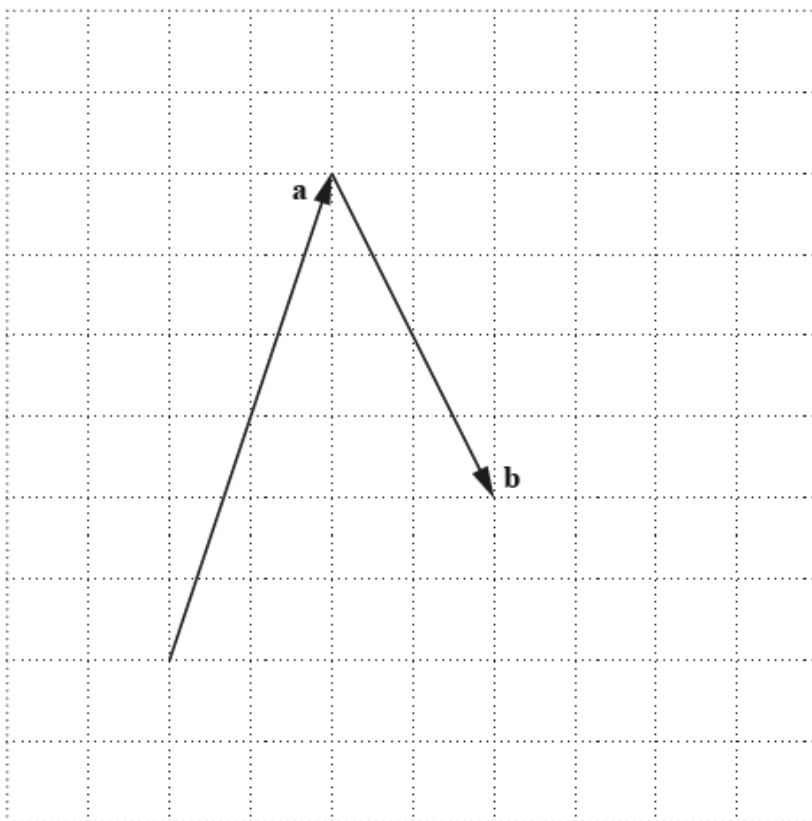


Vectors Exam Questions

Q1, (OCR H240/02, Practice Paper Set 1, Q1)

Vectors \mathbf{a} and \mathbf{b} are defined as follows: $\mathbf{a} = 2\mathbf{i} + 6\mathbf{j}$ and $\mathbf{b} = 2\mathbf{i} - 4\mathbf{j}$.

- (i) Given that $p\mathbf{a} + q\mathbf{b} = 6\mathbf{i} - 7\mathbf{j}$, find the values of the constants p and q . [3]
- (ii) It is now given instead that $|\mathbf{a} + k\mathbf{b}| = 5$. Use the diagram in the Printed Answer Booklet to find the two possible values of the constant k . [4]



Q2, (OCR H230/02, Specimen Question Paper, Q4)

The points A, B and C have position vectors $\begin{pmatrix} -2 \\ 1 \end{pmatrix}$, $\begin{pmatrix} 2 \\ 5 \end{pmatrix}$ and $\begin{pmatrix} 6 \\ 3 \end{pmatrix}$ respectively. M is the midpoint of BC .

- (i) Find the position vector of the point D such that $\overline{BC} = \overline{AD}$. [3]
- (ii) Find the magnitude of \overline{AM} . [3]

Q3, (OCR H230/01, Practice Paper Set 1, Q7)

The point A has position vector $\mathbf{i} - 2\mathbf{j}$. The point B is such that $|\overrightarrow{OB}| = |\overrightarrow{OA}|$ and \overrightarrow{OB} is perpendicular to \overrightarrow{OA} .

- (i) (a) Find $|\overrightarrow{OB}|$. [2]
- (b) Find the two possible directions of \overrightarrow{OB} , giving your answers correct to the nearest degree. [2]

The point C is such that $|\overrightarrow{AC}| = 2$.

- (ii) Find the maximum and minimum values of $|\overrightarrow{OC}|$. [4]

Q4, (OCR 4761, Jun 2008, Q2)

A particle has a position vector \mathbf{r} , where $\mathbf{r} = 4\mathbf{i} - 5\mathbf{j}$ and \mathbf{i} and \mathbf{j} are unit vectors in the directions east and north respectively.

(i) Sketch \mathbf{r} on a diagram showing \mathbf{i} and \mathbf{j} and the origin O . [1]

(ii) Calculate the magnitude of \mathbf{r} and its direction as a bearing. [4]

(iii) Write down the vector that has the same direction as \mathbf{r} and three times its magnitude. [1]

Q5, (OCR 4761, Jan 2012, Q5)

The vectors \mathbf{p} and \mathbf{q} are given by

$$\mathbf{p} = 8\mathbf{i} + \mathbf{j} \quad \text{and} \quad \mathbf{q} = 4\mathbf{i} - 7\mathbf{j}.$$

(i) Show that \mathbf{p} and \mathbf{q} are equal in magnitude. [3]

(ii) Show that $\mathbf{p} + \mathbf{q}$ is parallel to $2\mathbf{i} - \mathbf{j}$. [2]

(iii) Draw $\mathbf{p} + \mathbf{q}$ and $\mathbf{p} - \mathbf{q}$ on a set of axes.

Write down the angle between these two vectors. [3]
