Name:

Exam Style Questions

Vectors

Corbettmaths

Ensure you have: Pencil, pen, ruler, protractor, pair of compasses and eraser

You may use tracing paper if needed

Guidance

1. Read each question carefully before you begin answering it.
2. Don't spend too long on one question.
3. Attempt every question.
4. Check your answers seem right.
5. Always show your workings

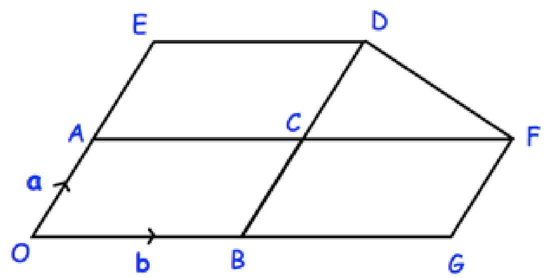
Revision for this topic

www.corbettmaths.com/contents

Video 353

1. In the diagram OBDE and OAFG are parallelograms.
B is the midpoint of OG.
A is the midpoint of OE.

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



(a) Express, in terms of **a** and **b**, the following vectors.
Give your answers in their simplest form.

(i) $\overrightarrow{OC}$

$\underline{a} + \underline{b}$ ....
(1)

(ii) $\overrightarrow{BA}$

$\underline{a} - \underline{b}$ ....
(1)

(iii) $\overrightarrow{DF}$

$\underline{b} - \underline{a}$ ....
(1)

(b) Show $\overrightarrow{EG}$ and $\overrightarrow{DF}$ are parallel.

$\overrightarrow{EG} = 2\underline{b} - 2\underline{a}$

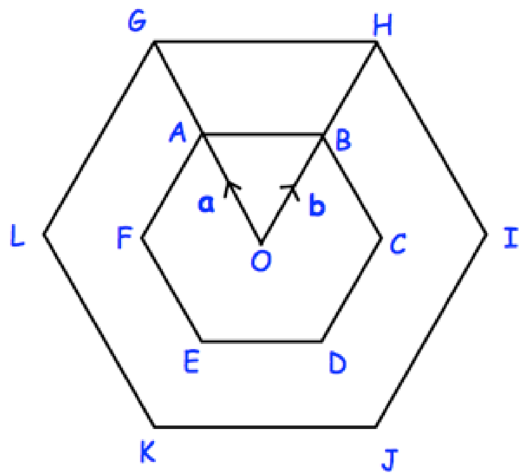
$\overrightarrow{DF} = \underline{b} - \underline{a}$

$\overrightarrow{EG} = 2\overrightarrow{DF}$

$\therefore$ they are parallel

(2)

2.



ABCDEF and GHIJKL are regular hexagons with centre O.
GHIJKL is an enlargement of ABCDEF, with scale factor 2.

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

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

$\underline{b} - \underline{a}$ ....
(1)

(b) Write the vector $\overrightarrow{OG}$ in terms of **a** and **b**.

$2\underline{a}$ ....
(1)

(c) Write the vector $\overrightarrow{OE}$ in terms of **a** and **b**.

$-\underline{b}$ ....
(1)

(d) Write the vector $\overrightarrow{FC}$ in terms of **a** and **b**.

$2\underline{b} - 2\underline{a}$
....
(1)

(e) Write the vector $\overrightarrow{IK}$ in terms of **a** and **b**.

$2\underline{a} - 4\underline{b}$
....
(1)

(f) Write the vector $\overrightarrow{LI}$ in terms of **a** and **b**.

$4\underline{b} - 4\underline{a}$
....
(1)

(g) Write the vector $\overrightarrow{LG}$ in terms of **a** and **b**.

$2\underline{b}$
....
(1)

(h) Write the vector $\overrightarrow{JG}$ in terms of **a** and **b**.

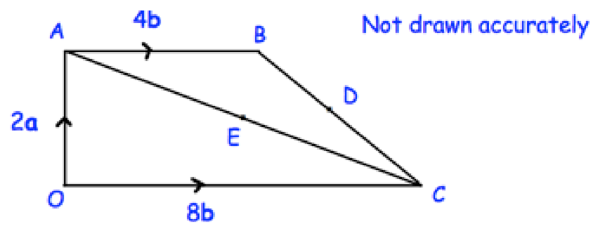
$4\underline{a}$
....
(1)

(i) Write the vector $\overrightarrow{DL}$ in terms of **a** and **b**.

$3\underline{a} - 2\underline{b}$
....
(1)

3. OABC is a trapezium.
Point D is the midpoint of BC.
Point E is the midpoint of AC.

$\overrightarrow{OA} = 2a$ $\overrightarrow{AB} = 4b$ and $\overrightarrow{OC} = 8b$



(a) Write these vectors in terms of **a** and **b**.

(i) $\overrightarrow{OB}$

$2\underline{a} + 4\underline{b}$ **(1)**

(ii) $\overrightarrow{AC}$

$8\underline{b} - 2\underline{a}$ **(1)**

(iii) $\overrightarrow{AE}$

$4\underline{b} - \underline{a}$ **(1)**

(b) Show $\overrightarrow{ED}$ and $\overrightarrow{OC}$ are parallel.

