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**A Level Mathematics Year 2 Exam Questions by Topic**  
**Chapter 12: Vectors**

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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/>

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AQA 2018 Paper 2 Question 14:

**14** A quadrilateral has vertices  $A$ ,  $B$ ,  $C$  and  $D$  with position vectors given by

$$\vec{OA} = \begin{bmatrix} 3 \\ 5 \\ 1 \end{bmatrix}, \vec{OB} = \begin{bmatrix} -1 \\ 2 \\ 7 \end{bmatrix}, \vec{OC} = \begin{bmatrix} 0 \\ 7 \\ 6 \end{bmatrix} \text{ and } \vec{OD} = \begin{bmatrix} 4 \\ 10 \\ 0 \end{bmatrix}$$

**14 (a)** Write down the vector  $\vec{AB}$

[1 mark]

**14 (b)** Show that  $ABCD$  is a parallelogram, but not a rhombus.

[5 marks]

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Edexcel 2018 Paper 2 Question 2:

2. Relative to a fixed origin  $O$ ,

the point  $A$  has position vector  $(2\mathbf{i} + 3\mathbf{j} - 4\mathbf{k})$ ,

the point  $B$  has position vector  $(4\mathbf{i} - 2\mathbf{j} + 3\mathbf{k})$ ,

and the point  $C$  has position vector  $(a\mathbf{i} + 5\mathbf{j} - 2\mathbf{k})$ , where  $a$  is a constant and  $a < 0$

$D$  is the point such that  $\overrightarrow{AB} = \overrightarrow{BD}$ .

(a) Find the position vector of  $D$ .

(2)

Given  $|\overrightarrow{AC}| = 4$

(b) find the value of  $a$ .

(3)

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Edexcel Sample Paper 1 Question 7:

7.

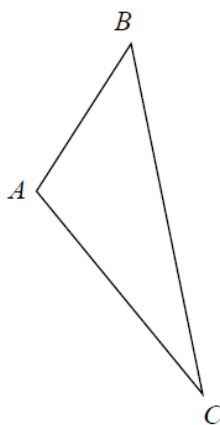


Figure 2

Figure 2 shows a sketch of a triangle  $ABC$ .

Given  $\overrightarrow{AB} = 2\mathbf{i} + 3\mathbf{j} + \mathbf{k}$  and  $\overrightarrow{BC} = \mathbf{i} - 9\mathbf{j} + 3\mathbf{k}$ ,

show that  $\angle BAC = 105.9^\circ$  to one decimal place.

(5)

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OCR A 2018 Paper 2 Question 2:

2 The points  $A$  and  $B$  have position vectors  $\begin{pmatrix} 1 \\ -2 \\ 5 \end{pmatrix}$  and  $\begin{pmatrix} -3 \\ -1 \\ 2 \end{pmatrix}$  respectively.

(i) Find the exact length of  $AB$ . [2]

(ii) Find the position vector of the midpoint of  $AB$ . [1]

The points  $P$  and  $Q$  have position vectors  $\begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix}$  and  $\begin{pmatrix} 5 \\ 1 \\ 3 \end{pmatrix}$  respectively.

(iii) Show that  $ABPQ$  is a parallelogram. [3]

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OCR B MEI 2018 Paper 3 Question 10:

10 Point A has position vector  $\begin{pmatrix} a \\ b \\ 0 \end{pmatrix}$  where  $a$  and  $b$  can vary, point B has position vector  $\begin{pmatrix} 4 \\ 2 \\ 0 \end{pmatrix}$  and point C has position vector  $\begin{pmatrix} 2 \\ 4 \\ 2 \end{pmatrix}$ . ABC is an isosceles triangle with  $AC = AB$ .

(i) Show that  $a - b + 1 = 0$ . [4]

(ii) Determine the position vector of A such that triangle ABC has minimum area. [6]