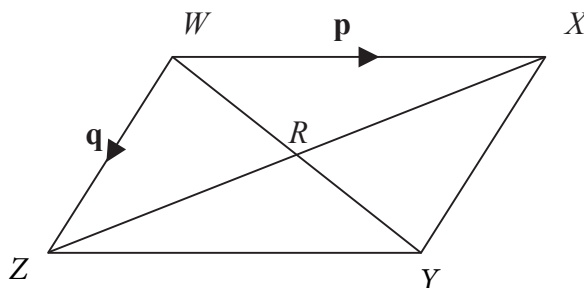


Diagram **NOT**
accurately drawn

WX and XZ are diagonals of parallelogram $WXYZ$.
 WY and XZ intersect at R

(b) Express \vec{WR} in terms of \mathbf{p} and \mathbf{q} .

.....

(1)

(Total for Question 9 is 3 marks)

10

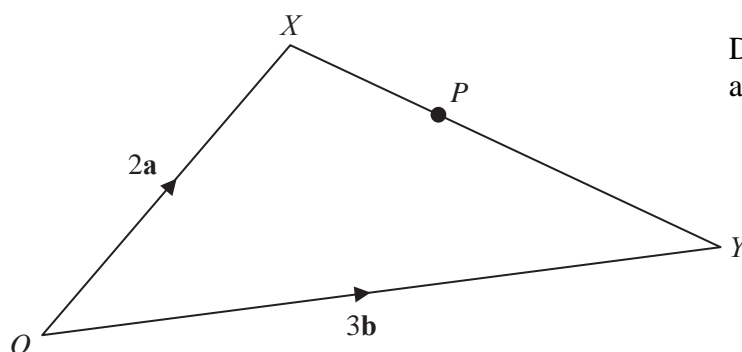


Diagram **NOT**
accurately drawn

OXY is a triangle.

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

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

- (a) Find \overrightarrow{XY} in terms of \mathbf{a} and \mathbf{b} .

$$\overrightarrow{XY} = \dots\dots\dots$$

(1)

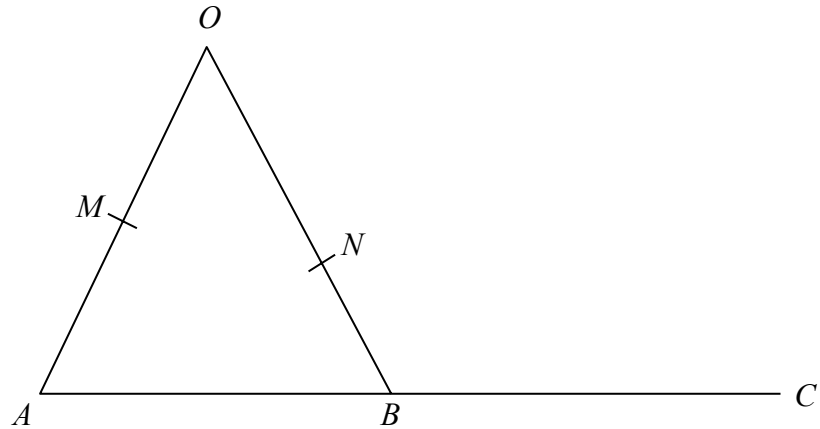
P is the point on XY such that $XP : PY = 2 : 3$

- (b) Show that \overrightarrow{OP} is parallel to the vector $\mathbf{a} + \mathbf{b}$

(3)

(Total for Question 10 is 4 marks)

11



OMA , ONB and ABC are straight lines.

M is the midpoint of OA .

B is the midpoint of AC .

$\vec{OA} = 6\mathbf{a}$ $\vec{OB} = 6\mathbf{b}$ $\vec{ON} = k\mathbf{b}$ where k is a scalar quantity.

Given that MNC is a straight line, find the value of k .

(Total for Question 11 is 5 marks)

12

In triangle ABC

M is the midpoint of AC

N is the point on BC where $BN : NC = 2 : 3$

$$\vec{AC} = 2\mathbf{a}$$

$$\vec{AB} = 3\mathbf{b}$$

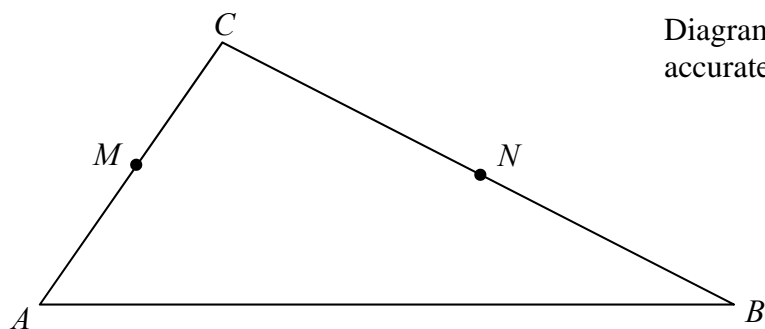


Diagram **NOT**
accurately drawn

- (a) Work out \vec{MN} in terms of \mathbf{a} and \mathbf{b} .
Give your answer in its simplest form.

.....
(3)

- (b) Use your answer to part (a) to explain why MN is **not** parallel to AB .

(1)

(Total for Question 12 is 4 marks)