



KS3.M-G14 Pythagoras' Theorem

AQA KS3.M-G14 · Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** A right-angled triangle has short sides 3 cm and 4 cm. Work out the length of the hypotenuse.

(1)

- 2** A right-angled triangle has legs 6 cm and 8 cm. Give the length of the hypotenuse.

(1)

- 3** Find the length of the hypotenuse of a right-angled triangle with sides 5 cm and 12 cm.

(2)

- 4** A square has side length 7 cm. A diagonal of the square is the hypotenuse of a right triangle formed by two adjacent sides. Calculate the length of the diagonal.

(2)

- 5** Work out the length of the shorter side in a right-angled triangle if the hypotenuse is 13 cm and the other short side is 5 cm.

(2)

- 6** A ladder leans against a wall. The base of the ladder is 4 m from the wall and the top reaches 3 m up the wall. Calculate the length of the ladder.

(3)

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- 7** A right-angled triangle has hypotenuse 17 cm and one short side 8 cm. Find the other short side.

(3)

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- 8** A right-angled triangle has sides 9 cm and 40 cm. Work out the length of the hypotenuse.

(3)

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- 9** A rectangular garden has length 15 m and width 8 m. A path runs from one corner to the opposite corner. Calculate the length of the path.

(a) Write down the calculation to find the diagonal of the rectangle.

(1)

(b) Hence find the length of the path.

(3)

10 A right-angled triangle has sides 7 m and 24 m. Calculate the length of the hypotenuse and give your answer in metres.

(a) Show the calculation for the square of the hypotenuse. (1)

(b) Find the hypotenuse length. (3)

11 A right-angled triangle has hypotenuse 26 cm and one short side 10 cm. Calculate the other short side.

(3)

12 A ramp rises 1.2 m over a horizontal distance of 3.5 m. Calculate the length of the ramp to the nearest centimetre.

(3)

13 A triangular park has right angle at A. The sides meeting at A are 30 m and 16 m. Find the distance between the two far corners (the hypotenuse).

(2)

- 14** A square picture has diagonal 14 cm. Find the length of each side of the square, giving your answer in cm to 2 decimal places.

(2)

- 15** A triangular sail is right-angled with equal short sides of length x . The hypotenuse measures 10 m. Find x .

(3)

- 16** A TV screen has width 48 cm and diagonal 55 cm. Calculate the height of the screen to the nearest millimetre.

(3)

- 17** A triangular field is right-angled. One short side is 150 m and the hypotenuse is 170 m. A farmer wants to fence the two short sides only. Calculate the total length of fencing needed, giving your answer in metres.

(4)

- 18** A pedestrian bridge crosses a river. The supports are 9 m apart on the bank and the bridge is 12 m long across the river forming a right-angled triangle with the bank. A safety cable runs diagonally from the far end of the bridge to the nearer support on the same bank. Calculate the length of the safety cable to the nearest centimetre.

(4)

Mark scheme · KS3.M-G14 Pythagoras' Theorem

Question 1

- **B1** 5 cm cao
- Answer: **5 cm**

Question 2

- **B1** 10 cm cao
- Answer: **10 cm**

Question 3

- **M1** correct method: $5^2 + 12^2 = 25 + 144 = 169$ oe
- **A1** 13 cm cao
- Answer: **13 cm**

Question 4

- **M1** method: $\text{diagonal}^2 = 7^2 + 7^2 = 49 + 49 = 98$
- **A1** $\sqrt{98} = 7\text{sqrt}(2)$ cm cao
- Answer: **7sqrt(2) cm**

Question 5

- **M1** method: $\text{shorter}^2 = 13^2 - 5^2 = 169 - 25 = 144$
- **A1** 12 cm cao
- Answer: **12 cm**

Question 6

- **M1** method: $\text{length}^2 = 4^2 + 3^2 = 16 + 9 = 25$
- **A1** length = 5 m cao
- **B1** units stated (m) or implied
- Answer: **5 m**

