

Pythagoras theory finding short and long sides

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Pythagoras: Finding a Side

Key idea

In a right-angled triangle with shorter sides a , b , and hypotenuse c (the longest side, opposite the right angle): $a^2 + b^2 = c^2$.

Missing hypotenuse

Shorter sides 6 cm, 8 cm.

$$c^2 = 6^2 + 8^2 = 36 + 64 = 100$$

$$c = 10 \text{ cm.}$$

Missing shorter side

Hypotenuse 13 m, one shorter side 5 m.

$$a^2 = 13^2 - 5^2 = 169 - 25 = 144$$

$$a = 12 \text{ m.}$$

Common mistake

Do not add or subtract the side lengths before squaring – use 5^2 , not $5 + 5$.



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Identifying Sides and Exact Answers

Key idea

The hypotenuse is always the **longest** side. If $a = 7$, $b = 9$:
 $c = \sqrt{7^2 + 9^2} = \sqrt{130}$ – if not a perfect square, leave it as a root unless told to round.

Spot the hypotenuse

Sides 9, 12, 15: the 15 must be the hypotenuse, since it is the longest.

Finding a shorter side

$c = 17$, one shorter side 8.
 $a^2 = 17^2 - 8^2 = 225$
 $a = 15$.

Common mistake

Subtract from the hypotenuse square, not the other way around – add or subtract the squares before you square root.

