Marked example 1

Paper 1 style · No calculator

1 6 marks AHL 3.12 · 3.13 ●○○ Routine

The points A, B and C have coordinates $A(2, -1, 3)$, $B(5, 3, 3)$ and $C(1, 4, -2)$.

(a) Find $\overrightarrow{AB}$ and $\left|\overrightarrow{AB}\right|$. **[2]**

(b) Find a unit vector in the direction of $\overrightarrow{AB}$. **[2]**

(c) $ABCD$ is a parallelogram. Find the coordinates of D. **[2]**

MARKSCHEME (a)

$\overrightarrow{AB} = \begin{pmatrix} 3 \\ 4 \\ 0 \end{pmatrix}$ **A1**

$\left|\overrightarrow{AB}\right| = \sqrt{9+16+0} = 5$ **A1**

Total 2 marks

MARKSCHEME (b)

$\frac{1}{5}\begin{pmatrix} 3 \\ 4 \\ 0 \end{pmatrix}$ **M1**

$\begin{pmatrix} \frac{3}{5} \\ \frac{4}{5} \\ 0 \end{pmatrix}$ **A1**

Total 2 marks

Note Divide by the magnitude.

MARKSCHEME (c)

$\overrightarrow{AD} = \overrightarrow{BC} = \begin{pmatrix} -4 \\ 1 \\ -5 \end{pmatrix}$ **M1**

$D(-2, 0, -2)$ **A1**

Total 2 marks

Note $\mathbf{d} = \mathbf{a} + \mathbf{c} - \mathbf{b}$.

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