Question 7

- **M1** method: $\text{other}^2 = 17^2 - 8^2 = 289 - 64 = 225$
- **A1** other = 15 cm cao
- **B1** units stated (cm) or implied
- Answer: **15 cm**

Question 8

- **M1** method: $\text{hyp}^2 = 9^2 + 40^2 = 81 + 1600 = 1681$
- **A1** hyp = 41 cm cao
- **B1** units stated (cm) or implied
- Answer: **41 cm**

Question 9

- (a) **M1** expression $15^2 + 8^2 = 225 + 64 = 289$ stated
- (a) Answer: **$15^2 + 8^2 = 289$**
- (b) **M1** method: $\text{diagonal} = \sqrt{289}$
- (b) **A1** diagonal = 17 m cao
- (b) **B1** units stated (m) or implied
- (b) Answer: **17 m**

Question 10

- (a) **M1** $7^2 + 24^2 = 49 + 576 = 625$ stated
- (a) **Answer: $7^2 + 24^2 = 625$**
- (b) **M1** method: $\text{hyp} = \sqrt{625}$
- (b) **A1** $\text{hyp} = 25 \text{ m}$ **cao**
- (b) **B1** units stated (m) or implied
- (b) **Answer: 25 m**

Question 11

- **M1** method: $\text{other}^2 = 26^2 - 10^2 = 676 - 100 = 576$
- **A1** $\text{other} = 24 \text{ cm}$ **cao**
- **B1** units stated (cm) or implied
- **Answer: 24 cm**

Question 12

- **M1** method: $\text{length}^2 = 1.2^2 + 3.5^2 = 1.44 + 12.25 = 13.69$
- **A1** $\text{length} = \sqrt{13.69} = 3.7 \text{ m}$ (to 2 s.f.)
- **B1** length given to nearest cm as 370 cm **cao**
- **Answer: 370 cm**

Question 13

- **M1** method: $\text{hyp}^2 = 30^2 + 16^2 = 900 + 256 = 1156$
- **A1** $\text{hyp} = 34 \text{ m}$ **cao**
- **Answer: 34 m**

Question 14

- **M1** method: $\text{side}^2 + \text{side}^2 = 14^2$ so $2\text{side}^2 = 196$, $\text{side}^2 = 98$
- **A1** $\text{side} = \sqrt{98} = 9.8994949\dots$ so 9.90 cm **cao**
- **Answer: 9.90 cm**

Question 15

- **M1** method: $x^2 + x^2 = 10^2 \Rightarrow 2x^2 = 100$
- **M1** $x^2 = 50$, so $x = \sqrt{50}$
- **A1** $x = 5\sqrt{2} \text{ m}$ or 7.07 m to 2 d.p. **cao**
- **Answer: $5\sqrt{2} \text{ m}$**

Question 16

- **M1** method: $\text{height}^2 = 55^2 - 48^2 = 3025 - 2304 = 721$
- **M1** $\text{height} = \sqrt{721} = 26.851\dots \text{ cm}$
- **A1** $\text{height} = 268.5 \text{ mm} \rightarrow$ to nearest mm 269 mm **cao**
- **Answer: 269 mm**

Question 17

- **M1** method: $\text{other short side}^2 = 170^2 - 150^2 = 28900 - 22500 = 6400$
- **M1** $\text{other short side} = 80 \text{ m}$
- **A1** $\text{total fencing} = 150 + 80 = 230 \text{ m}$
- **B1** units stated (m) or implied
- **Answer: 230 m**

Question 18

- **M1** model: $\text{cable}^2 = 12^2 + 9^2 = 144 + 81 = 225$
- **M1** cable = $\sqrt{225} = 15$ m
- **A1** convert to cm: 15 m = 1500 cm
- **B1** length to nearest cm 1500 cm cao
- **Answer: 1500 cm**