Trigonometry Intro

KS3 Maths · Follows the national curriculum

Name _____ Class _____ Date _____

1. Worked example

Find the opposite side: angle 25°, hypotenuse 12cm.

Step 1 · Identify the ratio needed

We know hypotenuse, want opposite → use SOH (sine)

Step 2 · Write the equation

$\sin 25° = \text{opposite} \div 12$

Step 3 · Rearrange and calculate

$\text{opposite} = 12 \times \sin 25° = 12 \times 0.423 = 5.07\text{cm}$

Answer: 5.07cm

Check: 5.07 ÷ 12 = 0.4225, which matches sin 25° = 0.4226 ✓

2. Now try one with the steps

Find the angle θ: opposite side 4 cm, adjacent side 9 cm.

Step 1 · Opposite and adjacent are known → TOA

Step 2 · Use the inverse function

Step 3 · Calculate and round

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. In a right triangle, the angle is 30°, the hypotenuse is 10cm. Find the opposite side using sine. [2]

2. Which trig ratio connects the adjacent and hypotenuse sides? [1]

3. A right triangle has an angle of 40°, with the adjacent side 8cm. Find the hypotenuse using cosine. [3]

4. A right triangle has opposite side 6cm and adjacent side 8cm. Find the angle using tangent. [3]

5. A ladder leans against a wall, making a 65° angle with the ground. The ladder is 4m long. How high up the wall does it reach? [3]

6. From a point 50m from the base of a tower, the angle of elevation to the top is 38°. Find the height of the tower. [3]

7. In a right-angled triangle, what is the side opposite the right angle called? [1]

8. Which trig ratio connects the opposite and adjacent sides? [1]

9. A right-angled triangle has an angle of 50° and the side adjacent to it is 6 cm. Find the opposite side to 1 decimal place. [2]

10. A right-angled triangle has an angle of 35° and a hypotenuse of 20 cm. Find the side adjacent to the angle to 1 decimal place. [2]

11. A right-angled triangle has opposite side 5 cm and hypotenuse 13 cm. Find the angle to 1 decimal place. [2]

12. A right-angled triangle has adjacent side 7 cm and hypotenuse 10 cm. Find the angle to 1 decimal place. [2]

13. A right-angled triangle has an angle of 60° and the side opposite it is 9 cm. Find the hypotenuse to 1 decimal place. [3]

14. A wheelchair ramp rises 1.2 m over a horizontal distance of 5 m. Find the angle it makes with the ground, to 1 decimal place. [3]

15. A kite string 30 m long makes an angle of 52° with the flat ground. How high is the kite, to 1 decimal place? [3]

16. A 5 m ladder has its foot 1.5 m from a wall. Find the angle between the ladder and the ground, to 1 decimal place. [3]

4. Before you hand it in

Using the wrong trig ratio because the labelling of opposite/adjacent was incorrect

The 'opposite' side is opposite the angle you're working with; the 'adjacent' side is next to it (but not the hypotenuse). If you change which angle you're focusing on, opposite and adjacent can SWAP.

Forgetting to use the inverse function ($\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$) when finding an ANGLE rather than a side

If you know two SIDES and want the ANGLE, use the inverse trig function (e.g. $\tan^{-1}$) on your calculator. If you know the ANGLE and one SIDE and want another SIDE, use the regular sin/cos/tan.

Getting sin 30° = –0.988 on the calculator

Check the display shows D or DEG before you start. sin 30° should give 0.5 — a quick test that your calculator is in the right mode.