C2 TRIGONOMETRY — Answers - Worksheet A

1 $\dfrac{AC}{\sin 118} = \dfrac{16}{\sin 26}$

$AC = \dfrac{16 \times \sin 118}{\sin 26}$

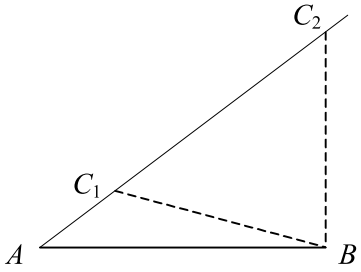
$= 32.2$ cm

2 $\dfrac{\sin \angle PRQ}{8.2} = \dfrac{\sin 57}{11.4}$

$\sin \angle PRQ = \dfrac{8.2 \times \sin 57}{11.4} = 0.6033$

$\angle PRQ = 37.1°$

3



$\dfrac{\sin \angle ACB}{16.2} = \dfrac{\sin 37}{12.3}$

$\sin \angle ACB = \dfrac{16.2 \times \sin 37}{12.3} = 0.7926$

$\angle ACB = 52.4$ or $180 - 52.4 = 52.4$ or 127.6

$\angle ABC = 180 - (37 + \angle ACB) = 90.568$ or 15.432

$\dfrac{AC}{\sin \angle ABC} = \dfrac{12.3}{\sin 37}$

$AC = \dfrac{12.3 \times \sin \angle ABC}{\sin 37} = 20.4$ or 5.4

$\therefore \angle ACB = 52.4°$, $AC = 20.4$ cm or $\angle ACB = 127.6°$, $AC = 5.4$ cm (all 1dp)

4 $XZ^2 = 7.8^2 + 15.3^2$

$- (2 \times 7.8 \times 15.3 \times \cos 31.5°)$

$= 91.422$

$XZ = 9.56$ cm (3sf)

5 $18^2 = 13^2 + 17^2 - (2 \times 13 \times 17 \times \cos \angle ACB)$

$\cos \angle ACB = \dfrac{13^2 + 17^2 - 18^2}{2 \times 13 \times 17}$

$= 0.3032$

$\angle ACB = 72.4°$ (1dp)

6 **a** $\alpha = 180 - (40 + 32) = 108$

$\dfrac{x}{\sin 108} = \dfrac{23.1}{\sin 40}$

$x = \dfrac{23.1 \times \sin 108}{\sin 40}$

$x = 34.2$ cm (3sf)

b $x^2 = 2.7^2 + 3.8^2$

$- (2 \times 2.7 \times 3.8 \times \cos 83)$

$x^2 = 19.229$

$x = 4.39$ m (3sf)

c $\dfrac{\sin \alpha}{7.6} = \dfrac{\sin 61}{10.5}$

$\sin \alpha = \dfrac{7.6 \times \sin 61}{10.5} = 0.6331$

$\alpha = 39.276$

$\beta = 180 - (61 + 39.276) = 79.724$

$\dfrac{x}{\sin 79.724} = \dfrac{10.5}{\sin 61}$

$x = \dfrac{10.5 \times \sin 79.724}{\sin 61}$

$x = 11.8$ cm (3sf)

7 **a** $\dfrac{\sin \alpha}{67} = \dfrac{\sin 96.5}{92}$

$\sin \alpha = \dfrac{67 \times \sin 96.5}{92}$

$\sin \alpha = 0.7236$

$\alpha = 46.351$

$\theta = 180 - 96.5 - \alpha$

$\theta = 37.1°$ (1dp)

b $1.9^2 = 0.8^2 + 1.7^2$

$- (2 \times 0.8 \times 1.7 \times \cos \theta)$

$\cos \theta = \dfrac{0.8^2 + 1.7^2 - 1.9^2}{2 \times 0.8 \times 1.7}$

$\cos \theta = -0.02941$

$\theta = 91.7°$ (1dp)

c $l^2 = 7.4^2 + 8.7^2$

$- (2 \times 7.4 \times 8.7 \times \cos 43.7)$

$l^2 = 37.3608$, $l = 6.1123$

$\dfrac{\sin \theta}{7.4} = \dfrac{\sin 43.7}{6.1123}$

$\sin \theta = \dfrac{7.4 \times \sin 43.7}{6.1123} = 0.8364$

$\theta = 56.8°$ (1dp)

