Marked example 2

Paper 1 style · No calculator

2 6 marks AHL 3.17 ●●○ Typical

The plane Π has equation $2x - y + 2z = 9$.

(a) Write down a vector normal to Π. **[1]**

(b) Find the Cartesian equation of the plane parallel to Π that passes through $(1, 1, 1)$. **[2]**

(c) Write the equation of Π in the form $\mathbf{r} = \mathbf{a} + \lambda\mathbf{b} + \mu\mathbf{c}$. **[3]**

MARKSCHEME (a)

$\begin{pmatrix} 2 \\ -1 \\ 2 \end{pmatrix}$ **A1**

Total 1 mark

MARKSCHEME (b)

$2 - 1 + 2 = 3$ **M1**

$2x - y + 2z = 3$ **A1**

Total 2 marks

MARKSCHEME (c)

a point, for example $(4, 1, 1)$: $8 - 1 + 2 = 9$ **A1**

$\mathbf{b} = \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix}$, as $\mathbf{b} \cdot \mathbf{n} = 0$ **A1**

$\mathbf{r} = \begin{pmatrix} 4 \\ 1 \\ 1 \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix} + \mu \begin{pmatrix} 0 \\ 2 \\ 1 \end{pmatrix}$ **A1**

Total 3 marks

Note Any point of Π.

Note Any direction perpendicular to $\mathbf{n}$.

Note Two non-parallel directions.

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