Area of a Triangle

Specification: AQA 7357: E1 · Edexcel 9MA0: 5.1

INDEPENDENT **You do**

A · Two sides and the included angle

1 In triangle ABC, $AB = 6.2$ cm, $AC = 8.5$ cm and angle $BAC = 64°$. Find the area.

2 In triangle PQR, $PQ = 11$ cm, $QR = 7.4$ cm and angle $PQR = 105°$. Find the area.

3 In triangle LMN, $LM = 12$ cm, $LN = 9.6$ cm and angle $MLN = 23°$. Find the area.

4 An isosceles triangle has two sides of 9 cm and base angles of 32°. Find its area.

B · From the area

5 Two sides of a triangle are 8 cm and 10 cm, and the angle θ between them is acute. The area is 30 cm². Find θ.

6 Two sides of a triangle are 6 cm and 9 cm, with angle θ between them. The area is 18 cm². Find the two possible values of θ.

7 In triangle ABC, $AB = 12$ cm and angle $BAC = 35°$. The area is 40 cm². Find AC.

8 No calculator. In triangle ABC, $AB = x$ cm, $AC = (x + 4)$ cm and angle $BAC = 120°$. The area is $15\sqrt{3}$ cm². Find x.

C · Reasoning No calculator for this section.

9 Two sides of a triangle are 6 cm and 8 cm.
(a) Find the exact area when the angle between them is 45°.
(b) Find the exact area when the angle between them is 135°.
(c) Explain why the answers are the same.

10 Two sides of a triangle are 5 cm and 8 cm. Explain why the area can never be more than 20 cm². Which angle gives exactly 20 cm²?

11 Show that an equilateral triangle with sides of length s has area $\frac{\sqrt{3}}{4}s^2$.

D · Multi-step and modelling

12 A triangle has sides 7 cm, 8 cm and 10 cm. Find its area.

13 A triangular garden has area 150 m². Two of its fences are 20 m and 25 m long, and the angle between them is obtuse.
(a) Find the angle between these two fences.
(b) Find the total length of fencing around the garden.

14 In triangle ABC, $AB = 2x$ cm, $AC = (10 - x)$ cm and angle $BAC = 30°$. The area is A cm².
(a) Show that $A = \frac{1}{2}(10x - x^2)$.
(b) Find the maximum area and the lengths of AB and AC when it occurs.

E · Exam-style question Use the mark scheme to self-assess.

15 In triangle ABC, $AB = 9$ cm, $BC = 7$ cm and the area of the triangle is 25 cm². Angle ABC is obtuse.
(a) Find angle ABC. [3 marks]
(b) Find AC. [3 marks]