

Vector Proof

For AQA GCSE Mathematics (8300) • Higher tier

Name _____

Total marks: **23**

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

- 1** Which vector is parallel to $2\mathbf{a} - 3\mathbf{b}$?
Circle your answer.

[1 mark]

$3\mathbf{a} - 2\mathbf{b}$

$4\mathbf{a} + 6\mathbf{b}$

$6\mathbf{a} - 9\mathbf{b}$

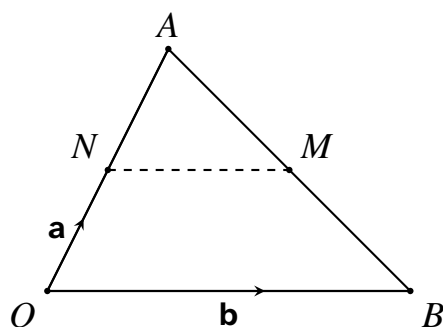
$2\mathbf{a} + 3\mathbf{b}$

- 2** $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$
 P is the point on AB such that $AP:PB = 2:3$
Write $\overrightarrow{OP}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.
Give your answer in its simplest form.

[2 marks]

Answer _____

3 $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$



Not drawn accurately

- (a) Write $\overrightarrow{AB}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.

[1 mark]

Answer _____

- (b) M is the midpoint of AB .
Write $\overrightarrow{OM}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.

[2 marks]

Answer _____

- (c) N is the midpoint of OA .
Prove that NM is parallel to OB and half its length.

[3 marks]

- 4 $\overrightarrow{PQ} = 3\mathbf{a} - 2\mathbf{b}$ and $\overrightarrow{QR} = 6\mathbf{a} - 4\mathbf{b}$
Prove that P , Q and R lie on a straight line.

[2 marks]

- 5 $\overrightarrow{OX} = 2\mathbf{a} + \mathbf{b}$ and $\overrightarrow{OY} = \mathbf{a} + k\mathbf{b}$
 $\overrightarrow{OY}$ is parallel to $\overrightarrow{OX}$.
Work out the value of k .

[2 marks]

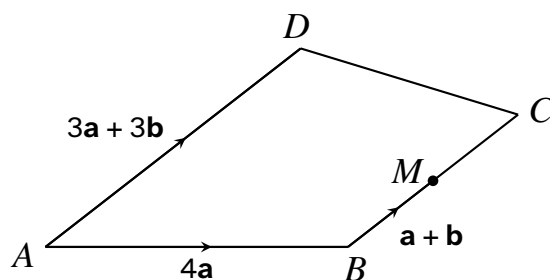
Answer $k =$ _____

- 6 $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$
 $\overrightarrow{OC} = 2\mathbf{a} + k\mathbf{b}$, where k is a number.
 A , B and C lie on a straight line.
Work out the value of k .

[3 marks]

Answer $k =$ _____

7 Here is a quadrilateral.



Not drawn accurately

$ABCD$ is a quadrilateral.

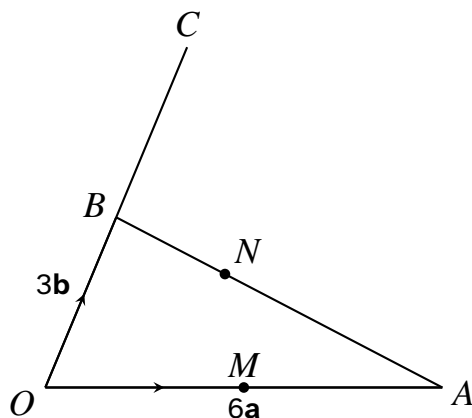
M is the midpoint of BC .

$\overrightarrow{AB} = 4\mathbf{a}$, $\overrightarrow{BM} = \mathbf{a} + \mathbf{b}$ and $\overrightarrow{AD} = 3\mathbf{a} + 3\mathbf{b}$

Prove that $ABCD$ is a trapezium.

[3 marks]

8 Here is a triangle.



OAB is a triangle. $\vec{OA} = 6\mathbf{a}$ and $\vec{OB} = 3\mathbf{b}$

M is the midpoint of OA .

N is the point on AB such that $AN:NB = 2:1$

C is the point such that OBC is a straight line and $OB = BC$.

Prove that M , N and C lie on a straight line.

[4 marks]
