IGCSE MATHEMATICS • EXERCISE SHEET

E6.2 Right-angled triangles

Name: _____ Class: _____ Date: _____ **Total: 12 marks**

KEY WORDS adjacent 邻边 • sine 正弦 • right-angled triangles 直角三角形 • cosine 余弦 • triangle 三角形

Objective

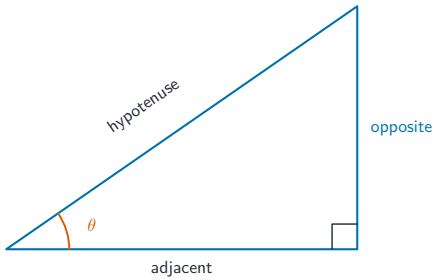
Build the skills to answer Extended exam questions on **right-angled triangles** 直角三角形 — the **sine, cosine and tangent** 正弦、余弦、正切 ratios (SOH-CAH-TOA), to find a side or an angle.

You must be able to:

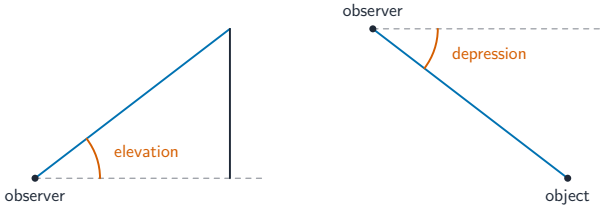
- label opposite, adjacent and hypotenuse
- use sin, cos, tan to find a missing side
- use the inverse ratios to find a missing angle

1 Worked examples

SOH-CAH-TOA



Give angle answers to 1 decimal place



Angles of elevation and depression apply right-triangle trig

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

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

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

2 Practice

2.1 A right-angled triangle has hypotenuse 12 cm and angle 40°. Find the opposite side. [2]

2.2 A right-angled triangle has opposite 5 cm and hypotenuse 10 cm. Find the angle. [2]

2.3 A right-angled triangle has adjacent 8 cm and angle 35°. Find the opposite side. [2]

3 Exam-style questions

3.1 In a right-angled triangle, the side opposite an angle is 7 cm and the adjacent side is 10 cm. Find the angle. [2]

3.2 A right-angled triangle has hypotenuse 15 cm and an angle of 52°. Find the side adjacent to the angle. [2]

3.3 A ramp rises 1.2 m over a horizontal distance of 5 m. Find the angle the ramp makes with the horizontal. [2]

Solutions

Marking: **M1** a correct method, **A1** the correct answer.

2.1 $\text{opp} = 12 \times \sin 40° = 12 \times 0.643 = 7.71$ cm.

2.2 $\sin\theta = \frac{5}{10} = 0.5 \to \theta = 30°$.

2.3 $\text{opp} = 8 \times \tan 35° = 8 \times 0.700 = 5.60$ cm.

3.1 $\tan\theta = \frac{7}{10} = 0.7 \to \theta = \tan^{-1}(0.7) = 35.0°$.

3.2 $\text{adj} = 15 \times \cos 52° = 15 \times 0.616 = 9.23$ cm.

3.3 $\tan\theta = \frac{1.2}{5} = 0.24 \to \theta = \tan^{-1}(0.24) = 13.5°$.