

IGCSE EDXCEL O'LEVEL MATHEMATICS-B TOPIC WISE QUESTION PAPERS
VECTORS P2

1.

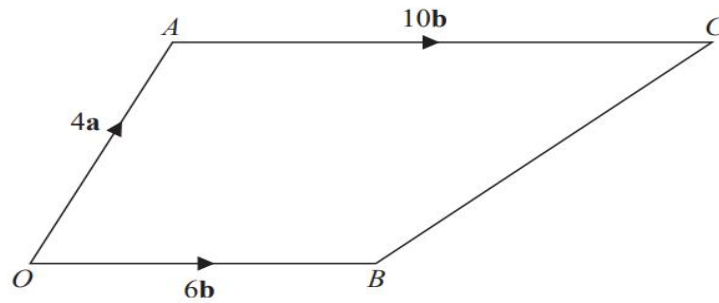


Diagram **NOT**
accurately drawn

Figure 4

Figure 4 shows a trapezium $OACB$.

$$\vec{OA} = 4\mathbf{a} \quad \vec{OB} = 6\mathbf{b} \quad \vec{AC} = 10\mathbf{b}$$

P is the point on AB such that OPC is a straight line.

Find an expression for $\vec{PC}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.
Give your answer in its simplest form.

(6)

June2020/Q7

2.

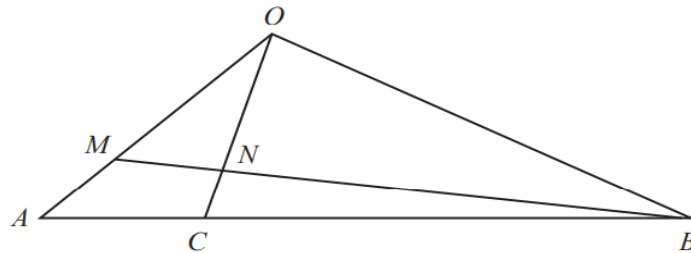


Diagram **NOT**
accurately drawn

Figure 2

Figure 2 shows the triangle OAB in which $\vec{OA} = 3\mathbf{a}$ and $\vec{OB} = 15\mathbf{b}$

C is the point on AB such that $\vec{AC} = \frac{1}{3} \vec{AB}$

N is the point on OC such that $\vec{ON} = \frac{3}{4} \vec{OC}$

(a) Find and simplify an expression for $\vec{BN}$ in terms of $\mathbf{a}$ and $\mathbf{b}$

(3)

M is the point on OA such that B , N and M are collinear.

(b) Find the ratio $OM : MA$
Show your working clearly.

June2023/12

3.

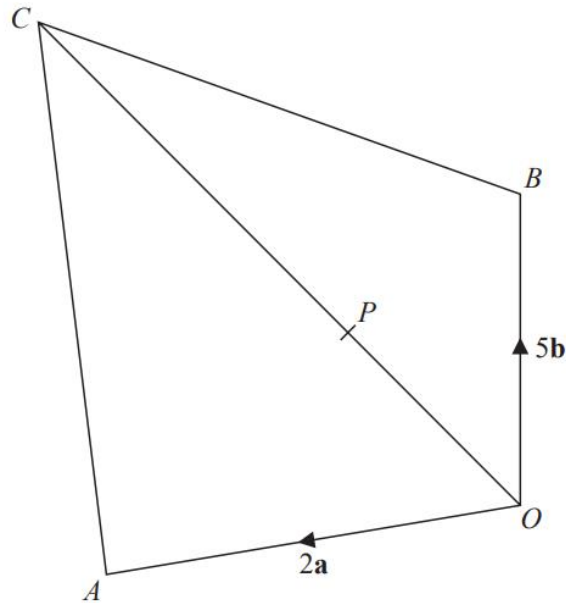


Diagram **NOT**
accurately drawn

Figure 1

In Figure 1, $OACB$ is a quadrilateral in which $\vec{OA} = 2\mathbf{a}$ and $\vec{OB} = 5\mathbf{b}$

(a) Find $\vec{AB}$ in terms of $\mathbf{a}$ and $\mathbf{b}$

(1)

P is the point on OC such that $OP : PC = 1 : 4$

Given that $\vec{BC} = 6\mathbf{a} + 5\mathbf{b}$

(b) (i) prove that A , P and B are collinear,

(ii) find a value of m and a value of n such that $AP : PB = m : n$

(5)

June2021/Q4

4.

