

## 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]

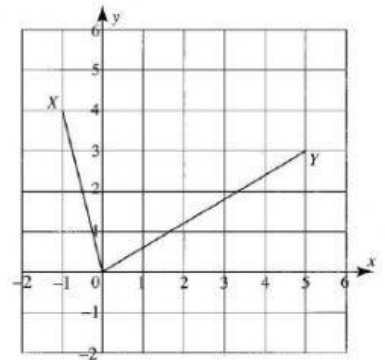
4. The graph shows the position vectors  $\vec{OX}$  and  $\vec{OY}$ .

(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)  $\vec{AC}$

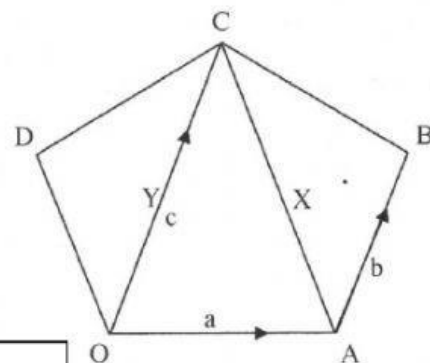
Ans:

(ii)  $\vec{BX}$

Ans:

(iii)  $\vec{XY}$

Ans:

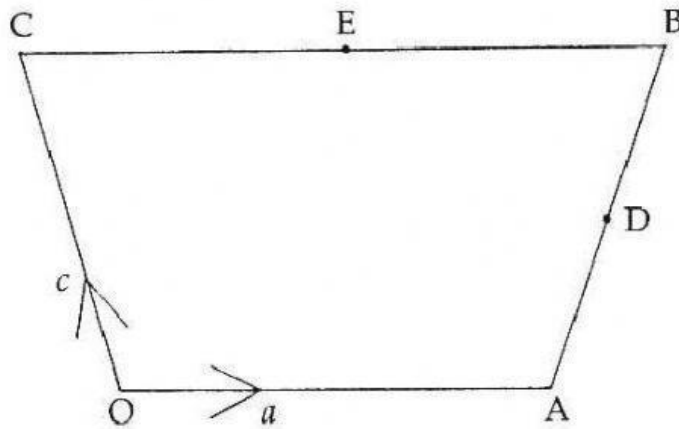


- (b) State two geometrical properties of  $XY$  and  $OA$ .

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]