Marked example 3

Paper 2 style · Graphic display calculator

3 6 marks AHL 3.17 ●●○ Typical

The plane Π contains the points $A(2,\ 1,\ -1)$, $B(4.5,\ 0,\ 3)$ and $C(-1,\ 4,\ 2)$.

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

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

(c) The point $D(k,\ 2,\ 0)$ lies in Π. Find the value of k. **[2]**

MARKSCHEME (a)

$\overrightarrow{AB} \times \overrightarrow{AC} = \begin{pmatrix} 2.5 \\ -1 \\ 4 \end{pmatrix} \times \begin{pmatrix} -3 \\ 3 \\ 3 \end{pmatrix}$ **M1**

$\begin{pmatrix} -15 \\ -19.5 \\ 4.5 \end{pmatrix}$, or $\begin{pmatrix} 10 \\ 13 \\ -3 \end{pmatrix}$ **A1**

Total 2 marks

MARKSCHEME (b)

$10 \times 2 + 13 \times 1 - 3 \times (-1) = 36$ **M1**

$10x + 13y - 3z = 36$ **A1**

Total 2 marks

MARKSCHEME (c)

$10k + 26 = 36$ **M1**

$k = 1$ **A1**

Total 2 marks

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