



Finding the length of the shorter sides

Year 9 Mathematics
Mainstream

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Learning Objectives

By the end of the lesson I hope that you understand and can apply the following to a range of questions from the Year 9 Mathematics course.

- To know how to use Pythagoras' Theorem to find the unknown side which is not the hypotenuse
- Be able to use Pythagoras' Theorem to find the length of a shorter side.



RECAP

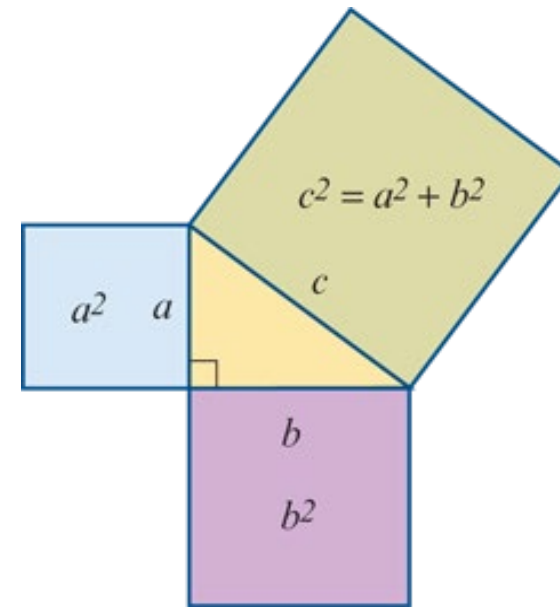
In a previous lesson we looked at how, for right angled triangles, there is a relationship between the sum of the areas of the two shortest sides of a right angled triangle and the area of the hypotenuse.

This is **only true** for right angled triangles.

The relationship is more formally known as:

$$c^2 = a^2 + b^2$$

In the previous lesson we looked at how to find the hypotenuse (which is the longest side) of a right-angled triangle. Let's use the same theory to find the length of a shorter side.



Let's jump straight into some examples!

Find the value of the pronumeral of the following triangle. Round your answer to two decimal places **and** give an exact answer.

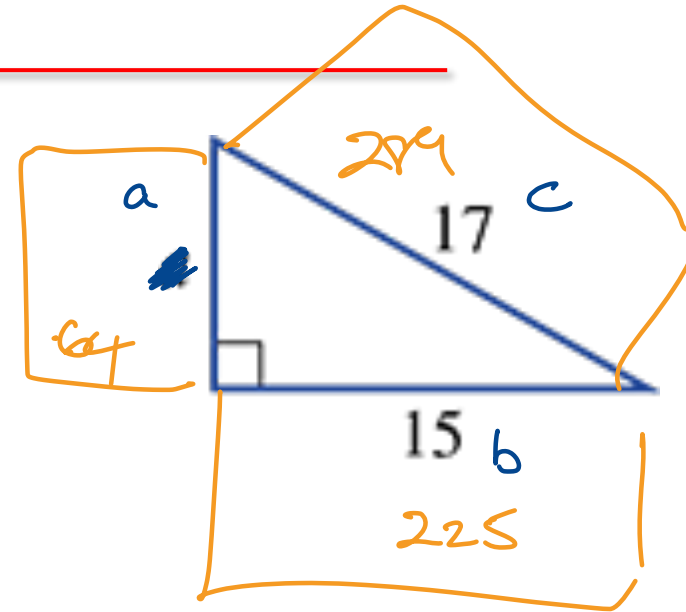
$$c^2 = a^2 + b^2$$
$$17^2 = a^2 + 15^2$$
$$289 = a^2 + 225$$

