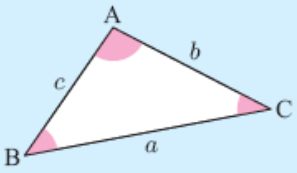
H THE SINE RULE

The **sine rule** is a set of equations which connects the lengths of the sides of any triangle with the sines of the angles of the triangle. The triangle does not have to be right angled for the sine rule to be used.

In any triangle ABC with sides a, b, and c units in length, and opposite angles A, B, and C respectively,

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} \quad or \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}.$$

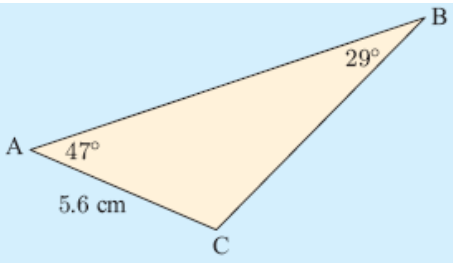


The sine rule is used to solve problems involving triangles, given:

- **two angles** and **one side**
- **two sides** and a **non-included** angle.

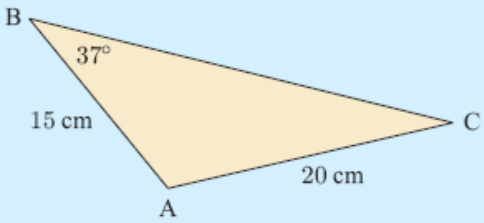
FINDING SIDES (AAS or ASA)

Find the length of BC correct to three significant figures.



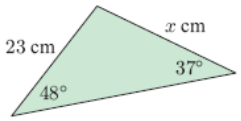
FINDING ANGLES (SSA)

Determine the size of $\widehat{ACB}$ correct to 3 significant figures.

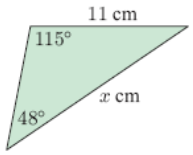


1 Find the value of x:

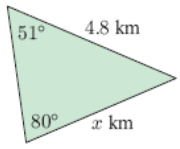
a



b



c

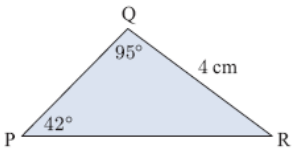


2 In triangle ABC, find:

a a if $A = 63°$, $B = 49°$, and $b = 18$ cm

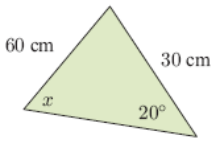
b b if $A = 82°$, $C = 25°$, and $c = 34$ cm

3 Find the lengths of the remaining sides of triangle PQR.

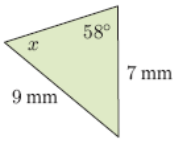


4) Find the value of x:

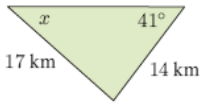
a



b



c



5) A triangle has vertices A, B, and C with opposite side lengths a, b, and c respectively. Find:

a $\widehat{BAC}$ if $\widehat{ABC} = 45°$, $a = 8$ cm, and $b = 11$ cm

b $\widehat{ABC}$ if $a = 32$ cm, $b = 23$ cm, and $\widehat{BAC} = 42°$

6) Unprepared for class, Mr Whiffen asks his students to determine the size of x in the diagram shown.

a Show that Mr Whiffen's question cannot be solved.

b Explain what this means about the triangle Mr Whiffen created.