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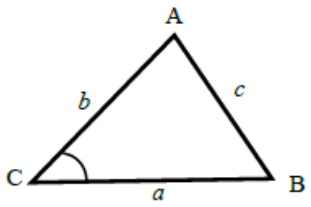
Problem solving - Area of a triangle

A LEVEL LINKS
Scheme of work: 4a. Trigonometric ratios and graphs
Textbook: Pure Year 1, 9.3 Areas of triangles

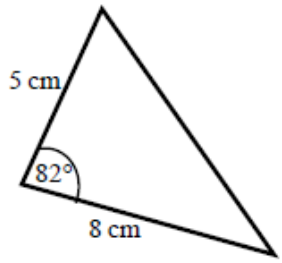
Key points

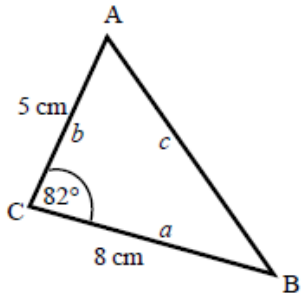
- a is the side opposite angle A.
  b is the side opposite angle B.
  c is the side opposite angle C.
- The area of the triangle is $\frac{1}{2}ab\sin C$.



Examples

Example 1 Find the area of the triangle.





Area = $\frac{1}{2}ab\sin C$

Area = $\frac{1}{2}\times 8\times 5\times \sin 82°$

Area = 19.805 361...

Area = 19.8 cm^2

1 Always start by labelling the sides and angles of the triangle.

2 State the formula for the area of a triangle.

3 Substitute the values of a, b and C into the formula for the area of a triangle.

4 Use a calculator to find the area.

5 Round your answer to 3 significant figures and write the units in your answer.

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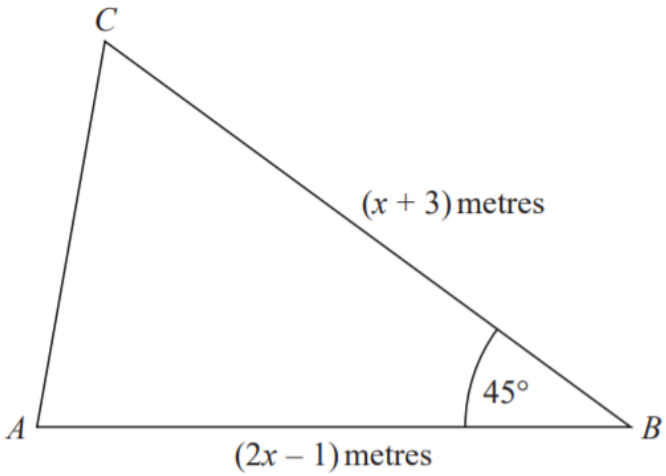
Practice questions

1



The area of triangle ABC is $6\sqrt{2}$ m^2.

Calculate the value of x.
Give your answer correct to 3 significant figures.

2 In triangle ABC, $AC = 7$ cm, $BC = 10$ cm and angle $BAC = 65°$

(a) Find, to the nearest 0.1°, the size of angle ABC.

(b) Find, in cm^2 to 3 significant figures, the area of triangle ABC.

3 In triangle ABC, $AB = x$ cm, $BC = (4x - 5)$ cm, $AC = (2x + 3)$ cm and angle $ABC = 60°$.

Find, to 3 significant figures,

(a) the value of x,

(b) the area of triangle ABC.

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Answers

1 $0.5\,(2x - 1)(x + 3)\sin 45° = 6\sqrt{2}$

$(2x - 1)(x + 3)\sin 45° = 12\sqrt{2}$

$(2x^2 + 5x - 3)\sin 45° = 12\sqrt{2}$

$2x^2 + 5x - 3 = 24$

$2x^2 + 5x - 27 = 0$

Use quadratic formula to find x.

$x = 2.63$ (3 sf)

x cannot be negative

2 (a) $B = 39.37\ldots = 39.4°$

(b) 33.9 cm^2

3 (a) $x = 4.86$

(b) 30.33.. = 30.3 cm^2