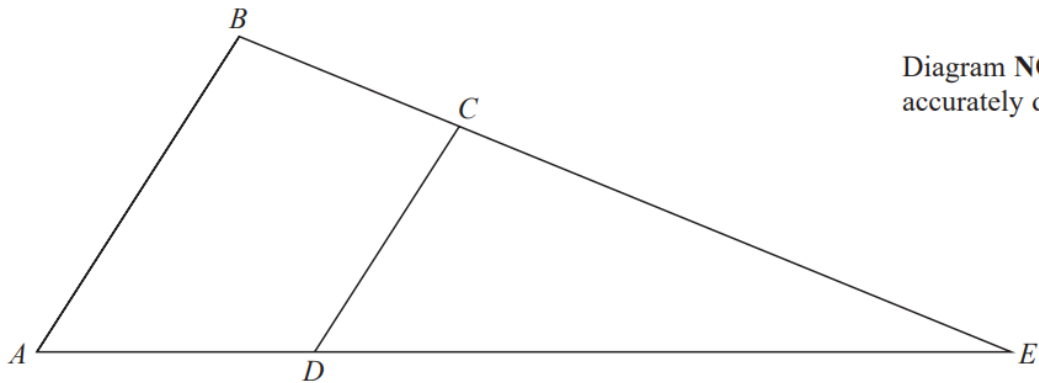


Diagram **NOT**
accurately drawn

Figure 1

Figure 1 shows quadrilateral $ABCD$ such that $\vec{AB} = \mathbf{a}$ and $\vec{AD} = \mathbf{b}$

E is the point such that ADE and BCE are straight lines.

Given that $\vec{BC} = \mathbf{b} - \frac{1}{3}\mathbf{a}$

(a) show that AB is parallel to DC (2)

Given also that λ is a scalar such that $\vec{BE} = \lambda\mathbf{b} - \mathbf{a}$

(b) find the value of λ (2)

The area of triangle ABE is x square units.

Given that the area of quadrilateral $ABCD$ is P square units,

(c) find an expression for P in terms of x (3)

June2022/Q7

5.

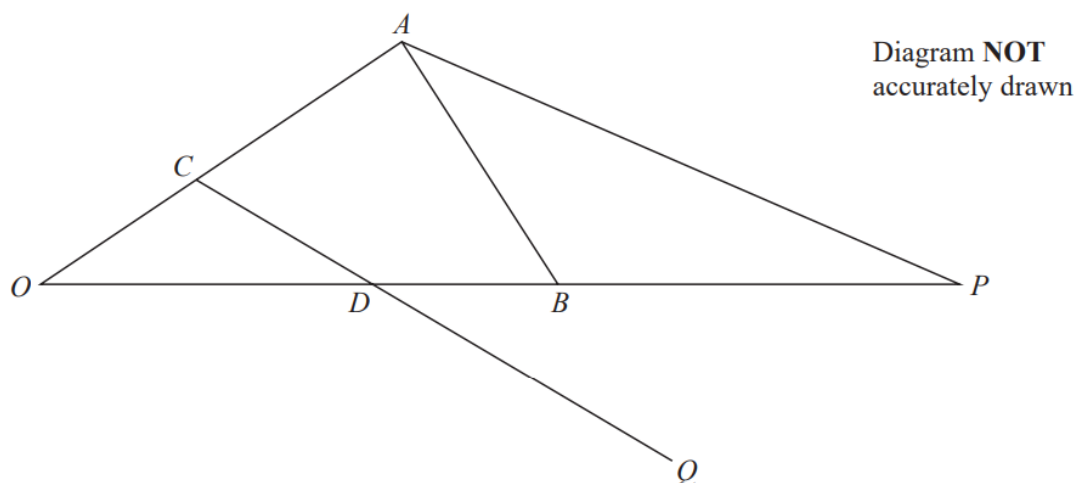


Figure 2

Figure 2 shows the triangle OAB with $\vec{OA} = 2\mathbf{a}$ and $\vec{OB} = 3\mathbf{b}$

The point C lies on OA such that $\vec{OC} = \frac{1}{3}\vec{OA}$

The point D lies on OB such that $\vec{OD} = \frac{2}{3}\vec{OB}$

(a) Find $\vec{CD}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.

