

Worksheet: Pythagoras' theorem in two dimensions · Calculator

TIME 35 min	TOTAL 32 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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NAME	CLASS	DATE
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- Use black ink or ball-point pen.
- Answer all questions. Answer the questions in the spaces provided – there may be more space than you need.
- Calculators may be used. If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must show all your working.

1

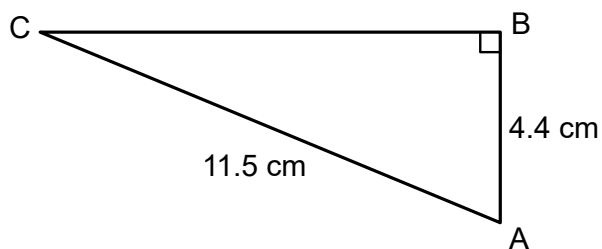
A triangle has sides of length 15 cm, 20 cm and 25 cm.
Is the triangle right-angled? You must show your working.

(2)

(Total for Question 1 is 2 marks)

2

ABC is a right-angled triangle.
Diagram NOT accurately drawn.



Work out the length of BC .
Give your answer correct to 1 decimal place.

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.....

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..... cm

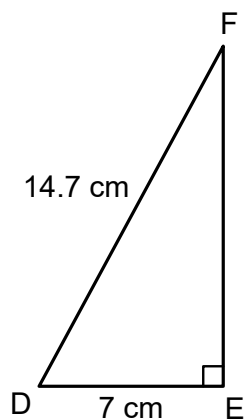
(3)

(Total for Question 2 is 3 marks)

.....

3

DEF is a right-angled triangle.
Diagram NOT accurately drawn.



Work out the length of EF .
Give your answer correct to 1 decimal place.

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..... cm

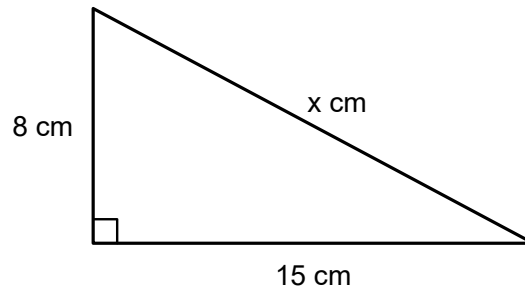
(3)

(Total for Question 3 is 3 marks)

4

The diagram shows a right-angled triangle.

Diagram NOT accurately drawn.



Work out the value of x .

$x =$

(3)

(Total for Question 4 is 3 marks)

5

A is the point $(-2, 2)$.

B is the point $(-10, 0)$.

Work out the length of AB .

Give your answer as a surd in its simplest form.

.....

(3)

(Total for Question 5 is 3 marks)

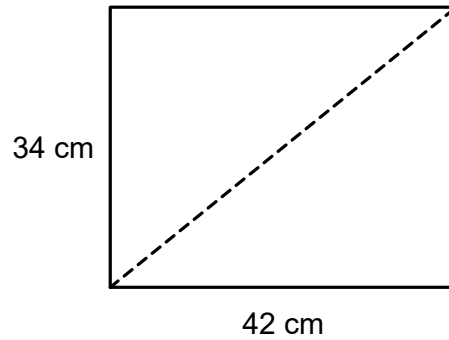
6

The base of a box is a rectangle 42 cm long and 34 cm wide.

A metal rod is 55 cm long.

The metal rod needs to lie flat on the base of the box.

Diagram NOT accurately drawn.



Will the metal rod fit flat on the base of the box?

You must show how you get your answer.

(4)

(Total for Question 6 is 4 marks)

7

A is the point $(5, 3)$.

B is the point $(-10, -5)$.

Work out the length of AB .

.....

