Your notes

GCSE Maths: revision notes

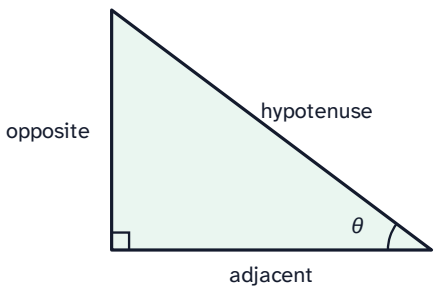
Trigonometry (SOHCAHTOA)

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Labelling the triangle

- Trigonometry links the sides and angles of right-angled triangles.
- The **hypotenuse** is the longest side, **opposite** the right angle. The **opposite** side is opposite the angle you are using. The adjacent side is next to that angle (but is not the hypotenuse).



SOHCAHTOA

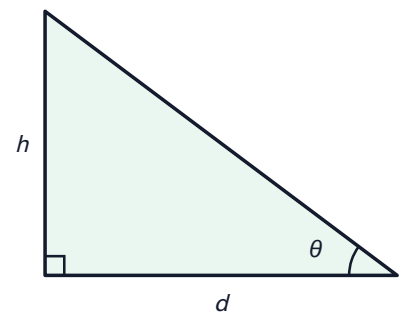
- sin θ = **opposite** ÷ **hypotenuse**. cos θ = **adjacent** ÷ hypotenuse. tan θ = opposite ÷ adjacent.
- Finding a side: if the **hypotenuse** is 10 cm and the angle is 30°, the **opposite** side is 10 × sin 30° = 5 cm.
- Finding an angle: use the inverse button. If the **opposite** side is 5 and the **adjacent** side is 12, θ = $\tan^{-1}(5 \div 12) = 22.6°$.

Exact values

- sin 0° = 0, sin 30° = ½, sin 45° = √2/2, sin 60° = √3/2, sin 90° = 1.
- cos 0° = 1, cos 30° = √3/2, cos 45° = √2/2, cos 60° = ½, cos 90° = 0.
- tan 0° = 0, tan 30° = √3/3 (= 1/√3), tan 45° = 1, tan 60° = √3.

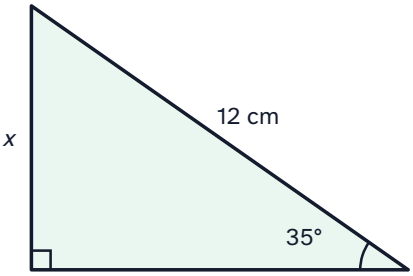
Elevation, depression and 3D

- The **angle of elevation** is measured up from the horizontal. The **angle of depression** is measured down from the horizontal.
- (Higher) In 3D problems, find a right-angled triangle inside the shape, then use Pythagoras or trigonometry.



Worked examples

In a right-angled triangle, the hypotenuse is 12 cm and the angle is 35°. Find x, the side opposite the angle, to 1 decimal place.



Label the sides from the angle: you have the hypotenuse (H) and want the opposite (O). **O and H, so use SOH: sin θ = O ÷ H**

Write the equation. **sin 35° = x ÷ 12**

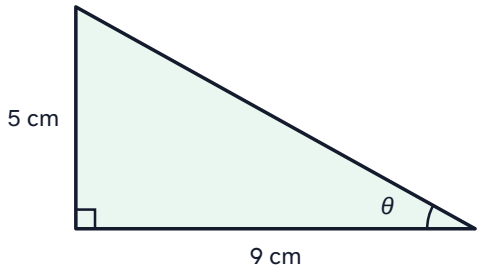
Multiply both sides by 12. **x = 12 × sin 35°**

Use your calculator (in degrees). **x = 6.8829...**

Answer: x = 6.9 cm

Your notes

The opposite side is 5 cm and the adjacent side is 9 cm. Find the angle θ to 1 decimal place.



