Pythagoras' Theorem

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Pythagoras's Theorem Activity

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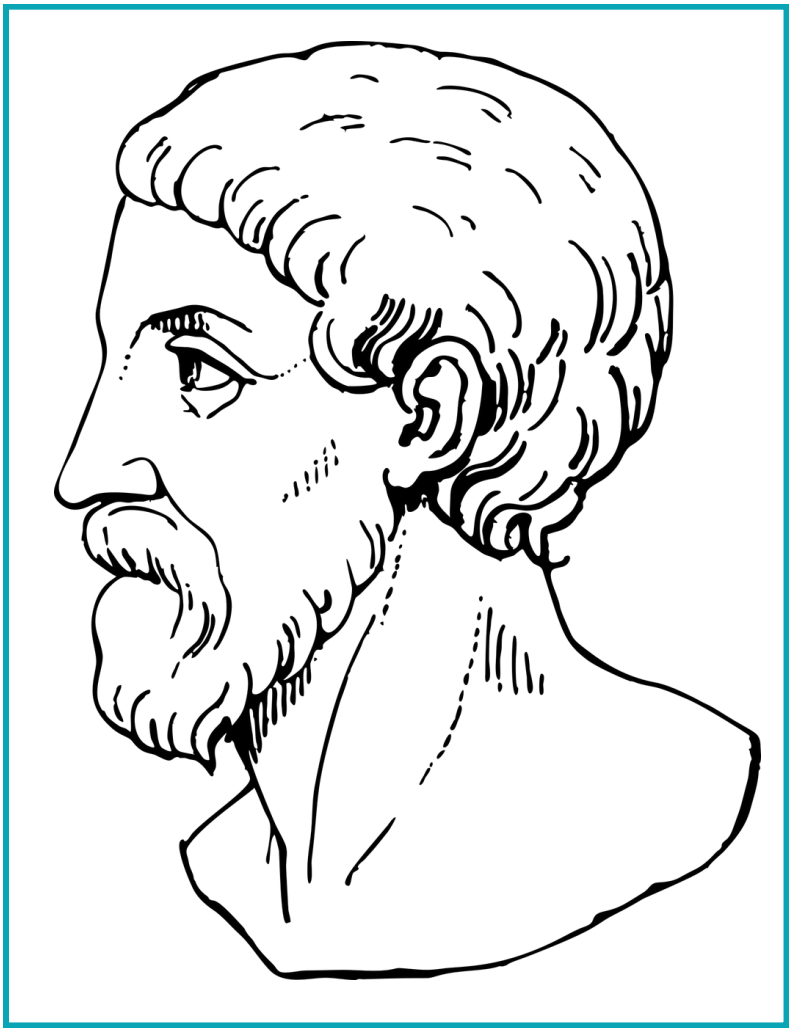
Name: Pythagoras

Occupation: Maths legend



- Pythagoras was an ancient Greek philosopher and mathematician who was born around the year 570 BC (before Christ).

- His teachings covered many areas, including Pythagoras' Theorem, which is all about triangles.

- He was also one of the earliest thinkers to talk about the idea that the Earth is spherical.

Square Thinkers

In many careers within construction (like surveying and architecture), working with square numbers and triangles is very important.

Miss Pie thinks of a number and squares it.

Thag thinks of a different number then squares it.

Russ realises that his number squared is equal to the other two square numbers added together.

What numbers did these people think of?

Hint: Try consecutive numbers first.

