Advanced Higher Maths
SQA 2016 Exemplar
Question 16

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A line, L_1, passes through the point P(2, 4, 1) and is parallel to

$$\mathbf{u}_1 = \mathbf{i} + 2\mathbf{j} - \mathbf{k}$$

and a second line, L_2, passes through Q(−5, 2, 5) and is parallel to

$$\mathbf{u}_2 = -4\mathbf{i} + 4\mathbf{j} + \mathbf{k}\ .$$

(a) Determine the vector equations for L_1 and L_2. **2**

(b) Show that the lines L_1 and L_2 intersect and find the point of intersection. **4**

(c) Determine the equation of the plane containing L_1 and L_2. **3**

Answers:

(a) $\mathbf{r}_1 = \begin{pmatrix} 2 \\ 4 \\ 1 \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix}$

$\mathbf{r}_2 = \begin{pmatrix} -5 \\ 2 \\ 5 \end{pmatrix} + \lambda \begin{pmatrix} -4 \\ 4 \\ 1 \end{pmatrix}$

(b) $(-1,\ -2,\ 4)$

(c) $2x + y + 4z = 12$ or equivalent