Exercise 3

Paper 2 style · Graphic display calculator

3 6 marks AHL 3.17 ●●○ Typical

The plane Π contains the points $A(1, -1, 2)$, $B(3.5, 0, 1)$ and $C(0, 2.5, 3)$.

(a) Find a vector normal to Π. **[2]**

(b) Find the Cartesian equation of Π, with integer coefficients. **[2]**

(c) The point $D(3, k, 1)$ lies in Π. Find the value of k. **[2]**

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)

$\overrightarrow{AB} \times \overrightarrow{AC} = \begin{pmatrix} 2.5 \\ 1 \\ -1 \end{pmatrix} \times \begin{pmatrix} -1 \\ 3.5 \\ 1 \end{pmatrix}$ **M1**

$\begin{pmatrix} 4.5 \\ -1.5 \\ 9.75 \end{pmatrix}$, or $\begin{pmatrix} 6 \\ -2 \\ 13 \end{pmatrix}$ **A1**

Total 2 marks

MARKSCHEME (b)

$6 \times 1 - 2 \times (-1) + 13 \times 2 = 34$ **M1**

$6x - 2y + 13z = 34$ **A1**

Total 2 marks

MARKSCHEME (c)

$18 - 2k + 13 = 34$ **M1**

$k = -1.5$ **A1**

Total 2 marks