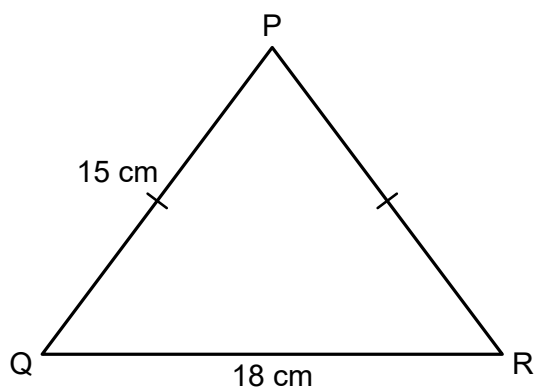
(3)

(Total for Question 7 is 3 marks)

8

PQR is an isosceles triangle with $PQ = PR = 15$ cm and $QR = 18$ cm.

Diagram NOT accurately drawn.



Work out the area of triangle PQR .

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..... cm²

(4)

(Total for Question 8 is 4 marks)

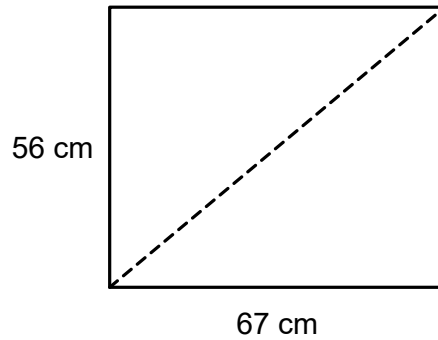
9

The base of a box is a rectangle 67 cm long and 56 cm wide.

A curtain rail is 86 cm long.

The curtain rail needs to lie flat on the base of the box.

Diagram NOT accurately drawn.



Will the curtain rail fit flat on the base of the box?

You must show how you get your answer.

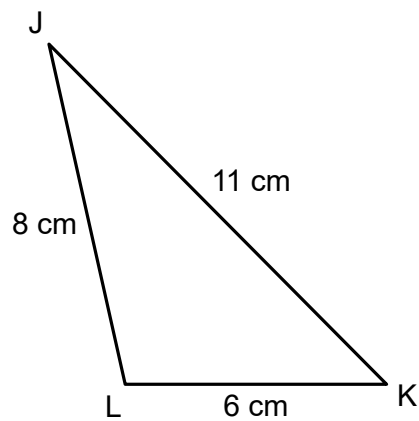
(4)

(Total for Question 9 is 4 marks)

10

Here is triangle JKL .

Diagram NOT accurately drawn.



Is triangle JKL a right-angled triangle?

You must show all your working.

(3)

(Total for Question 10 is 3 marks)

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by Pearson Edexcel.

Mark scheme

GCSE Mathematics · Worksheet: Pythagoras' theorem in two dimensions · 32 marks

Question 1 (2 marks)

[2 marks]

Answer: Yes: $15^2 + 20^2 = 625$ and $25^2 = 625$, which are equal.

- **M1** for $15^2 + 20^2 = 625$ and $25^2 = 625$
- **C1** for “Yes” with a correct comparison

Worked solution: $15^2 + 20^2 = 225 + 400 = 625$ and $25^2 = 625$.

These are equal, so by the converse of Pythagoras' theorem the triangle is right-angled.

Question 2 (3 marks)

[3 marks]

Answer: 10.6 cm

- **M1** for $11.5^2 - 4.4^2 (= 112.89)$
- **M1** for $\sqrt{11.5^2 - 4.4^2}$ or $\sqrt{112.89}$
- **A1** for 10.6 (10.62...)

Notes: An answer that is not rounded to 1 decimal place, e.g. 10.625, scores M1 M1 A0.

Worked solution: $BC^2 = 11.5^2 - 4.4^2 = 112.89$

$BC = \sqrt{112.89} = 10.62 \dots$, so $BC = 10.6$ cm (1 d.p.)

Question 3 (3 marks)

[3 marks]

Answer: 12.9 cm

- **M1** for $14.7^2 - 7^2 (= 167.09)$
- **M1** for $\sqrt{14.7^2 - 7^2}$ or $\sqrt{167.09}$
- **A1** for 12.9 (12.92...)

Notes: An answer that is not rounded to 1 decimal place, e.g. 12.926, scores M1 M1 A0.

