



AS Mathematics Exam Questions by Topic
Chapter 12: Vectors

These questions are taken from the Specimen Exam materials and the real 2018 papers for the new syllabus AS and A-level mathematics courses and arranged by chapter of the textbooks by Goldie et al (available here: <https://amzn.to/39umfr5> and <https://amzn.to/3hE8kBL>). There are a mixture of questions from OCR A, OCR B (MEI), Edexcel and AQA. Although the style of questions varies a little across the exam boards the content of the syllabus is almost identical so these are suitable for students preparing for any exam board.

Free problem sets for all other chapters, as well as video solutions, full past papers and other content for GCSE and A-level maths can be found at:

<https://mathsaurus.com/>

AQA AS Sample Paper 1 Question 13:

- 13 (a)** The unit vectors \mathbf{i} and \mathbf{j} are perpendicular.
Find the magnitude of the vector $-20\mathbf{i} + 21\mathbf{j}$
Circle your answer.

[1 mark]

-1 1 $\sqrt{41}$ 29

- 13 (b)** The angle between the vector \mathbf{i} and the vector $-20\mathbf{i} + 21\mathbf{j}$ is θ
Which statement about θ is true?
Circle your answer.

[1 mark]

$0^\circ < \theta < 45^\circ$ $45^\circ < \theta < 90^\circ$ $90^\circ < \theta < 135^\circ$ $135^\circ < \theta < 180^\circ$

Edexcel AS 2018 Paper 1 Question 3:

3. Given that the point A has position vector $4\mathbf{i} - 5\mathbf{j}$ and the point B has position vector $-5\mathbf{i} - 2\mathbf{j}$,

(a) find the vector \vec{AB} , (2)

(b) find $|\vec{AB}|$.

Give your answer as a simplified surd. (2)

Edexcel AS Sample Paper 1 Question 3:

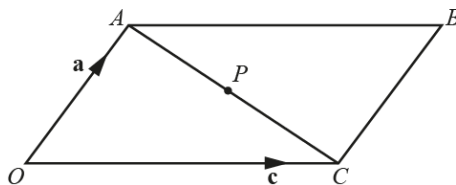
3. Given that the point A has position vector $3\mathbf{i} - 7\mathbf{j}$ and the point B has position vector $8\mathbf{i} + 3\mathbf{j}$,

(a) find the vector \vec{AB} (2)

(b) Find $|\vec{AB}|$. Give your answer as a simplified surd. (2)

OCR A AS 2018 Paper 1 Question 7:

7 $OABC$ is a parallelogram with $\vec{OA} = \mathbf{a}$ and $\vec{OC} = \mathbf{c}$. P is the midpoint of AC .



(i) Find the following in terms of \mathbf{a} and \mathbf{c} , simplifying your answers.

(a) \vec{AC} [1]

(b) \vec{OP} [2]

(ii) Hence prove that the diagonals of a parallelogram bisect one another. [4]

OCR A AS Sample Paper 2 Question 4:

- 4 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]

OCR A Sample Paper 1 Question 2:

- 2 The points A , B and C have position vectors $3\mathbf{i} - 4\mathbf{j} + 2\mathbf{k}$, $-\mathbf{i} + 6\mathbf{k}$ and $7\mathbf{i} - 4\mathbf{j} - 2\mathbf{k}$ respectively. M is the midpoint of BC .
- (i) Show that the magnitude of \overline{OM} is equal to $\sqrt{17}$. [2]
- (ii) Point D is such that $\overline{BC} = \overline{AD}$. Show that position vector of the point D is $11\mathbf{i} - 8\mathbf{j} - 6\mathbf{k}$. [3]

OCR B MEI AS Sample Paper 1 Question 6:

- 6 Two points, A and B , have position vectors $\mathbf{a} = \mathbf{i} - 3\mathbf{j}$ and $\mathbf{b} = 4\mathbf{i} + 3\mathbf{j}$. The point C lies on the line $y = 1$. The lengths of the line segments AC and BC are equal. Determine the position vector of C . [4]

OCR B MEI Sample Paper 3 Question 3:

- 3 Show that points $A(1, 4, 9)$, $B(0, 11, 17)$ and $C(3, -10, -7)$ are collinear. [4]
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