You have the opposite (O) and adjacent (A), so use TOA. **$\tan \theta = 5 \div 9$**

Use inverse tan (shift, tan) to find the angle. **$\theta = \tan^{-1}(5 \div 9) = 29.054...°$**

Answer: θ = 29.1°

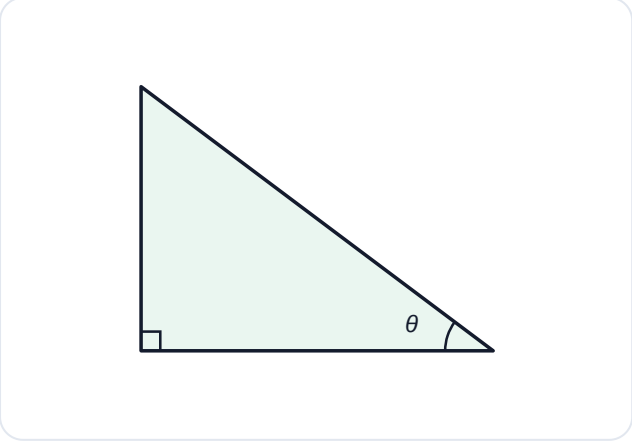
Key terms

Hypotenuse	The longest side of a right-angled triangle, opposite the right angle.
Opposite	The side opposite the angle you are using.
Adjacent	The side next to the angle you are using, which is not the hypotenuse.
Sine (sin)	Opposite ÷ hypotenuse.
Cosine (cos)	Adjacent ÷ hypotenuse.
Tangent (tan)	Opposite ÷ adjacent.
Angle of elevation	The angle measured upwards from the horizontal.
Angle of depression	The angle measured downwards from the horizontal.

Quick questions

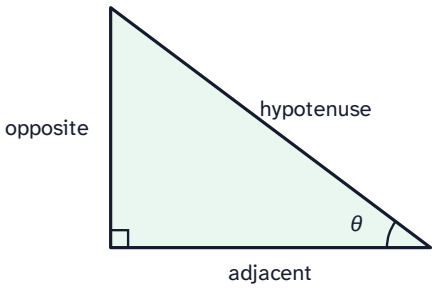
Cover the answers and test yourself: remembering is what makes it stick.

1. Which side is the hypotenuse?

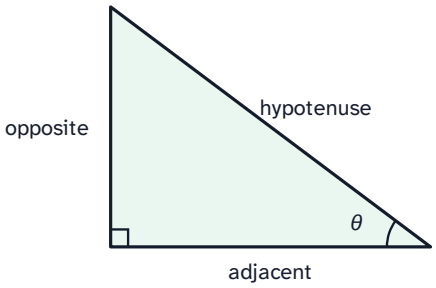


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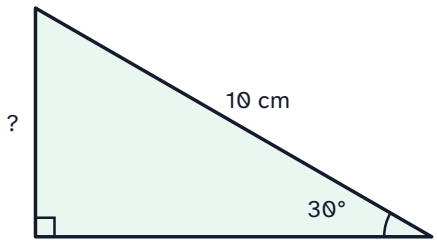
2. Which ratio is opposite ÷ hypotenuse?



3. Which ratio is adjacent ÷ hypotenuse?

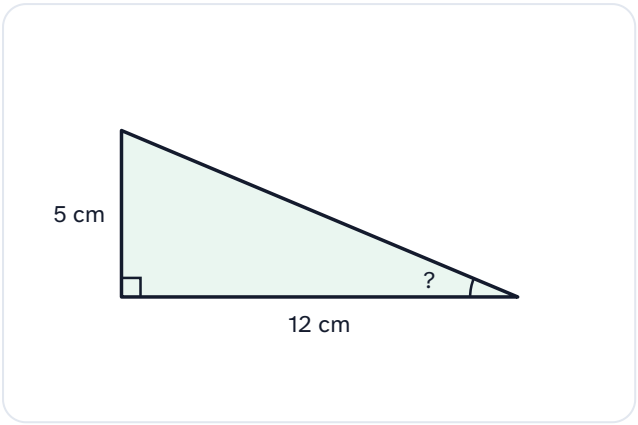


4. A right-angled triangle has a hypotenuse of 10 cm and an angle of 30°. How long is the side opposite the 30° angle?



Your notes

5. The opposite side is 5 cm and the adjacent side is 12 cm. What is the angle, to 1 d.p.?



6. What is sin 30°?
7. What is tan 45°?
8. What is cos 90°?

Answers

1. The longest side, opposite the right angle
2. Sine
3. Cosine
4. 5 cm
5. 22.6°
6. 0.5
7. 1
8. 0

What to do next

Practise 12 questions on this topic

Try 4 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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