$$289 - 225 = a^2$$

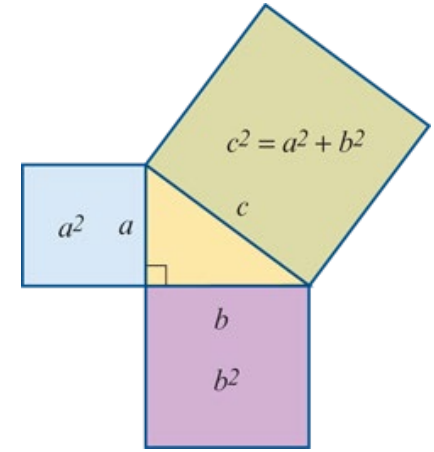
$$64 = a^2$$

$$\sqrt{64} = a$$

$$a = \underline{\underline{8}}$$



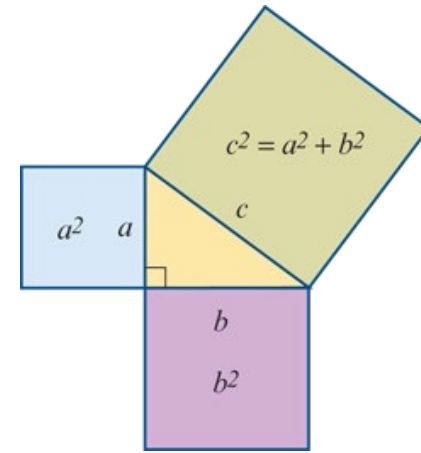
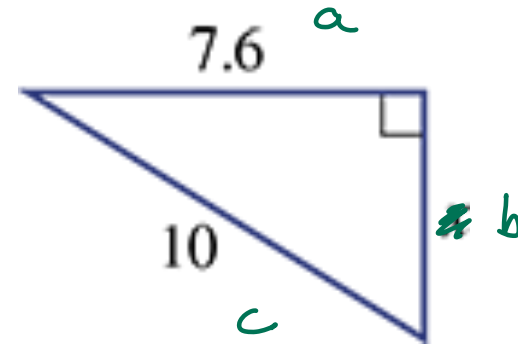
$$a = \sqrt{64}$$
$$= \underline{\underline{8}}$$



Example 2

Find the value of the pronumeral of the following triangle. Round your answer to two decimal places and give an exact answer.

$$\begin{aligned}c^2 &= a^2 + b^2 \\10^2 &= 7.6^2 + b^2 \\100 &= 57.76 + b^2 \\100 - 57.76 &= b^2 \\b^2 &= 42.24 \\b &= \sqrt{42.24} \\&= \frac{4\sqrt{66}}{5}\end{aligned}$$



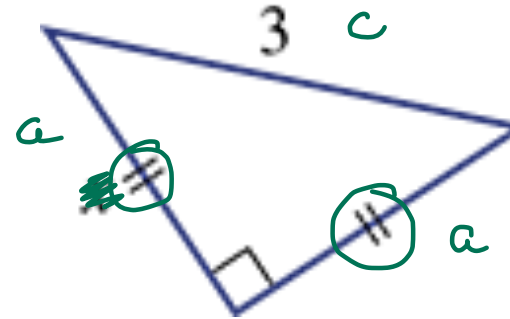
$$\begin{aligned}\therefore x &= \frac{4\sqrt{66}}{5} \\x &= \underline{\underline{6.50}}\end{aligned}$$



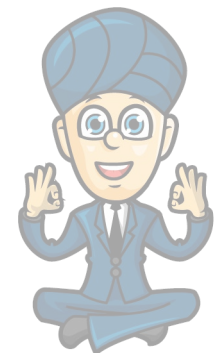
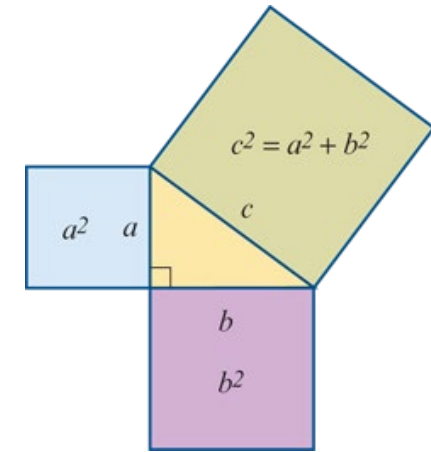
Example 3

Find the value of the pronumeral of the following triangle. Round your answer to two decimal places **and** give an exact answer.

$$\begin{aligned}c^2 &= a^2 + b^2 \\3^2 &= a^2 + a^2 \\9 &= 2a^2 \\4.5 &= a^2 \\a &= \sqrt{4.5}\end{aligned}$$



$$\begin{aligned}x &= \frac{3\sqrt{2}}{2} \\x &= \underline{\underline{2.12}}\end{aligned}$$



Questions to complete:

The questions I would like you to complete for this lesson are:

Exercise 3B: Finding the length of the shorter sides

Questions: 2ace, 3cf, 4ab, 6a, 7, 8, 10

Extension Questions (optional)

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