

E6.1 Pythagoras' theorem

Name: _____ Class: _____ Date: _____

Total: 11 marks

KEY WORDS triangle 三角形 • right-angled triangle 直角三角形 • hypotenuse 斜边 • pythagoras' theorem 勾股定理
• opposite 对边

Objective

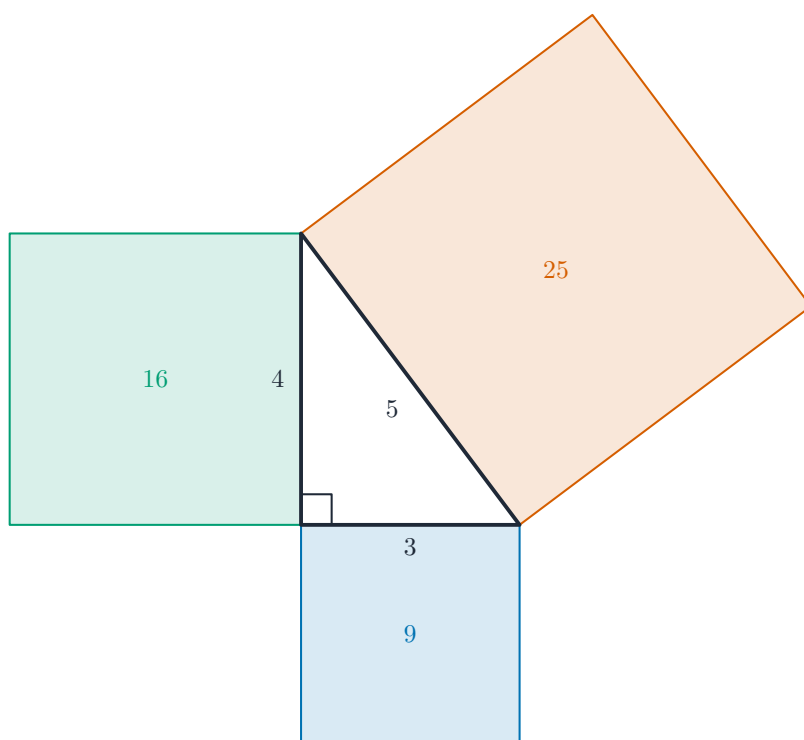
Build the skills to answer Extended exam questions on **Pythagoras' theorem** 勾股定理 — finding a missing side of a **right-angled triangle** 直角三角形.

You must be able to:

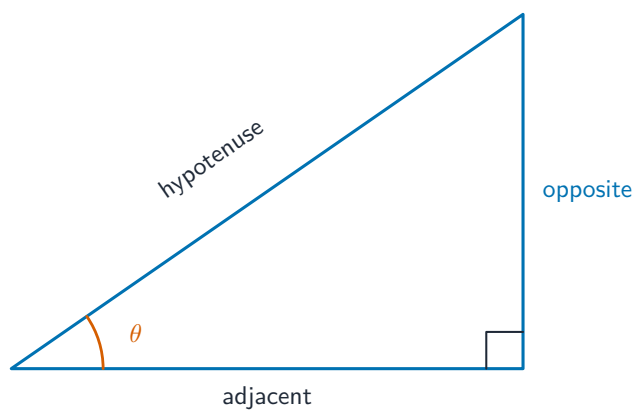
- use $a^2 + b^2 = c^2$ to find the hypotenuse
- rearrange to find a shorter side
- apply Pythagoras to a practical problem

1 Worked examples

- Pythagoras' theorem



The hypotenuse is the longest side, opposite the right angle



The same right triangle is used in trigonometry

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

- **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.

2 Practice

2.1 A right-angled triangle has legs 6 cm and 8 cm. Find the hypotenuse. [2]

2.2 A right-angled triangle has hypotenuse 17 cm and one leg 8 cm. Find the other leg. [2]

2.3 A right-angled triangle has legs 5 cm and 12 cm. Find the hypotenuse. [2]

3 Exam-style questions

3.1 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. [3]

3.2 A rectangle is 9 cm by 12 cm. Find the length of its diagonal. [2]

Solutions

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

2.1 $c = \sqrt{6^2 + 8^2} = \sqrt{100} = 10 \text{ cm.}$

2.2 other leg $= \sqrt{17^2 - 8^2} = \sqrt{289 - 64} = \sqrt{225} = 15 \text{ cm.}$

2.3 $c = \sqrt{5^2 + 12^2} = \sqrt{169} = 13 \text{ cm.}$

3.1 height $= \sqrt{5^2 - 1.4^2} = \sqrt{25 - 1.96} = \sqrt{23.04} = 4.80 \text{ m.}$

3.2 diagonal $= \sqrt{9^2 + 12^2} = \sqrt{81 + 144} = \sqrt{225} = 15 \text{ cm.}$