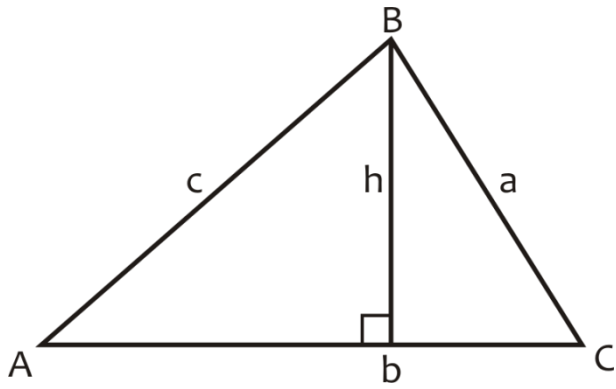
THE SINE RULE

In any ΔABC, the angles are usually denoted by the capital letters A, B, C and the sides opposite these angles by a, b, c respectively.

Given: any ΔABC



To Prove: $\frac{a}{sinA} = \frac{b}{sinB} = \frac{c}{sinC}$

Construction: Draw the perpendicular from B to AC.

Proof:

$$sinA = \frac{h}{c} \rightarrow h = c\ sinA$$

$$sinC = \frac{h}{a} \rightarrow h = asinC$$

$$h = c\ sinA = a\ sinC$$

$$\rightarrow \frac{\boldsymbol{c}}{\boldsymbol{sinC}} = \frac{\boldsymbol{a}}{\boldsymbol{sinA}} \qquad \textbf{proven}$$

This formula, the sine rule, is used for solving triangles which are not right-angled and in which either, two angles and any side are given, or two sides and the opposite one of them are given.

Example: In ΔABC, B=39°, C=82°, a = 6.73cm. Find c.

Solving

Using the sine rule

$$\frac{a}{sinA} = \frac{c}{sinC} = \frac{b}{sinB}$$

$$\frac{6.73}{sinA} = \frac{c}{sin82} = \frac{b}{sin39}$$

$A = 180 - 82 - 39$ (∠s in triangle)

$A = 180 - 121 = 59^o$

$$\frac{6.73}{sin59} = \frac{c}{sin82} \rightarrow c = \frac{6.73}{sin59} \times sin82$$

$$= \frac{6.73}{0.8572} \times 0.9903 = 7.8511 \times 0.9903$$

$$= \mathbf{7.78}\boldsymbol{cm}$$