

$$1 \quad \frac{AC}{\sin 118} = \frac{16}{\sin 26}$$

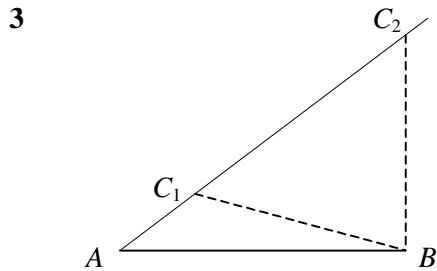
$$AC = \frac{16 \times \sin 118}{\sin 26}$$

$$= 32.2 \text{ cm}$$

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

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

$$\angle PRQ = 37.1^\circ$$



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

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

$$\angle ACB = 52.4 \text{ or } 180 - 52.4 = 52.4 \text{ or } 127.6$$

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

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

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

$\therefore \angle ACB = 52.4^\circ, AC = 20.4 \text{ cm}$ or $\angle ACB = 127.6^\circ, AC = 5.4 \text{ cm}$ (all 1dp)

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

$$- (2 \times 7.8 \times 15.3 \times \cos 31.5^\circ)$$

$$= 91.422$$

$$XZ = 9.56 \text{ cm (3sf)}$$

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

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

$$= 0.3032$$

$$\angle ACB = 72.4^\circ \text{ (1dp)}$$

$$6 \quad \text{a } \alpha = 180 - (40 + 32) = 108$$

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

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

$$x = 34.2 \text{ cm (3sf)}$$

$$\text{b } x^2 = 2.7^2 + 3.8^2$$

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

$$x^2 = 19.229$$

$$x = 4.39 \text{ m (3sf)}$$

$$\text{c } \frac{\sin \alpha}{7.6} = \frac{\sin 61}{10.5}$$

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

$$\alpha = 39.276$$

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

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

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

$$x = 11.8 \text{ cm (3sf)}$$

$$7 \quad \text{a } \frac{\sin \alpha}{67} = \frac{\sin 96.5}{92}$$

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

$$\sin \alpha = 0.7236$$

$$\alpha = 46.351$$

$$\theta = 180 - 96.5 - \alpha$$

$$\theta = 37.1^\circ \text{ (1dp)}$$

$$\text{b } 1.9^2 = 0.8^2 + 1.7^2$$

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

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

$$\cos \theta = -0.02941$$

$$\theta = 91.7^\circ \text{ (1dp)}$$

$$\text{c } l^2 = 7.4^2 + 8.7^2$$

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

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

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

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

$$\theta = 56.8^\circ \text{ (1dp)}$$

8 a area

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

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

b area

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

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

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

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

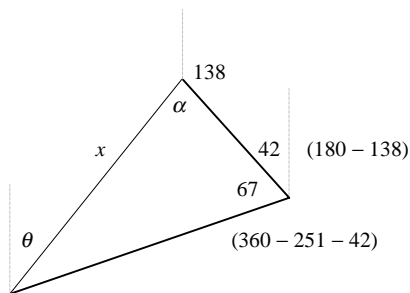
$$\alpha = 58.270$$

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

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

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

9



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

$$x^2 = 52.879$$

$$x = 7.27 \text{ miles (3sf)}$$

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

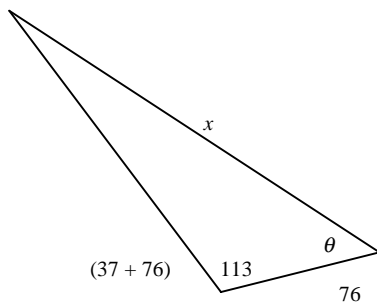
$$\sin \alpha = \frac{7.8 \times \sin 67}{7.2718} = 0.9874$$

$$\alpha = 80.882$$

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

$$\text{bearing} = 039^\circ \text{ (nearest degree)}$$

10



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

$$x^2 = 75.105$$

$$x = 8.67 \text{ km (3sf)}$$

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

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

$$\theta = 47.130$$

$$\text{bearing} = 180 + 76 + \theta = 303^\circ \text{ (nearest degree)}$$

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

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

$$\angle BAC = 53.819$$

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

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

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

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

$$= 165.906$$

$$XZ = 12.9 \text{ cm (3sf)}$$