

Calculating the Length of the Hypotenuse

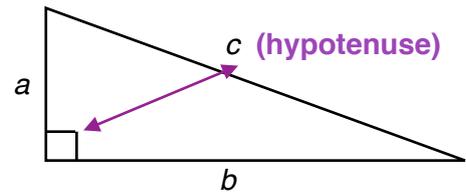
Notes

Pythagoras' Theorem is used in *right-angled triangles*.

The longest side of a right-angled is called the *hypotenuse*.

The hypotenuse side is *opposite the right angle*.

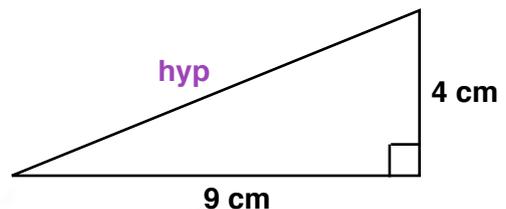
Pythagoras' Theorem: $a^2 + b^2 = c^2$
where a and b are the two shorter sides and c is the hypotenuse



N.B. It does not matter which side is a and which side is b .
Label the hypotenuse side with **hyp** so you know which number should be on its own.

E.g. 1 Find the length of the hypotenuse in the diagram.
Give your answer to 3 s.f..

Working: Let the length of the hypotenuse be x .
 $4^2 + 9^2 = x^2$
 $16 + 81 = x^2$
 $x^2 = 97$
 $x = \sqrt{97} = 9.85 \text{ cm (3 s.f.)}$



N.B. Make sure you include units in your answers.

E.g. 2 The two shorter sides of a right-angled triangle are 5 cm and 7 cm. How long is the hypotenuse? Give your answer to 3 s.f..

E.g. 3 Find the length of the diagonals of a square whose sides measure 14 cm. Give your answer to 3 s.f..

E.g. 4 A4 sheet of paper measure 210 mm by 297 mm. Find the length of the longest straight line that can be drawn on an A4 sheet of paper, giving your answer to the nearest mm.

Introduction of irrational numbers

E.g. 5 Find the length of the hypotenuse of a right-angled triangles whose other lengths are both of length 1 unit.

The number $\sqrt{2}$ is an irrational number i.e. it cannot be written as a fraction, so it is a non-repeating decimal. Pythagoras thought irrational numbers were heretical so when one of his disciples, Hippasus, proved that $\sqrt{2}$ was irrational it is said that he was drowned in the sea.

Video: [Pythagoras](#)

[Solutions to Starter and E.g.s](#)

Exercise

p50 Ex 3.2 Qu 1-10

Summary

Pythagoras' Theorem is used in *right-angled triangles*, where the longest side is called the *hypotenuse*. The hypotenuse side is *opposite the right angle*.

Pythagoras' Theorem: $a^2 + b^2 = c^2$ where a and b are the two shorter sides and c is the hypotenuse.

[Textbook answers \(only available during a lockdown\)](#)

