

Multi-Step Pythagoras



Key idea

Use Pythagoras to find a hidden length. Then use it in a **second** step: area, perimeter, or comparison.

Method

1. Find the hidden right triangle.
2. Get the missing side.
3. Use it in step two; add units.

Example: height then area

Isosceles: sides 13, base 10.
Half base = 5, so $h^2 = 13^2 - 5^2 = 144$, $h = 12$.
Area = $\frac{1}{2} \times 10 \times 12 = 60 \text{ cm}^2$.

Common mistake

Do not stop at the height or diagonal — finish the real target.

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Two Steps in Action



Diagonal then perimeter

Rectangle 6×8 .

$$d^2 = 6^2 + 8^2 = 100, \text{ so } d = 10.$$

$$\text{Perimeter} = 2(6 + 8) = 28 \text{ cm.}$$

Common mistake

Write the intermediate length down clearly, so you do not mix it up with the final target.

Compare two routes

Rectangle 8×15 .

$$d^2 = 8^2 + 15^2 = 289, \text{ so } d = 17.$$

Two sides = 23, so the diagonal is 6 m shorter.

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Exact Answers (Surds)



Key idea

Sometimes the length is not whole. Leave it **exact** as a surd unless asked to round.

Square from its diagonal

Square, diagonal 18, side s : $s^2 + s^2 = 18^2$.

$2s^2 = 324$, $s^2 = 162$, so $s = 9\sqrt{2}$ cm.

Common mistake

Do not round the intermediate length too early. Keep it exact, then round only the final answer.

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