(2)

The point P is such that $ODBP$ is a straight line and AP is parallel to CD .

(b) Find $\vec{OP}$ in terms of $\mathbf{b}$.

(4)

The point Q is such that $\vec{CD} = \vec{DQ}$

(c) Show that A , B and Q are collinear.

(4)

January 2019/Q8

6.

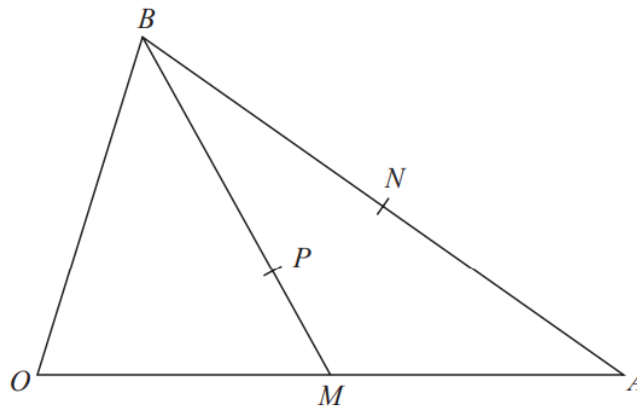


Diagram **NOT**
accurately drawn

Figure 3

Figure 3 shows the triangle OAB where $\vec{OA} = 12\mathbf{a}$ and $\vec{OB} = 6\mathbf{b}$
 M is the midpoint of OA and N is the midpoint of AB .

The point P on BM is such that $BP : PM = 2 : 1$

(a) Simplifying your answer, find, in terms of $\mathbf{a}$ and $\mathbf{b}$

(i) $\vec{BM}$ (ii) $\vec{OP}$

(3)

(b) Hence show that O , P and N are collinear.

(4)

Given that $|\mathbf{a}| = |\mathbf{b}| = 1 \text{ cm}$ and that $\angle AOB = 70^\circ$

(c) find the length, in cm to 3 significant figures, of OP .

(3)

January 2021/Q10

7.

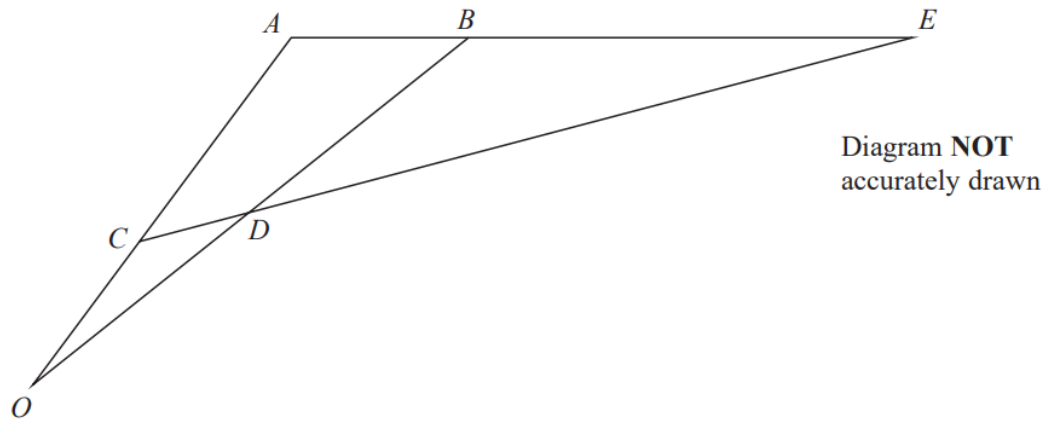


Figure 1

Figure 1 shows triangle OAB

Given that $\vec{OA} = \mathbf{a}$ and $\vec{OB} = \mathbf{b}$

(a) find $\vec{AB}$ in terms of $\mathbf{a}$ and $\mathbf{b}$

(1)

The point C lies on OA such that $OC:OA = 1:3$

The point D lies on OB such that $\vec{OD} = \frac{2}{5} \vec{OB}$

Given that the point E is such that ABE and CDE are straight lines,

(b) find and simplify an expression, in terms of $\mathbf{a}$ and $\mathbf{b}$, for $\vec{AE}$

(6)

January 2022/Q5

8.