$\vec{OC} = 8\underline{b}$

$\vec{ED} = \underline{a} - 4\underline{b} + 4\underline{b} + \frac{1}{2}(-4b - 2\underline{a} + 8\underline{b})$

$\vec{ED} = \underline{a} - 4\underline{b} + 4\underline{b} - 2\underline{b} - \underline{a} + 4\underline{b}$

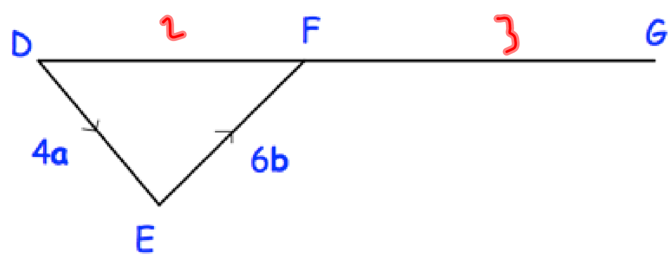
(3)

$\vec{ED} = 2\underline{b}$ $\vec{OC} = 4\vec{ED}$

$\therefore$ parallel

4. DFG is a straight line.

$\overrightarrow{DE} = 4a$ and $\overrightarrow{EF} = 6b$



(a) Write down the vector $\overrightarrow{DF}$ in terms of **a** and **b**

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

....

(1)

(b) DF : FG = 2:3

Work out the vector $\overrightarrow{DG}$ in terms of **a** and **b**
Give your answer in its simplest form.

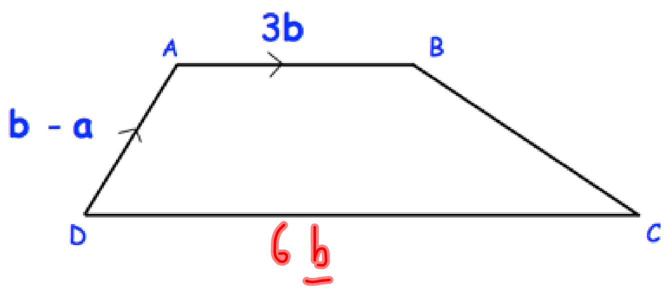
$(2\underline{a} + 3\underline{b}) \times 5$

$10\underline{a} + 15\underline{b}$

....

(2)

5. ABCD is a trapezium



AB and DC are parallel.
DC = 2AB

(a) Write down the vector $\overrightarrow{DC}$ in terms of **a** and **b**

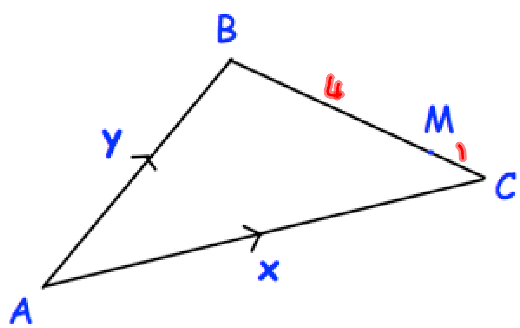
$6\underline{b}$
(1)

(b) Work out the vector $\overrightarrow{BC}$ in terms of **a** and **b**
Give your answer in its simplest form.

$-3\underline{b} - \underline{b} + \underline{a} + 6\underline{b}$

$2\underline{b} + \underline{a}$
(2)

6.



ABC is a triangle.
M lies on BC such that BM = $\frac{4}{5}$ BC

Express these vectors in terms of **x** and **y**

(a) $\overrightarrow{BC}$

$-\underline{y}+\underline{x}$ .... **(1)**

(b) $\overrightarrow{BM}$

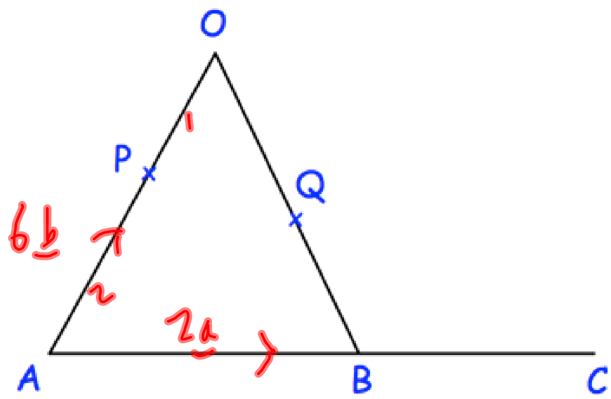
$-\frac{4}{5}\underline{y}+\frac{4}{5}\underline{x}$ .... **(1)**

(c) $\overrightarrow{AM}$

$\underline{y}-\frac{4}{5}\underline{y}+\frac{4}{5}\underline{x}$

$\frac{1}{5}\underline{y}+\frac{4}{5}\underline{x}$ .... **(1)**

7.



AOB is a triangle.
P is a point on AO.

$\overrightarrow{AB} = 2a$ $\qquad$ $\overrightarrow{AO} = 6b$ $\qquad$ AP:PO = 2:1

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

$2\underline{a} - 6\underline{b}$

(1)

Q is the midpoint of OB.
B is the midpoint of AC.

(b) Show PQC is a straight line.

$\overrightarrow{PQ} = 2\underline{b} + \underline{a} - 3\underline{b}$

$\overrightarrow{PQ} = \underline{a} - \underline{b}$

$\overrightarrow{QC} = \underline{a} - 3\underline{b} + 2\underline{a}$

$\overrightarrow{QC} = 3\underline{a} - 3\underline{b}$

$\overrightarrow{QC} = 3\overrightarrow{PQ}$

QC and PQ are parallel and also both pass through the point Q, therefore PQC must be a straight line. (co-linear)

(3)