Marked example 1

Paper 1 style · No calculator

1 6 marks AHL 3.14 · 3.15 ●○○ Routine

The line L passes through the points $A(1, -2, 4)$ and $B(3, 1, 2)$.

(a) Find a vector equation of L. **[2]**

(b) Show that the point $C(7, 7, -2)$ lies on L. **[2]**

(c) Find the coordinates of the point where L meets the plane $z = 0$. **[2]**

MARKSCHEME (a)

$\overrightarrow{AB} = \begin{pmatrix} 2 \\ 3 \\ -2 \end{pmatrix}$ **A1**

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

Total 2 marks

Note Any point of the line and any multiple of the direction.

MARKSCHEME (b)

$1 + 2\lambda = 7 \Rightarrow \lambda = 3$ **M1**

$y = -2 + 9 = 7,\ z = 4 - 6 = -2$, so C is on L **R1**

Total 2 marks

Note Both other coordinates checked. AG.

MARKSCHEME (c)

$4 - 2\lambda = 0 \Rightarrow \lambda = 2$ **M1**

$(5, 4, 0)$ **A1**

Total 2 marks

Written and verified by a practising IB mathematics teacher, produced with AI assistance; solved twice and recomputed by software.
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