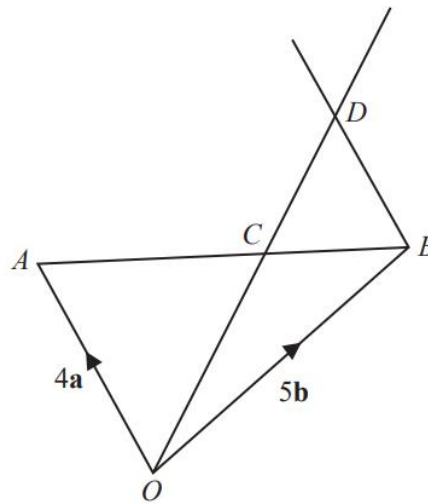


Diagram **NOT**
accurately drawn

Figure 4

Figure 4 shows triangle OAB

The point C lies on AB such that $AC = \frac{3}{5}AB$

Given that $\vec{OA} = 4\mathbf{a}$ and $\vec{OB} = 5\mathbf{b}$

- (a) find an expression for $\vec{OC}$ in terms of $\mathbf{a}$ and $\mathbf{b}$
Give your answer in its simplest form.

(3)

The point D is such that OCD is a straight line.

Given that BD is parallel to OA

- (b) use a vector method to find an expression for $\vec{OD}$ in terms of $\mathbf{a}$ and $\mathbf{b}$
Give your answer in its simplest form.

(4)

January 2023/Q6

9.

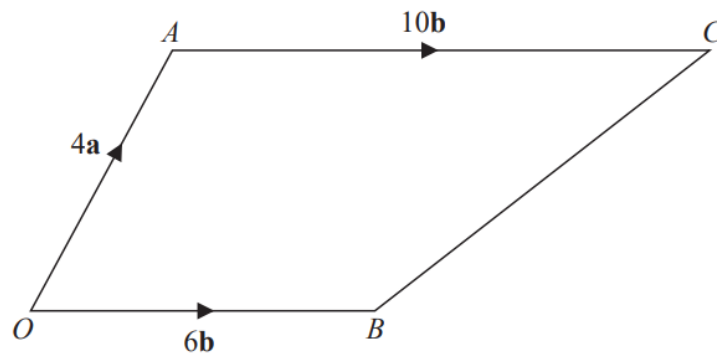


Diagram **NOT**
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Figure 4

Figure 4 shows a trapezium $OACB$.

$$\vec{OA} = 4\mathbf{a} \quad \vec{OB} = 6\mathbf{b} \quad \vec{AC} = 10\mathbf{b}$$

P is the point on AB such that OPC is a straight line.

Find an expression for $\vec{PC}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.
Give your answer in its simplest form.

October2020/Q7

10.

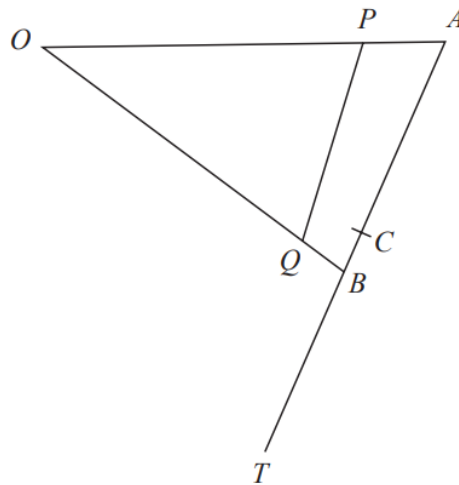


Diagram **NOT**
accurately drawn

Figure 3

Figure 3 shows the triangle OAB in which $\overrightarrow{OA} = 4\mathbf{a}$ and $\overrightarrow{OB} = 6\mathbf{b}$

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

(a) Find and simplify an expression for $\overrightarrow{OC}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.

