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A LEVEL MATHS

(60) Vectors (Position and Direction Vectors)

WORKING AT D/E

(1) Points A and B have coordinates $(3,7)$ and $(4\ -8)$ respectively.

(a) Write down the position vectors $\overrightarrow{OA}$ and $\overrightarrow{OB}$.

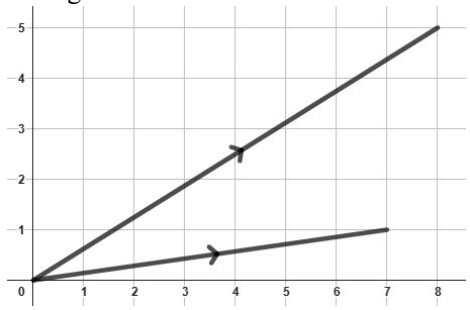
(b) Find the direction vector $\overrightarrow{AB}$.

(c) Hence, write down the vector $\overrightarrow{BA}$.

(d) Find the modulus of $\overrightarrow{AB}$ in exact form.

(e) Find the angle the vector $\overrightarrow{OA}$ makes with the positive x axes.

(2) The diagram shows the vectors $\overrightarrow{OA}$ and $\overrightarrow{OB}$.



(a) Given that $\left|\overrightarrow{OA}\right| = 5\sqrt{2}$, find the coordinates of the vector B.

(b) Explain why $\overrightarrow{BA}$ can be written as $\begin{pmatrix}1\\4\end{pmatrix}$.

(c) Find $\left|\overrightarrow{AB}\right| =$

(3) Given that $\overrightarrow{OC} = \begin{pmatrix}-4\\8\end{pmatrix}$ and $\overrightarrow{CD} = \begin{pmatrix}2\\6\end{pmatrix}$, find $\overrightarrow{OD}$ in the form $\begin{pmatrix}p\\q\end{pmatrix}$

WORKING AT B/C

(1) Given that $\overrightarrow{OA} = \begin{pmatrix}-4\\8\end{pmatrix}$ and $\overrightarrow{AB} = \begin{pmatrix}-3\\-2\end{pmatrix}$,

(a) Find $\left|\overrightarrow{OB}\right|$ in the form $\sqrt{p}$

(b) Find the angle $\overrightarrow{OB}$ makes with the vector **-i** .

(c) $OBAC$ is a parallelogram. Find the coordinates of C.

(2) $OABC$ is a kite.

$\left|\overrightarrow{OA}\right| = \left|\overrightarrow{OC}\right|$ and $\left|\overrightarrow{AB}\right| = \left|\overrightarrow{BC}\right|$

$\overrightarrow{OA}$ = -2**i** – 6**j** and $\overrightarrow{AB}$ = 2**i** − 4**j**

(a) Find $\overrightarrow{OC}$

(b) Find the area of the kite $OABC$

(3) $\overrightarrow{OC} = \begin{pmatrix}2\\1\end{pmatrix}$ and $\overrightarrow{OD} = \begin{pmatrix}p\\q\end{pmatrix}$

Given that $\overrightarrow{DC} = \begin{pmatrix}8\\-3\end{pmatrix}$, find $\left|\overrightarrow{OD}\right|$

WORKING AT A*/A

(1) A circle has equation $x^2 + y^2 = 25$. The point P lines on the circle and has position vector $\overrightarrow{OP} = \begin{pmatrix}6m\\8m\end{pmatrix}$ where m is a constant. Find the possible coordinates of the point P.

(2) $\overrightarrow{OA}$ = -10**i** and $\overrightarrow{OB}$ = -6**i** – 10**j**

(a) Find $\left|\overrightarrow{OA}\right|$ and $\left|\overrightarrow{OB}\right|$

(b) Prove that ΔOAB is not an isosceles triangle.

(c) Find the area of ΔOAB

(3) $\overrightarrow{OA}$ = 5**i** – 6**j** and $\overrightarrow{AB}$ is parallel to the vector **j**. Given that $\overrightarrow{OB} = p$**i** where p is a constant, find $\overrightarrow{AB}$.