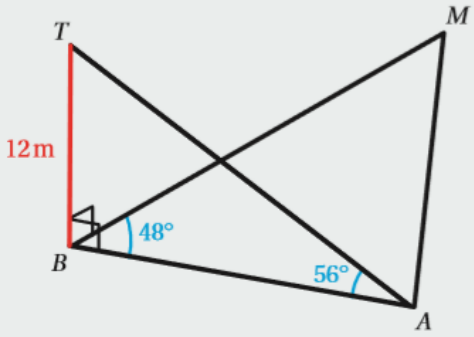
Mixed practice 11

1 In triangle ABC, $AB = 6.2$ cm, $CA = 8.7$ cm and angle $ACB = 37.5°$. Find the two possible values of ABC.

2 A vertical tree of height 12 m stands on horizontal ground. The bottom of the tree is at the point B. Observer A, standing on the ground, sees the top of the tree at an angle of elevation of 56°.

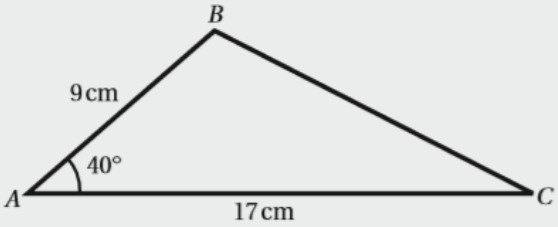


a Find the distance of A from the bottom of the tree.

Another observer, M, stands the same distance away from the tree, and $ABM = 48°$

b Find the distance AM.

3 The diagram shows triangle ABC, with $AB = 9$ cm, $AC = 17$ cm and angle $BAC = 40°$.



i Find the length of BC.

ii Find the area of triangle ABC.

iii D is a point on AC such that angle $BDA = 63°$. Find the length of BD.

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4 The lengths of the three sides of a triangle are 6.4 cm, 7.0 cm and 11.3 cm.

i Find the largest angle in the triangle.

ii Find the area of the triangle.

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5 In triangle ABC, $AB = 2\sqrt{3}$, $AC = 10$ and angle $BAC = 150°$. Find the exact length of BC.

6 In the obtuse angled triangle KLM, $LM = 6.1$ cm, $KM = 4.2$ cm and angle $KLM = 42°$.

Find the area of the triangle.

7 In triangle ABC, angle $AB = 10$ cm, $BC = 8$ cm and $CA = 7$ cm.

a Find the exact value of cos $(\angle ABC)$

b Find the exact value of sin $(\angle ABC)$.

c Find the exact value of the area of the triangle.

8 In triangle ABC, $AB = 5$, $AC = x$ and the angle at A is θ. M is the midpoint of the side AC.

a Use the cosine rule to find an expression for MB^2 in terms of x and θ.

b Given that $BC = MB$, show that $\cos\theta = \frac{3x}{20}$.

c If $x = 5$, find the value of the angle θ such that $MB = BC$.

9 Two radar stations, A and B, are 20 km apart. B is due east of A. Station B detects a ship on a bearing of 310°. The same ship is 15 km from station A.

a Find the two possible bearings of the ship from station A.

b Hence find the distance between the two possible positions of the ship.

10 A regular pentagon has area 200 cm^2. Find the length of each side.

11 In triangle ABC, $AB = 10$, $BC = 5$, $CA = x$ and angle $CAB = \theta$.

a Show that $x^2 - 20x\cos\theta + 75 = 0$.

b Find the range of values of cos θ for which the equation in part **a** has real roots.

c Hence find the set of values of θ for which it is possible to construct triangle ABC with the given measurements.

Mixed practice 11

1 $58.7°, 121°$

2 **a** 8.09 m **b** 6.58 m

3 **a** 11.6 cm **b** 49.2 cm^2 **c** 6.49 cm

4 **a** $115°$ **b** 20.3 cm^2

5 $2\sqrt{43}\text{ cm}$

6 7.23 cm^2

7 **a** $\frac{23}{32}$ **b** $\frac{3\sqrt{55}}{32}$ **c** $\frac{15\sqrt{55}}{4}$

8 **a** $\frac{x^2}{4}+25-5x\cos\theta$ **b** Proof

c $\theta = 41.4°$

9 **a** 009° or 071° **b** 15.5 km

10 10.8 cm

11 **a** Proof

b $\left[-1, -\frac{\sqrt{3}}{2}\right] \cup \left[\frac{\sqrt{3}}{2}, 1\right]$ **c** $0° < \theta \leqslant 30°$