8 **a** area

$= \frac{1}{2} \times 2.1 \times 3.4 \times \sin 66$

$= 3.26 \text{ m}^2$ (3sf)

b area

$= \frac{1}{2} \times 35 \times 68 \times \sin 116$

$= 1070 \text{ cm}^2$ (3sf)

c $\frac{\sin\alpha}{5.8} = \frac{\sin 72.4}{6.5}$

$\sin\alpha = \frac{5.8 \times \sin 72.4}{6.5} = 0.8505$

$\alpha = 58.270$

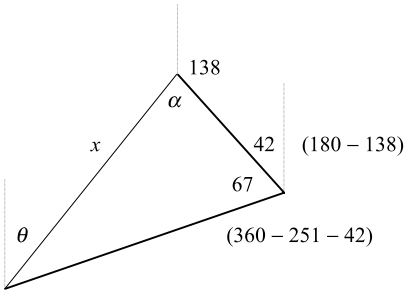
$\beta = 180 - (72.4 + \alpha) = 49.330$

area

$= \frac{1}{2} \times 5.8 \times 6.5 \times \sin 49.330$

$= 14.3 \text{ cm}^2$ (3sf)

9



a $x^2 = 4.2^2 + 7.8^2 - (2 \times 4.2 \times 7.8 \times \cos 67)$

$x^2 = 52.879$

$x = 7.27$ miles (3sf)

b $\frac{\sin\alpha}{7.8} = \frac{\sin 67}{7.2718}$

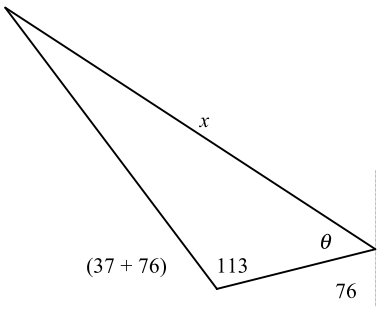
$\sin\alpha = \frac{7.8 \times \sin 67}{7.2718} = 0.9874$

$\alpha = 80.882$

$\theta = 138 + \alpha - 180 = 38.882$

bearing = 039° (nearest degree)

10



$x^2 = 3.2^2 + 6.9^2 - (2 \times 3.2 \times 6.9 \times \cos 113)$

$x^2 = 75.105$

$x = 8.67$ km (3sf)

$\frac{\sin\theta}{6.9} = \frac{\sin 113}{8.666}$

$\sin\theta = \frac{6.9 \times \sin 113}{8.666} = 0.7329$

$\theta = 47.130$

bearing = $180 + 76 + \theta = 303°$ (nearest degree)

11 $9.7^2 = 10.4^2 + 11.0^2 - (2 \times 10.4 \times 11.0 \times \cos \angle BAC)$

$\cos \angle BAC = \frac{10.4^2 + 11.0^2 - 9.7^2}{2 \times 10.4 \times 11.0} = 0.5903$

$\angle BAC = 53.819$

area $= \frac{1}{2} \times 10.4 \times 11.0 \times \sin 53.819 = 46.2 \text{ cm}^2$

12 $\frac{1}{2} \times 22.5 \times YZ \times \sin 34 = 100$

$YZ = \frac{200}{22.5 \times \sin 34} = 15.896$

$XZ^2 = 22.5^2 + 15.896^2 - (2 \times 22.5 \times 15.896 \times \cos 34)$

$= 165.906$

$XZ = 12.9$ cm (3sf)