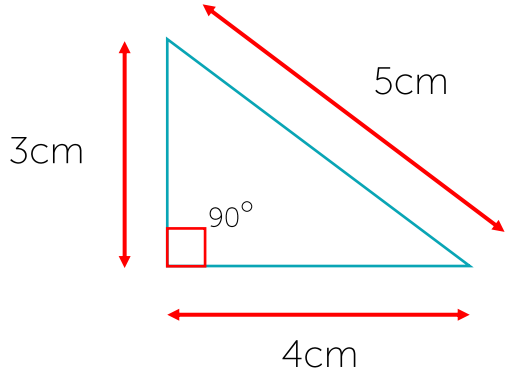
$$\square^2 + \square^2 = \square^2$$

Pythagoras' Theorem

Pythagoras' Theorem states that **any triangle with sides in the ratio of 3, 4, and 5 will be right angle triangles.**

So, the most simple example is:

- Height = 3cm
- Base = 4cm
- Hypotenuse = 5cm



This is a mathematical truth discovered by Pythagoras—there is no real reason for it, he just realised it was a consistent rule.

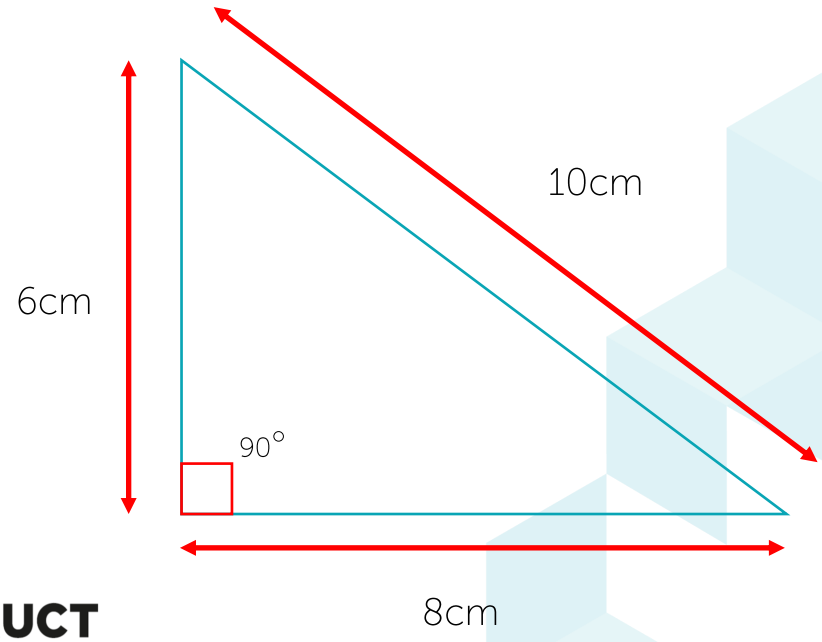
The rule also works with triangles which have sides that are all multiples of 3, 4, and 5. For example:

6cm, 8cm, and 10cm

9cm, 12cm and 15cm

12cm, 16cm, 20cm.

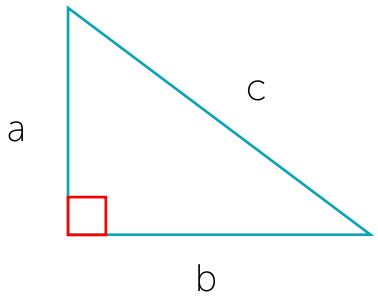
AND SO ON...



Pythagoras' Theorem

Pythagoras' Theorem also states that the sides of every right-angle triangle have this relationship:

