Solutions

Award method and answer marks as indicated; accept equivalent correct methods.

2.1

- $O = H\sin\theta = 12\sin 30° = \mathbf{6}$ cm.

2.2

- $A = H\cos\theta = 14\cos 60° = \mathbf{7}$ cm.

2.3

- $\theta = \tan^{-1}(O/A) = \tan^{-1}(5/12) = \mathbf{22.6}°$.

2.4

- $\theta = \tan^{-1}(3/7) = \mathbf{23.2}°$ to one decimal place.

3.1

(a)

- Angle is from north, so north is adjacent: $N = 10\cos 40° = \mathbf{7.66}$ km.

(b)

- East is opposite: $E = 10\sin 40° = \mathbf{6.43}$ km.

(c)

- Reverse bearing: $b = 40 + 180 = \mathbf{220}°$.

3.2

(a)

- Height is opposite and 12 m is adjacent, so $\tan\theta = h/d$.
- Rearrange $h = d\tan\theta$.
- $h = 12\tan 38° \approx \mathbf{9.38}$ m.

(b)

- Use $\cos\theta = d/H$, so $H = d/\cos\theta$.
- $H = 12/\cos 38° \approx \mathbf{15.2}$ m.
- Sine requires the hypotenuse as its denominator; 12 m is adjacent, not hypotenuse.

3.3

- From angle A, BC is opposite and AB is adjacent: $\tan A = \dfrac{\text{opp}}{\text{adj}} = \dfrac{5}{7}$.
- $A = \tan^{-1}\left(\dfrac{5}{7}\right) = 35.53\ldots°$, so $\mathbf{35.5}°$.

3.4

- The ramp is the hypotenuse and the height is opposite the angle: $\sin 12° = \dfrac{h}{4.5}$, so $h = 4.5\sin 12°$.
- $h = 0.9356\ldots$, so $\mathbf{0.936}$ m.