
- 11** With respect to the origin O , the points A, B, C and D have position vectors given by

$$\overrightarrow{OA} = \begin{pmatrix} 1 \\ 5 \\ 3 \end{pmatrix}, \quad \overrightarrow{OB} = \begin{pmatrix} 0 \\ 4 \\ 1 \end{pmatrix}, \quad \overrightarrow{OC} = \begin{pmatrix} 1 \\ -3 \\ 1 \end{pmatrix} \quad \text{and} \quad \overrightarrow{OD} = \begin{pmatrix} 3 \\ -5 \\ 4 \end{pmatrix}.$$

The line m passes through the points A and B .

- (a)** Find a vector equation for m .

[2]

[illegible]

- (b) Find the position vector of the point of intersection of m and the line passing through the points C and D . [4]

[illegible]

(c) Find the position vector of the foot of the perpendicular from C to m . [4]

Blank lined paper for writing.

If you use the following page to complete the answer to any question, the question number must be clearly shown.

This image shows a full page of primary-ruled paper. It features multiple sets of horizontal dashed lines spaced evenly down the page, providing a guide for handwriting practice. The background is white, and there are no margins or other markings present.

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- (a)** Find a vector equation for the line l_1 .

[illegible]

The line l_2 has equation $\mathbf{r} = 2\mathbf{i} + \mathbf{j} + 5\mathbf{k} + \mu(\mathbf{i} + 2\mathbf{j} + 3\mathbf{k})$.

- (b) Show that l_1 and l_2 do **not** intersect.

[illegible]

(c) Find the acute angle between the directions of l_1 and l_2 . [3]

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$$\overrightarrow{OA} = \begin{pmatrix} 1 \\ -4 \\ 2 \end{pmatrix},$$

$$\overrightarrow{OB} = \begin{pmatrix} -2 \\ 1 \\ 3 \end{pmatrix}$$

and

$$\overrightarrow{OC} = \begin{pmatrix} 2 \\ 3 \\ 5 \end{pmatrix}.$$

(a)

[2]

[illegible]

(b)

[4]

Handwriting practice lines (dotted lines) for the letter 'a'.

(c) Hence find the exact area of triangle ABC .

[3]