

BGCSE EXTENDED – Vectors

1. The vectors $\mathbf{p}$ and $\mathbf{q}$ are defined as $\mathbf{p} = \begin{pmatrix} -7 \\ 24 \end{pmatrix}$ and $\mathbf{q} = \begin{pmatrix} 12 \\ -5 \end{pmatrix}$.

Find the column vector for

- (i) $3\mathbf{q}$,

Ans:

[1]

- (ii) $\mathbf{p} - \mathbf{q}$

Ans:

[1]

2. The vectors $\mathbf{p}$ and $\mathbf{q}$ are defined as $\mathbf{p} = \begin{pmatrix} 12 \\ -5 \end{pmatrix}$ and $\mathbf{q} = \begin{pmatrix} -6 \\ 5 \end{pmatrix}$.

Calculate

- (i) the column vector $\mathbf{p} + 2\mathbf{q}$,

Ans:

[2]

3. $\vec{OA}$ and $\vec{OB}$ are position vectors relative to the origin O .

Given the points $A(3, -1)$ and $B(-1, 2)$

- (a) write $\vec{OA}$ and $\vec{OB}$ as column vectors,

Ans:

[2]

- (b) express $\vec{AB}$ as a column vector,

Ans:

[2]

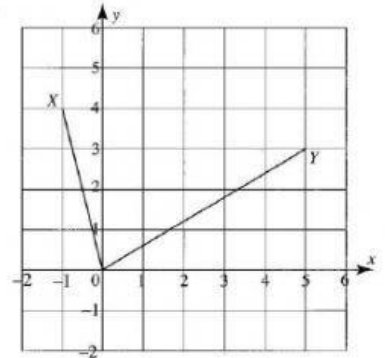
4. The graph shows the position vectors $\vec{OX}$ and $\vec{OY}$.

- (a) Write down the column vectors for $\vec{OX}$ and $\vec{OY}$.

Ans:

- (b) Express $\vec{XY}$ as a column vector.

Ans:



- 5.(a) Write and simplify an expression in terms of $\mathbf{a}$, $\mathbf{b}$ and/or $\mathbf{c}$ for

- (i) $\vec{AC}$

Ans:

- (ii) $\vec{BX}$

Ans:

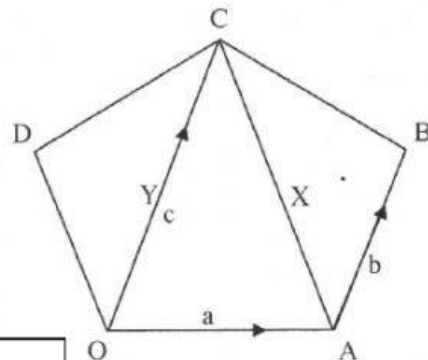
- (iii) $\vec{XY}$

Ans:

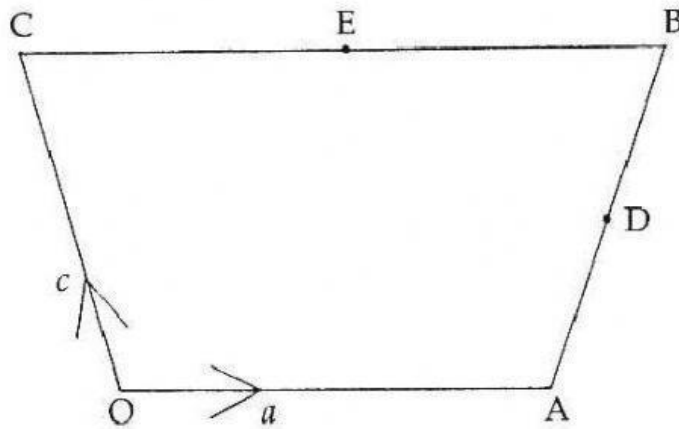
- (b) State two geometrical properties of $\vec{XY}$ and $\vec{OA}$.

Ans: 1.

Ans: 2.



6.



not to scale

In the figure, OABC is a trapezium with $OA = a$, $OC = c$ and CB is parallel to, and twice the length of OA. The points D and E are the mid-points of AB and CB respectively.

(a) Find, in terms of a and/or c

(i) $\vec{CB}$, Ans: [1]

(ii) $\vec{CA}$, Ans: [1]

(iii) $\vec{AB}$, Ans: [1]

(iv) $\vec{DB}$, Ans: [1]

(v) $\vec{AE}$, Ans: [1]

(b) Express $\vec{ED}$ in terms of a and c . Ans: [2]

(c) State two geometrical relationships between CA and ED, giving reasons for your answers. Ans: Ans: [4]

(d) Give the special name of the quadrilateral OAEC. Ans: [1]