

## 3D Trig MS

0 min  
0 marks

1. (a)  $l = \sqrt{8^2 + 8^2}$  (M1)  
 $= \sqrt{128}$   
 $= 11.3$  (3 s.f.) (A1)

(b)  $L = \sqrt{\sqrt{128^2} + 8^2}$  **OR**  $L = \sqrt{11.3^2 + 8^2}$  (allow ft from (a)) (M1)  
 $= \sqrt{128 + 64}$  **OR**  $= \sqrt{127.69} + 64$   
 $= 13.9$  (3 s.f.) **OR**  $= 13.8$  (3 s.f.) (A1)

[4]

2. (a)  $\sqrt{5^2 + 1^2} = \sqrt{26}$  (or 5.10 (3 s.f.)) (M2)(A2) (C4)

(b)  $\sqrt{4^2 + \sqrt{26}^2}$  (M2)  
 $= \sqrt{42} = 6.48$  (3 s.f.) (A2) (C4)

[8]

3. (a)  $AC = \sqrt{(22.5)^2 + 30^2}$  (M1)  
 $= 37.5$  cm (A1)

(b)  $\tan \hat{GAC} = \frac{40}{37.5}$  (M1)

$\hat{GAC} = 46.8^\circ$  (or 0.818 radians) (A1)

[4]

**4. Unit penalty applies in parts (a) and (b)**

(a)  $AC^2 = 7.2^2 + 9.6^2$  (M1)

*Note: Award (M1) for correct substitution in Pythagoras Theorem.*

**UP**  $AC = 12$  m (A1) (C2)

(b)  $AG^2 = 12^2 + 3.5^2$  (M1)

*Note: Award (M1) for correct substitution in Pythagoras Theorem.*

**UP**  $AG = 12.5$ m (A1)(ft) (C2)

*Note: Follow through from their answer to part (a).*

(c)  $\tan \theta = \frac{3.5}{12}$  or  $\sin \theta = \frac{3.5}{12.5}$  or  $\cos \theta = \frac{12}{12.5}$  (M1)

*Note: Award (M1) for correct substitutions in trig ratio.*

$\theta = 16.3^\circ$  (A1)(ft) (C2)

*Notes: Follow through from parts (a) and/or part (b) where appropriate. Award (M1)(A0) for use of radians (0.284).*

[6]

**5. Note: Unit penalty (UP) applies in part (a)**

(a)  $PB = \frac{1}{2} \sqrt{40^2 + 40^2} = \sqrt{800} = 28.28$  (28.3) (M1)(A1)

*Note: Award (M1) for correct substitutions, (A1) for correct answer.*

**UP**  $OB = \sqrt{40^2 + 28.28^2} = 49.0$  cm ( $\sqrt{2400}$  cm) (M1)(A1)(ft) (C4)

*Note: Award (M1) for correct substitution, can (ft) from any answer to PB.*

(b)  $\sin^{-1}\left(\frac{40}{49}\right)$

**OR**

$$\cos^{-1}\left(\frac{28.28}{49}\right)$$

**OR**

$$\tan^{-1}\left(\frac{40}{28.28}\right)$$

(M1)

$$= 54.7 \text{ (54.8)}$$

(A1)(ft) (C2)

*Note: Award (M1) for any correct trig. ratio.  
In radians = 0.616, award (M1)(A0).*

*Note: Common error: (a)  $OB = \sqrt{40^2 + 20^2} = 44.7 \text{ cm}$ .*

*Award (M0)(A0)(M1) (A1)(ft), and (b) angle  
 $OBP = 63.4^\circ$  ( $63.5^\circ$ )(M1)(A1)(ft).*

[6]

6. Unit penalty (UP) applies in parts (a) and (b) in this question.

(a)  $VM^2 = 13^2 - 5^2$

(M1)

**UP**

$$= 12 \text{ cm}$$

(A1) (C2)

(b)  $h^2 = 12^2 - 5^2$  (or equivalent)

(M1)

**UP**

$$= 10.9 \text{ cm}$$

(A1)(ft) (C2)

(c)  $\cos \theta = \frac{5}{12}$  (or equivalent)

(M1)

$$\theta = 65.4^\circ$$

(A1)(ft) (C2)

*Note: Accept  $\theta = 65.3^\circ$  (use of 10.9 with sine ratio).*

[6]