Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

13; $\frac{1}{13}\begin{pmatrix}3\\-4\\12\end{pmatrix}$

2.2

$2-2+4=4$; $\cos\theta=\frac{4}{3\times3}$; $\theta=\mathbf{63.6}^\circ$

2.3

$\begin{pmatrix}6\\-3\\1\end{pmatrix}$; area $\sqrt{46}=\mathbf{6.78}$

2.4

$(\mathbf{7},\mathbf{3},-\mathbf{1})$; $\lambda=2$ from x; gives $y=2$, $z=0$, so it lies on L (R1)

3.1

(a) $\sqrt{4^2+3^2}=\mathbf{5}$ km h^{-1}

(b) $(\mathbf{6},\mathbf{8})$

(c) $A(4t,3t)$, $B(10-2t,4t)$; difference $\begin{pmatrix}10-6t\\t\end{pmatrix}$

(d) $d^2=37t^2-120t+100$; minimum at $t=\frac{120}{74}$; $d=\mathbf{1.64}$ km

(e) $t=\mathbf{1.62}$ hours

3.2

(a) $\mathbf{v}=\begin{pmatrix}3\\20-10t\end{pmatrix}$

(b) $\sqrt{3^2+10^2}=\mathbf{10.4}$ m s^{-1}

(c) $20-10t=0$, $t=2$; height **20** m

(d) $20t-5t^2=0$, $t=4$; **12** m

(e) $\tan^{-1}\frac{20}{3}=\mathbf{81.5}^\circ$

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