# Marked example 1

Paper 1 style · No calculator

## 1 7 marks AHL 3.18 · 1.16 ●●○ Typical

The plane $\Pi$ has equation $x + 2y - 2z = 5$ and the line $L$ has equation $\mathbf{r} = \begin{pmatrix} 1 \\ -1 \\ 2 \end{pmatrix} + \lambda \begin{pmatrix} 2 \\ 1 \\ 1 \end{pmatrix}$.

**(a)** Find the coordinates of the point where $L$ meets $\Pi$. **[4]**

**(b)** Find the sine of the acute angle between $L$ and $\Pi$. **[3]**

**MARKSCHEME (a)**

$(1 + 2\lambda) + 2(-1 + \lambda) - 2(2 + \lambda) = 5$ **M1**

$2\lambda - 5 = 5$ **A1**

$\lambda = 5$ **A1**

$(11, 4, 7)$ **A1**

Total 4 marks

**Note** Substitute the line into the plane.

**MARKSCHEME (b)**

$\mathbf{b} \cdot \mathbf{n} = 2 + 2 - 2 = 2$ **A1**

$|\mathbf{b}| = \sqrt{6},\ |\mathbf{n}| = 3$ **A1**

$\sin\theta = \dfrac{2}{3\sqrt{6}} = \dfrac{\sqrt{6}}{9}$ **A1**

Total 3 marks



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