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



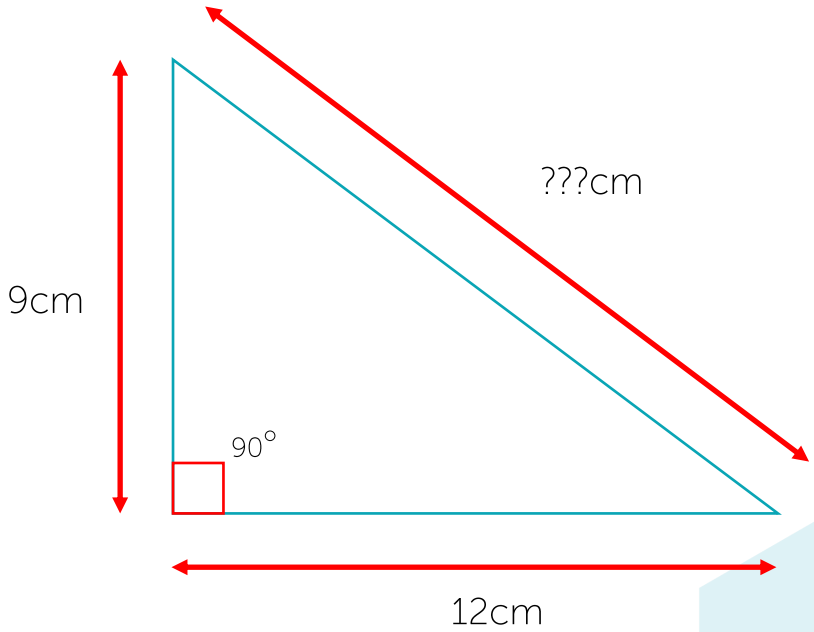
The two shorter sides are a and b, and the hypotenuse (the long side opposite the right angle) is c.

Let's check this with a simple 3, 4, 5 triangle.

$$3^2 + 4^2 = 5^2$$

If you are looking at a right-angle triangle whose hypotenuse is unknown, you can use the rule to calculate the missing length.

Use $a^2 + b^2 = c^2$ to work out the length the missing side of the below triangle.



Length of side c:

The Project

Josh is in charge of a housebuilding project. His team is going to build a new home for a private client.

As part of his team, you are going to help him create his plans.

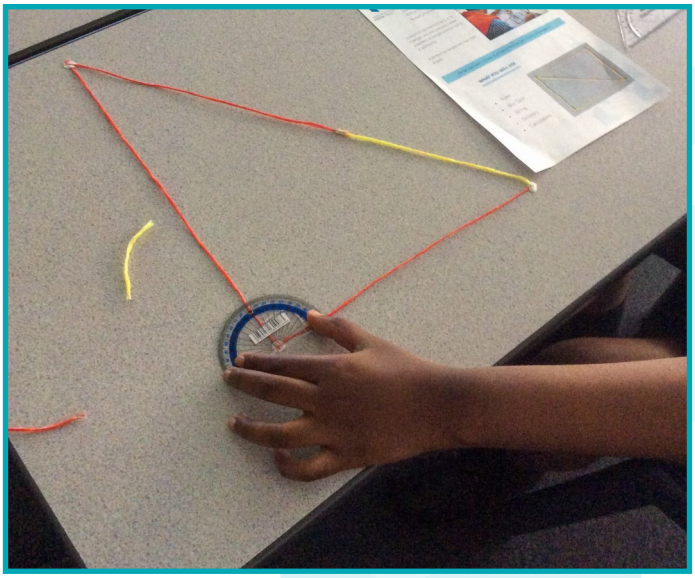
Using the rule behind the 3, 4, 5 triangle, you are going to create a perfect rectangle without using a protractor.

A perfect rectangle has four right angles.

How can we create a perfect rectangle using triangles?

What you will use:

- Ruler
- Blu-Tack
- String
- Scissors
- Calculators



Instructions

In pairs:

1. *Create a perfect right-angle triangle, you need to construct a 3, 4, 5 triangle.*

2. *Cut your lengths of string into 30cm, 40cm, and 50cm using your tape measure and scissors.*

3. *Use blu-tack to secure the sides of the triangle to the table tightly.*

4. *Create a rectangle by adding in the remaining two lengths of string.*

6 Months into the Project

Joshua is monitoring the progress of the project.

Before it started, he set a deadline of 8 months for the 6 houses to be built by a team of 75 people.

They will complete one house at a time.

6 months in, and the project is on track to meet the deadline successfully.

1. How many homes have been built?

At this 6-month point, 25 of the team suddenly fall ill, and can no longer continue. This reduces the rate at which the team can build a house. You must now work out how long it will take to complete the project.

2. How long after the deadline will the project now be completed?