

Exercise walk-through

Right-angled triangles ■ E6.2

eXercise

You must be able to

- label opposite, adjacent and hypotenuse
- use $\sin$, $\cos$, $\tan$ to find a missing side
- use the inverse ratios to find a missing angle

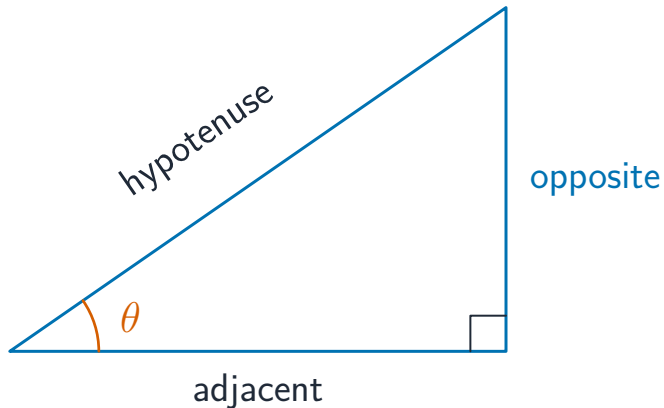
Method — SOH-CAH-TOA

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

- **Find a side:** hyp 10, angle $30^\circ \rightarrow \text{opp} = 10 \sin 30^\circ = 5$.
- **Find an angle:** opp 4, adj 3 $\rightarrow \tan \theta = \frac{4}{3} \rightarrow \theta = \tan^{-1} \frac{4}{3} = 53.1^\circ$.

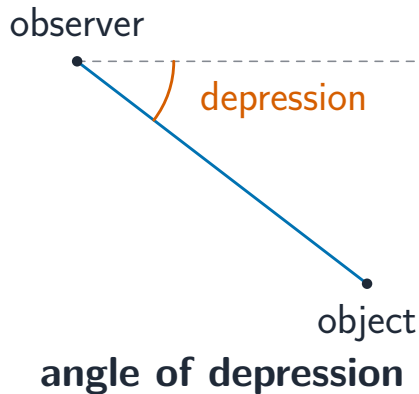
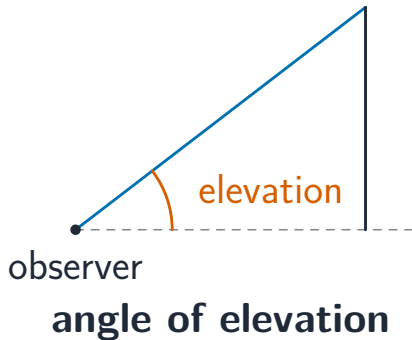
Answer shapes: **M1** a correct method, **A1** the correct answer.

Method — SOH-CAH-TOA



Name the sides from the angle: opposite, adjacent, hypotenuse

Method — SOH-CAH-TOA



Angles of elevation and depression apply right-triangle trig

Practice 2.1 ■ 2 marks

A right-angled triangle has hypotenuse 12 cm and angle 40° . Find the opposite side.

Solution 2.1

Method: SOH-CAH-TOA

Worked steps

$$\text{opp} = 12 \times \sin 40^\circ = 12 \times 0.643 = 7.71 \text{ cm} \quad \text{M1} \quad \text{A1} \quad \text{for } 12 \sin 40; \text{ for } 7.71.$$

Practice 2.2 ■ 2 marks

A right-angled triangle has opposite 5 cm and hypotenuse 10 cm. Find the angle.

Solution 2.2

Method: SOH-CAH-TOA

Worked steps

$$\sin \theta = \frac{5}{10} = 0.5 \rightarrow \theta = 30^\circ \quad \text{M1 A1 for } \sin \theta = 0.5; \text{ for } 30^\circ.$$

Practice 2.3 ■ 2 marks

A right-angled triangle has adjacent 8 cm and angle 35° . Find the opposite side.

Solution 2.3

Method: SOH-CAH-TOA

Worked steps

$$\text{opp} = 8 \times \tan 35^\circ = 8 \times 0.700 = 5.60 \text{ cm} \quad \text{M1} \quad \text{A1} \quad \text{for } 8 \tan 35; \text{ for } 5.60.$$

Exam-style 3.1 ■ 2 marks

In a right-angled triangle, the side opposite an angle is 7 cm and the adjacent side is 10 cm. Find the angle.

Solution 3.1

Method: SOH-CAH-TOA

Worked steps

$$\tan \theta = \frac{7}{10} = 0.7 \rightarrow \theta = \tan^{-1}(0.7) = 35.0^\circ \quad \text{M1} \quad \text{A1} \quad \text{for } \tan \theta = 0.7; \text{ for } 35.0^\circ.$$

Exam-style 3.2 ■ 2 marks

A right-angled triangle has hypotenuse 15 cm and an angle of 52° . Find the side adjacent to the angle.

Solution 3.2

Method: SOH-CAH-TOA

Worked steps

$$\text{adj} = 15 \times \cos 52^\circ = 15 \times 0.616 = 9.23 \text{ cm} \quad \text{M1} \quad \text{A1} \quad \text{for } 15 \cos 52; \text{ for } 9.23.$$

Exam-style 3.3 ■ 2 marks

A ramp rises 1.2 m over a horizontal distance of 5 m. Find the angle the ramp makes with the horizontal.

Solution 3.3

Worked steps

$$\tan \theta = \frac{1.2}{5} = 0.24 \rightarrow \theta = \tan^{-1}(0.24) = 13.5^\circ \quad \text{M1} \quad \text{A1} \quad \text{for } \tan \theta = 0.24; \text{ for } 13.5^\circ.$$