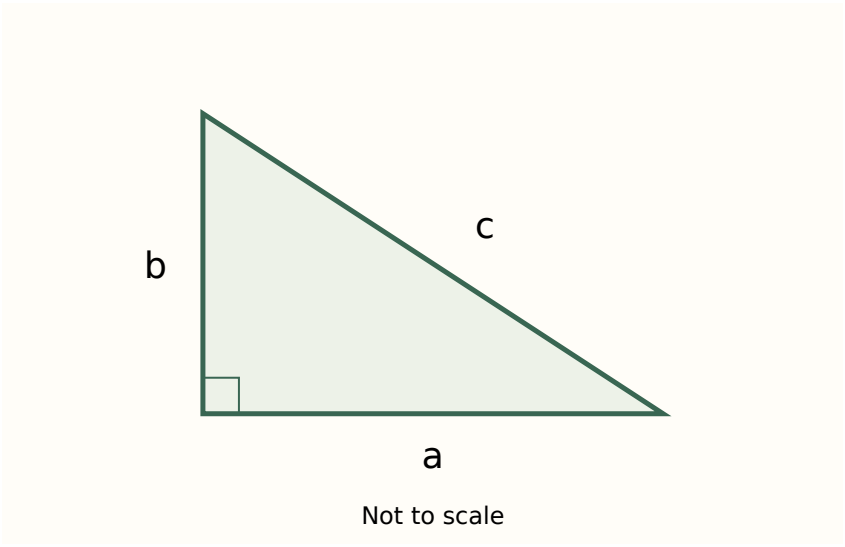
Pythagoras’ theorem - topic test

15 questions | 37 marks | 45 minutes

A progressive topic paper with calculations, explanations and practical applications.

Equivalent correct methods earn the corresponding marks.

1. Which side is the hypotenuse in the supplied triangle? [1 mark]



It is opposite the right angle.

The two legs meet at that angle.

Answer: The side labelled c.

2. Write the theorem for legs a, b and hypotenuse c. [1 mark]

Square the two legs.

Add their squares to obtain the hypotenuse square.

Answer: $a^2 + b^2 = c^2$.

3. Legs are 3 cm and 4 cm. Find the hypotenuse. [2 marks]

$c^2 = 9 + 16 = 25$.

Take the positive root.

Answer: 5 cm.

4. Legs are 12 m and 16 m. Find the hypotenuse. [2 marks]

$c^2 = 144 + 256 = 400$.

Take the root.

Answer: 20 m.

5. The hypotenuse is 13 cm and one leg is 12 cm. Find the other leg. [2 marks]

$x^2 = 169 - 144 = 25$.

Take the root.

Answer: 5 cm.

6. The hypotenuse is 25 cm and one leg is 15 cm. Find the other leg. [2 marks]

$x^2 = 625 - 225 = 400$.

Take the root.

Answer: 20 cm.

7. Test lengths 9 cm, 12 cm and 15 cm for a right angle. [2 marks]

$81 + 144 = 225$.

This equals 15^2.

Answer: They form a right triangle.

8. Test lengths 4 cm, 6 cm and 8 cm for a right angle. [2 marks]

$16 + 36 = 52$.

This is not $8^2 = 64$.

Answer: They are not a right triangle.

9. A right triangle has legs 2 cm and 5 cm. [3 marks]

(a) Give the exact hypotenuse length. [2 marks]

The squared sum is $4 + 25 = 29$.

Take the positive root.

Answer: $\sqrt{29}$ cm.

(b) Between which consecutive integers does this length lie? [1 mark]

$25 < 29 < 36$.

Answer: Between 5 and 6 cm.

10. A rectangular park is 50 m by 120 m. Find its diagonal. [3 marks]

$d^2 = 2500 + 14400 = 16900$.

Take the positive root.

Answer: 130 m.

11. A ladder is 6.5 m long and its foot is 2.5 m from a perpendicular wall. Find the height reached. [3 marks]

$h^2 = 42.25 - 6.25 = 36$.

Take the root.

Answer: 6 m.

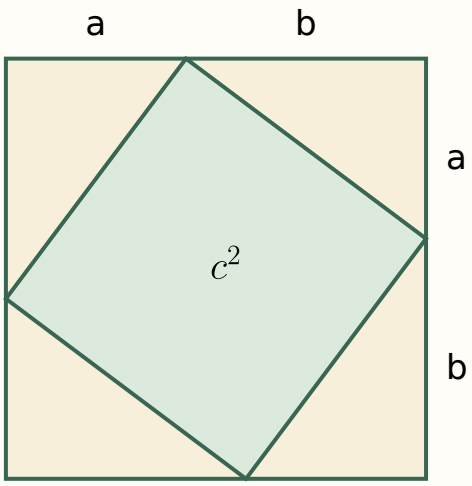
12. Legs are 80 cm and 1.5 m. Find the hypotenuse in metres. [3 marks]

Convert 80 cm to 0.8 m.

$c^2 = 0.64 + 2.25 = 2.89.$

Answer: 1.7 m.

13. Four right triangles with legs 3 and 4 fit inside a square of side 7, as shown. Use areas to find the central square side. [3 marks]



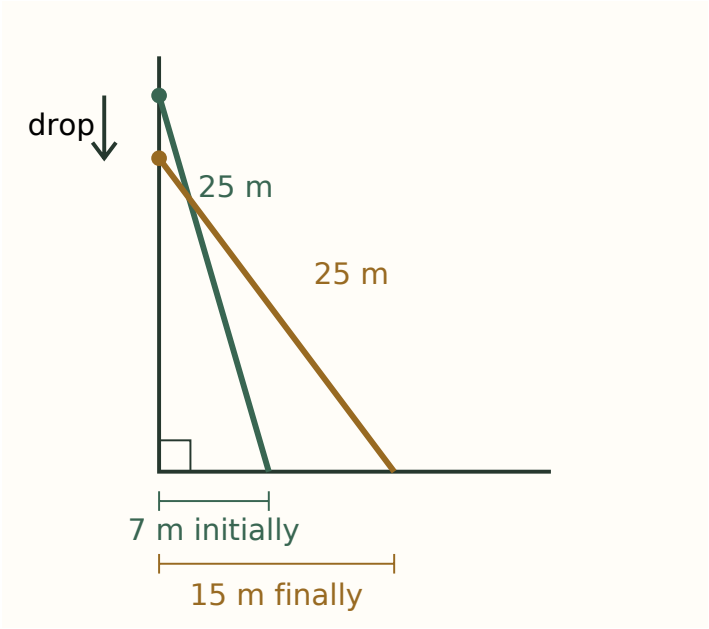
Four triangles each have area $\frac{ab}{2}$.

Outer area 49; each triangle area 6.

Subtract 24 to get area 25; take the root.

Answer: 5 units.

14. A 25 m ladder moves from a foot distance of 7 m to a foot distance of 15 m from a perpendicular wall. Find the vertical drop of its top. [4 marks]



Initial height: $\sqrt{25^2 - 7^2} = \sqrt{576} = 24$ m.

Final height: $\sqrt{25^2 - 15^2} = \sqrt{400} = 20$ m.

The top drops $24 - 20 = 4$ m. The foot moves 8 m, which is a different distance.

Answer: 4 m.

15. A rectangle has width 8 cm and diagonal 17 cm. [4 marks]

(a) Find its length. [2 marks]

$l^2 = 17^2 - 8^2 = 225.$

Take the positive root.

Answer: 15 cm.

(b) Find its perimeter. [2 marks]

Use $2(l + w)$.

$2(15 + 8) = 46$ cm.

Answer: 46 cm.