Worked solution: $EF^2 = 14.7^2 - 7^2 = 167.09$

$EF = \sqrt{167.09} = 12.92 \dots$, so $EF = 12.9$ cm (1 d.p.)

Question 4 (3 marks)

[3 marks]

Answer: $x = 17$

- M1 for $8^2 + 15^2 (= 289)$
- M1 for $\sqrt{289}$
- A1 for 17 cao

Worked solution: $x^2 = 8^2 + 15^2 = 64 + 225 = 289$, so $x = \sqrt{289} = 17$.

Question 5 (3 marks)

[3 marks]

Answer: $AB = 2\sqrt{17}$

- M1 for the horizontal and vertical distances 8 and 2 (or their squares)
- M1 for $\sqrt{8^2 + 2^2} (= \sqrt{68})$
- A1 for $2\sqrt{17}$

Notes: A decimal answer scores M1 M1 A0.

Worked solution: Difference in the x -coordinates $= -10 - (-2) = -8$; difference in the y -coordinates $= 0 - 2 = -2$.

$$AB = \sqrt{8^2 + 2^2} = \sqrt{68} = 2\sqrt{17}$$

Question 6 (4 marks)

[4 marks]

Answer: No: the diagonal of the base is 54.0 cm, which is less than 55 cm.

- P1 for $42^2 + 34^2 (= 2920)$
- P1 for $\sqrt{2920}$
- A1 for 54.03...
- C1 for no with a correct comparison of 55 cm with their diagonal

Worked solution: The longest length that can lie flat on the base is the diagonal of the rectangle.

$$d^2 = 42^2 + 34^2 = 2920, \text{ so } d = 54.037 \dots \text{ cm.}$$

55 cm is more than 54.0 cm, so the metal rod will not fit.

Question 7 (3 marks)

[3 marks]

Answer: $AB = 17$

- M1 for the horizontal and vertical distances 15 and 8 (or their squares)
- M1 for $\sqrt{15^2 + 8^2} (= \sqrt{289})$
- A1 for 17

Worked solution: Difference in the x -coordinates $= -10 - 5 = -15$; difference in the y -coordinates $= -5 - 3 = -8$.

$$AB = \sqrt{15^2 + 8^2} = \sqrt{289} = 17$$

Question 8 (4 marks)

[4 marks]

Answer: 108 cm²

- M1 for $18 \div 2 (= 9)$ used in a right-angled triangle
- M1 for $15^2 - 9^2 (= 144)$
- M1 for $\frac{1}{2} \times 18 \times 12$
- A1 for 108

Worked solution: The perpendicular height from P meets QR at its midpoint, so half the base is 9 cm.

$$\text{Height} = \sqrt{15^2 - 9^2} = \sqrt{144} = 12 \text{ cm}$$

$$\text{Area} = \frac{1}{2} \times 18 \times 12 = 108 \text{ cm}^2$$

Question 9 (4 marks)

[4 marks]

Answer: Yes: the diagonal of the base is 87.3 cm, which is more than 86 cm.

- P1 for $67^2 + 56^2 (= 7625)$
- P1 for $\sqrt{7625}$
- A1 for 87.32...
- C1 for yes with a correct comparison of 86 cm with their diagonal

Worked solution: The longest length that can lie flat on the base is the diagonal of the rectangle.

$$d^2 = 67^2 + 56^2 = 7625, \text{ so } d = 87.321 \dots \text{ cm.}$$

86 cm is less than 87.3 cm, so the curtain rail will fit.

Question 10 (3 marks)

[3 marks]

Answer: No: $6^2 + 8^2 = 100$ but $11^2 = 121$

- **M1** for squaring the sides, e.g. 36, 64 and 121
- **M1** for $6^2 + 8^2 = 100$ compared with $11^2 = 121$
- **C1** for No, with a correct reason, e.g. $100 \neq 121$

Notes: Accept a correct method using any equivalent comparison.

Worked solution: $6^2 + 8^2 = 36 + 64 = 100$ and $11^2 = 121$.

These are not equal, so the triangle is not right-angled.