(3)

The point T is such that ABT is a straight line and $AC = CT$.

The point P is such that $\overrightarrow{OP} = \frac{3}{4} \overrightarrow{OA}$

Q is the point on OB such that the points P , Q and T are collinear.

Given that $OQ:QB = n:1$

(b) find the value of n .

(4)

October 2021/Q10

11.

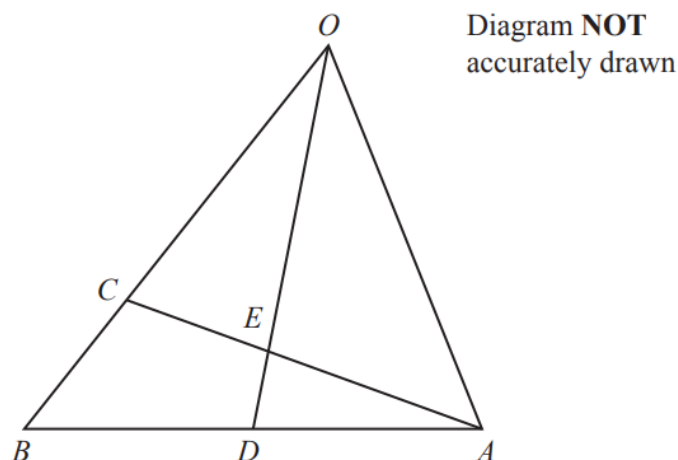


Figure 2

Figure 2 shows triangle OAB with $\vec{OA} = 4\mathbf{a}$ and $\vec{OB} = 3\mathbf{b}$

The point C lies on OB such that $\vec{OC} = 2\mathbf{b}$

The point D is the midpoint of AB

The point E lies on AC such that OED is a straight line.

(a) Find, in terms of $\mathbf{a}$ and $\mathbf{b}$, simplifying your answer where possible,

(i) $\vec{CA}$ (ii) $\vec{AB}$ (iii) $\vec{OD}$

(4)

Given that $CE = \lambda CA$

(b) use a vector method to find the value of λ

(4)

The point P is such that $\vec{OP} = \mu\vec{OD}$ where $\mu > 1$ and $\vec{AP}$ is parallel to $\vec{OB}$

Given that the area of triangle OCE is 8 cm^2

(c) find the area, in cm^2 , of triangle APE

(4)

October 2023/Q9

12.

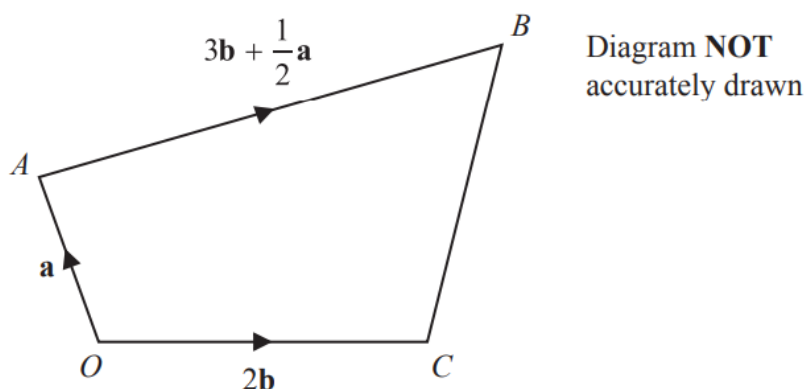


Figure 3

Figure 3 shows quadrilateral $OABC$

$$\vec{OA} = \mathbf{a} \quad \vec{AB} = 3\mathbf{b} + \frac{1}{2}\mathbf{a} \quad \vec{OC} = 2\mathbf{b}$$

The point D lies on OB such that $\vec{OD} = \frac{3}{5}\vec{OB}$

(a) Find a simplified expression for $\vec{AD}$ in terms of $\mathbf{a}$ and $\mathbf{b}$

(3)

The point E lies on CB such that $\vec{CE} = k\vec{CB}$

Given that ADE is a straight line

(b) (i) find the value of k

(4)

(ii) find the ratio $AD : DE$ in the form $x : y$ where x and y are integers.

(2)

October 2024/Q7/P2