

Exercise walk-through

Pythagoras' theorem ■ E6.1

eXercise

You must be able to

- use $a^2 + b^2 = c^2$ to find the hypotenuse
- rearrange to find a shorter side
- apply Pythagoras to a practical problem

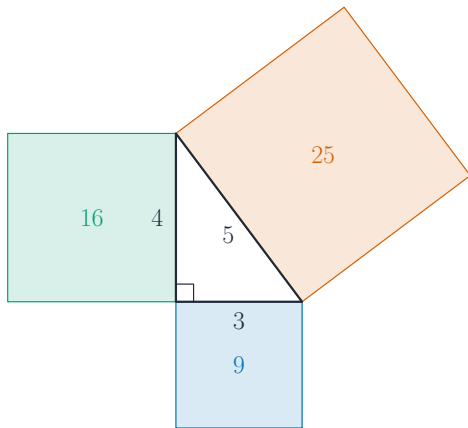
Method — Pythagoras' theorem

$$a^2 + b^2 = c^2$$

- **Find hypotenuse:** legs 3 and 4 $\rightarrow c = \sqrt{9 + 16} = 5$.
- **Find a short side:** hyp 13, leg 5 $\rightarrow \text{other} = \sqrt{169 - 25} = \sqrt{144} = 12$.

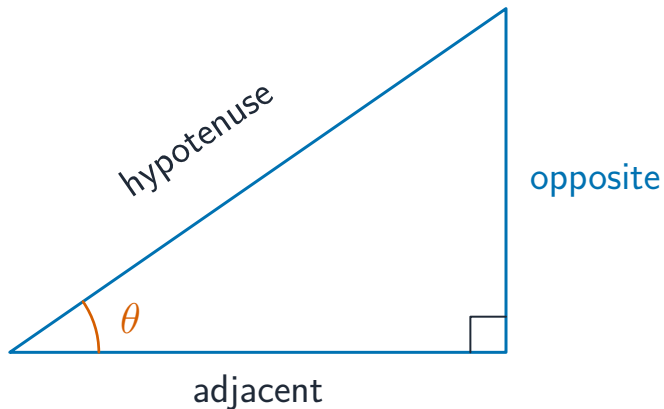
Answer shapes: **M1** a correct method, **A1** the correct answer.

Method — Pythagoras' theorem



The squares on the two shorter sides ($9+16$) add to the square on the hypotenuse (25)

Method — Pythagoras' theorem



The same right triangle is used in trigonometry

Practice 2.1 ■ 2 marks

A right-angled triangle has legs 6 cm and 8 cm. Find the hypotenuse.

Solution 2.1

Method: Pythagoras' theorem

Worked steps

$$c = \sqrt{6^2 + 8^2} = \sqrt{100} = 10 \text{ cm} \quad \text{M1} \quad \text{A1} \quad \text{for } \sqrt{36 + 64}; \text{ for } 10.$$

Practice 2.2 ■ 2 marks

A right-angled triangle has hypotenuse 17 cm and one leg 8 cm. Find the other leg.

Solution 2.2

Method: Pythagoras' theorem

Worked steps

$$\text{other leg} = \sqrt{17^2 - 8^2} = \sqrt{289 - 64} = \sqrt{225} = 15 \text{ cm} \quad \text{M1} \quad \text{A1} \quad \text{for } 17^2 - 8^2; \text{ for } 15.$$

Practice 2.3 ■ 2 marks

A right-angled triangle has legs 5 cm and 12 cm. Find the hypotenuse.

Solution 2.3

Method: Pythagoras' theorem

Worked steps

$$c = \sqrt{5^2 + 12^2} = \sqrt{169} = 13 \text{ cm} \quad \text{M1} \quad \text{A1} \quad \text{for 13.}$$

Exam-style 3.1 ■ 3 marks

A ladder of length 5 m leans against a wall. Its foot is 1.4 m from the wall. Find how high up the wall it reaches, correct to 2 decimal places.

Solution 3.1

Worked steps

height = $\sqrt{5^2 - 1.4^2} = \sqrt{25 - 1.96} = \sqrt{23.04} = 4.80$ m **M1** **M1** **A1** *for $5^2 - 1.4^2$;
for the square root; for 4.80.*

Exam-style 3.2 ■ 2 marks

A rectangle is 9 cm by 12 cm. Find the length of its diagonal.

Solution 3.2

Worked steps

$$\text{diagonal} = \sqrt{9^2 + 12^2} = \sqrt{81 + 144} = \sqrt{225} = 15 \text{ cm} \quad \text{M1} \quad \text{A1} \quad \text{for 15.}$$