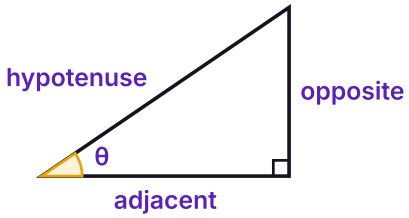
Richmond Tutoring

Trigonometry

SOHCAHTOA, the exact values you have to learn, and the Higher-tier rules for triangles that are not right-angled.



SOH $\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$

CAH $\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$

TOA $\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$

Which one do I use?

1. Label the sides from the angle: **hyp** (longest, opposite the right angle), **opp** (across from the angle), **adj** (next to it).
2. Tick the two sides you know or want. The ratio with both is the one to use.
3. Finding a side: rearrange and multiply or divide. Finding an angle: use $\sin^{-1}$, $\cos^{-1}$ or $\tan^{-1}$.
4. Check your calculator is in degrees (a small **D** on the screen).

Two worked examples

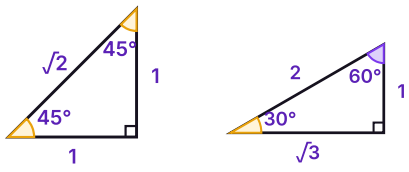
Find a side. Hypotenuse 10 cm, angle 35°, find the opposite side x.
$\sin 35° = x/10 \rightarrow x = 10 \times \sin 35° = 5.74$ cm (3 s.f.)

Find an angle. Opposite 7 cm, adjacent 12 cm.
$\tan\theta = 7/12 \rightarrow \theta = \tan^{-1}(7/12) = 30.3°$ (1 d.p.)

Pythagoras or trig? Two sides, finding the third side of a right-angled triangle: Pythagoras, $a^2 + b^2 = c^2$. An angle involved: trig.

Exact values LEARN THESE

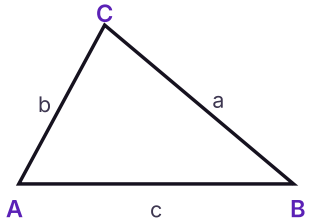
	0°	30°	45°	60°	90°
sin	0	½	√2/2	√3/2	1
cos	1	√3/2	√2/2	½	0
tan	0	√3/3	1	√3	—



You need these for non-calculator questions. Tan 90° has no value.

Forgotten one? Draw the two triangles: half a square (sides 1, 1, √2) and half an equilateral triangle (sides 1, √3, 2). Then use SOHCAHTOA on them.

Any triangle HIGHER



Side a is opposite angle A, and so on.

Sine rule

$a/\sin A = b/\sin B = c/\sin C$

Use with a pair: a side *and* its opposite angle.

Cosine rule

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

Use with two sides and the angle between them, or all three sides.

Area

Area = ½ ab sin C

Two sides and the angle between them.