

Vector Equation of Straight Line

Difficulty: Easy

Question Paper 1

Level	A Level
Subject	Maths Pure 3
Exam Board	CIE
Topic	Vectors
Sub-Topic	Vector Equation of Straight Line
Difficulty	Easy
Booklet	Question Paper 1

Time allowed: 24 minutes

Score: /17

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E
>90%	81%	70%	58%	46%	34%

Question 1

With respect to the origin O , the points A and B have position vectors given by $\vec{OA} = \mathbf{i} + 2\mathbf{j} + 2\mathbf{k}$ and $\vec{OB} = 3\mathbf{i} + 4\mathbf{j}$. The point P lies on the line AB and OP is perpendicular to AB .

(i) Find a vector equation for the line AB . [1]

(ii) Find the position vector of P . [4]

Question 2

The line l has vector equation $\mathbf{r} = \mathbf{i} + 2\mathbf{j} + \mathbf{k} + \lambda(2\mathbf{i} - \mathbf{j} + \mathbf{k})$.

(i) Find the position vectors of the two points on the line whose distance from the origin is $\sqrt{10}$. [5]

Question 3

The points A , B and C have position vectors, relative to the origin O , given by

$$\vec{OA} = \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix}, \quad \vec{OB} = \begin{pmatrix} 3 \\ 0 \\ 1 \end{pmatrix} \quad \text{and} \quad \vec{OC} = \begin{pmatrix} 1 \\ 1 \\ 4 \end{pmatrix}.$$

- (i) Find a vector equation for the line passing through A and B . [2]

Question 4

The point P has position vector $3\mathbf{i} - 2\mathbf{j} + \mathbf{k}$. The line l has equation $\mathbf{r} = 4\mathbf{i} + 2\mathbf{j} + 5\mathbf{k} + \mu(\mathbf{i} + 2\mathbf{j} + 3\mathbf{k})$.

- (i) Find the length of the perpendicular from P to l , giving your answer correct to 3 significant figures. [5]