

Trigonometry

Cambridge IGCSE Maths (0580) · Knowledge organiser

KEY DEFINITIONS

Hypotenuse

The longest side of a right-angled triangle, opposite the right angle.

Angle of elevation

The angle up from the horizontal to an object.

Bearing

A three-figure angle measured clockwise from north.

Sine rule

$a/\sin A = b/\sin B = c/\sin C$, for any triangle.

YOU SHOULD BE ABLE TO...

- Use Pythagoras' theorem to find a missing side in right-angled triangles and solve problems, including deciding whether a triangle is right-angled.
- Solve bearings problems and other two-dimensional problems with Pythagoras and trigonometry, drawing a clear diagram for each.
- Sketch and interpret the graphs of $y = \sin x$, $y = \cos x$ and $y = \tan x$ for $0^\circ \leq x \leq 360^\circ$, including their key features.
- Use the cosine rule to find a missing side, or an angle when all three sides are known, in any triangle.
- Find the angle between a line and a plane by identifying the projection of the line onto the plane and a suitable right-angled triangle.
- Practise giving exact answers without a calculator, using exact trigonometric values and leaving answers in terms of π .

COMMON MISTAKES

- ✗ Bearings: the wrong angle, or measured from the wrong line
- ✗ Calculator set to radians instead of degrees
- ✗ Using the sine rule when two sides and the angle between them are given (that needs the cosine rule)

KEY FORMULAS

B = given in the exam (formula booklet or list); learn the rest.

Pythagoras $a^2 + b^2 = c^2$

SOHCAHTOA $\sin \theta = \frac{\text{opp}}{\text{hyp}}$, $\cos \theta = \frac{\text{adj}}{\text{hyp}}$, $\tan \theta = \frac{\text{opp}}{\text{adj}}$

Bearings: measured clockwise from north, written with 3 figures

Exact values $\sin 30^\circ = \frac{1}{2}$, $\cos 60^\circ = \frac{1}{2}$, $\tan 45^\circ = 1$,
 $\sin 60^\circ = \frac{\sqrt{3}}{2}$, $\sin 45^\circ = \frac{\sqrt{2}}{2}$

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

Cosine rule **B** $a^2 = b^2 + c^2 - 2bc \cos A$

Area of a triangle **B** $\frac{1}{2}ab \sin C$

Obtuse angles $\sin(180^\circ - x) = \sin x$,
 $\cos(180^\circ - x) = -\cos x$

WORKED EXAMPLE

A ladder 5 m long leans against a wall with its foot 1.4 m from the wall. Find the angle the ladder makes with the ground.

1. $\cos \theta = \text{adjacent/hypotenuse} = 1.4/5 = 0.28$

2. $\theta = \cos^{-1}(0.28)$

Answer: $\theta = 73.7^\circ$ (1 d.p.)