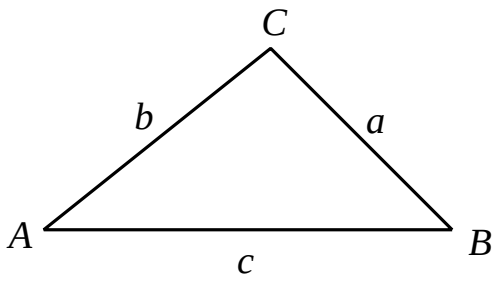
9.1 Summary

Trigonometry
Non-Right Angled Triangles



The Sine Rule

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

Known : One side length & two (and ∴ three) angles
Seeking : Any side length

The Upside Down Sine Rule

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

Known : Two side lengths & an excluded angle
Seeking : The other excluded angle

The Cosine Rule

$$a^2 = b^2 + c^2 - 2bc\cos A$$

Known : Two side lengths & the included angle
Seeking : The third side length

The Reversed Cosine Rule

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

Known : Three side lengths
Seeking : Any angle

Useful Area of a Triangle Formula

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

9.2 Exercise

Question 1

In $\triangle ABC$, two of the angles are, $A = 53°$, and $B = 85°$.

Opposite the angle, A, is a side of length $a = 16$ cm.

(i) What is the size of angle C, the third angle ?

(ii) Sketch the triangle, not to scale, and mark on all known lengths and angles.

(iii) Find the length of each missing side, stating which is b and which is c.

Question 2

In $\triangle ABC$, two of the lengths are, $a = 4$ cm, $b = 12$ cm.

The angle between these two known lengths is $C = 47°$.

(i) Sketch the triangle, not to scale, and mark on all known lengths and angles.

(ii) Find the length of the third side, c.

(iii) Find the area of the triangle.

Question 3

A triangle has sides of length 18 cm, 12 cm and 10 cm.

(i) Find the size of the angle opposite the side of length 18 cm.

(ii) Find the area of the triangle.

Question 4

In $\triangle LMN$, the lengths l and n are 4.5 cm and 2.7cm respectively.

Angle M is obtuse, 112°.

(i) Sketch the triangle, not to scale, and mark on all known lengths and angles.

(ii) Find the length of m, the side opposite angle M.

Question 5

In $\triangle XYZ$, find the length of sides x and y if angles X and Y are 134° and 27° respectively, and the side, z, is 14 cm.

Question 6

In $\triangle FGH$, the sides are of lengths, $f = 3.6$ cm, $g = 4.2$ cm and $h = 5.1$ cm.
Find the size of the angle opposite side h.