

Vector Proof

For Pearson Edexcel GCSE Mathematics (1MA1) • Higher tier

Name _____

Total marks: **25**

Answer **all** questions in the spaces provided. Show your working: marks are given for correct method.
Diagrams are NOT accurately drawn.

- 1** $\overrightarrow{PQ} = 3\mathbf{a} - 6\mathbf{b}$ and $\overrightarrow{RS} = \mathbf{a} - 2\mathbf{b}$
Explain why PQ is parallel to RS .

(2)

(Total for Question 1 is 2 marks)

- 2** $\overrightarrow{AB} = 4\mathbf{p} + 2\mathbf{q}$ and $\overrightarrow{BC} = \mathbf{p} + k\mathbf{q}$
 A, B and C lie on a straight line.
Find the value of k .

$k = \dots\dots\dots$

(2)

(Total for Question 2 is 2 marks)

- 3 OPQ is a triangle. $\overrightarrow{OP} = \mathbf{a}$ and $\overrightarrow{OQ} = \mathbf{b}$
 R is the point on PQ such that $PR:RQ = 1:2$
Find $\overrightarrow{OR}$ in terms of $\mathbf{a}$ and $\mathbf{b}$. Give your answer in its simplest form.

.....

(3)

(Total for Question 3 is 3 marks)

5 ABC is a triangle.

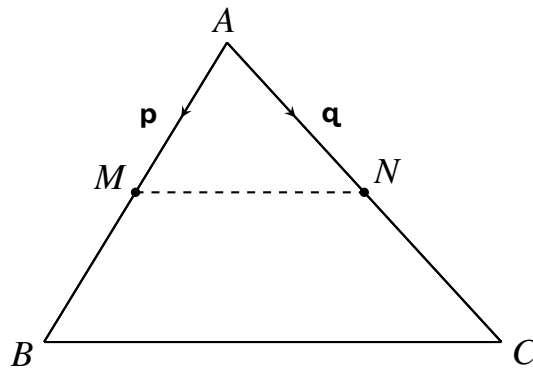


Diagram **NOT** accurately drawn

M is the midpoint of AB and N is the midpoint of AC .

$\overrightarrow{AB} = \mathbf{p}$ and $\overrightarrow{AC} = \mathbf{q}$

Use a vector method to prove that MN is parallel to BC .

(4)

(Total for Question 5 is 4 marks)

6 OAB is a triangle.

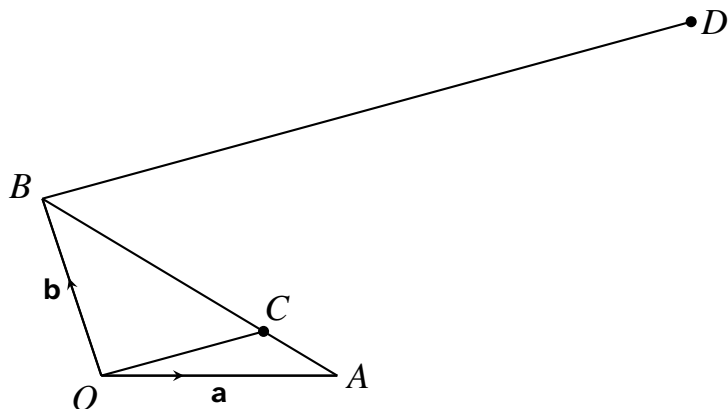


Diagram **NOT** accurately drawn

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

C is the point on AB such that $AC:CB = 1:3$

D is the point such that $\overrightarrow{OD} = 3\mathbf{a} + 2\mathbf{b}$

Prove, using vectors, that OC is parallel to BD .

(4)

(Total for Question 6 is 4 marks)

7 OAB is a triangle.

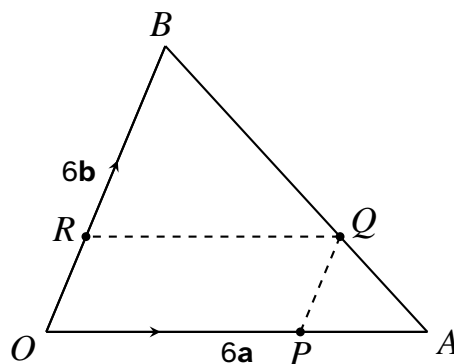


Diagram **NOT** accurately drawn

$$\vec{OA} = 6\mathbf{a} \quad \vec{OB} = 6\mathbf{b}$$

P is the point on OA such that $OP:PA = 2:1$

Q is the point on AB such that $AQ:QB = 1:2$

R is the point on OB such that $OR:RB = 1:2$

Use a vector method to prove that $OPQR$ is a parallelogram.

(5)

(Total for Question 7 is 5 marks)
