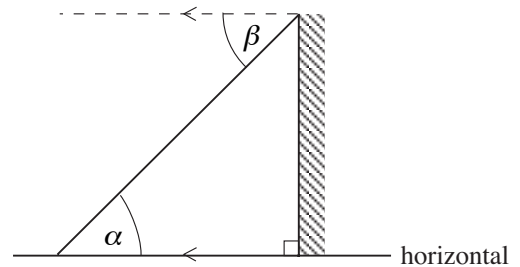


Sine Rule and Cosine Rule

Essential information

- the **angle of elevation** (α) is the angle made with the horizontal, as shown in the diagram (angle β is called the **angle of depression**).

Angle α = angle β (alternate angles).



- for any triangle ABC , the sine rule states

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

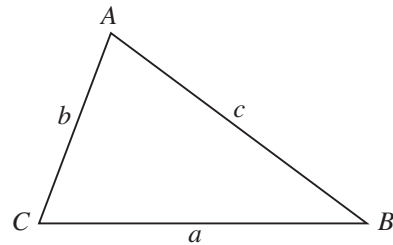
and the cosine rule states

$$c^2 = a^2 + b^2 - 2ab \cos C,$$

and similarly,

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

$$b^2 = c^2 + a^2 - 2ca \cos B$$



- Heron's formula for the area of a triangle with side lengths a , b and c is:

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

where

$$s = \frac{a+b+c}{2}$$

- the principal value solution for

$$\sin \theta = a \quad \text{is in the range} \quad -90^\circ < \theta \leq 90^\circ$$

$$\cos \theta = b \quad \text{is in the range} \quad 0^\circ \leq \theta < 180^\circ$$

$$\tan \theta = c \quad \text{is in the range} \quad -90^\circ < \theta \leq 90^\circ$$