Exercise 2

Paper 1 style · No calculator

2 6 marks AHL 3.17 ●●○ Typical

The plane Π has equation $x + 2y - 3z = 4$.

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

(b) Find the Cartesian equation of the plane parallel to Π that passes through $(2, 0, 1)$. **[2]**

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

The markscheme is on the next page: try the question first. Written and verified by a practising IB mathematics teacher, produced with AI assistance; solved twice and recomputed by software. Not affiliated with or endorsed by the International Baccalaureate Organization.
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MARKSCHEME (a)

$\begin{pmatrix} 1 \\ 2 \\ -3 \end{pmatrix}$ A1

Total 1 mark

MARKSCHEME (b)

$2 + 0 - 3 = -1$ M1

$x + 2y - 3z = -1$ A1

Total 2 marks

MARKSCHEME (c)

a point, for example $(4, 0, 0)$ A1

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

$\mathbf{r} = \begin{pmatrix} 4 \\ 0 \\ 0 \end{pmatrix} + \lambda \begin{pmatrix} 2 \\ -1 \\ 0 \end{pmatrix} + \mu \begin{pmatrix} 3 \\ 0 \\ 1 \end{pmatrix}$ A1

Total 3 marks

Note Any point of Π.

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

Note Two non-parallel directions.