A Short History of the Discovery of Pythagoras’ Theorem and NO, it wasn’t only Pythagoras’ Discovery!

Pythagoras’ Theorem is perhaps one of the most famously known mathematical concepts, especially among secondary school students around the world. It discusses that the square on the hypotenuse of a right-angled triangle is equal to the sum of the areas of the squares in the other two sides. Pythagorean triples are three integers that satisfy the equation ‘\(a^2 + b^2 = c^2\)’, often written in the form \((a, b, c)\). A triangle which is formed using these three integers is called the Pythagorean triangle and must be a right-angled triangle.

Here \(c\) is the hypotenuse of the triangle, and \(a\) and \(b\) are the sides opposite of the hypotenuse.

This theorem is used in various fields, from Physics to Architecture and even navigation. A real-life use is that it can be used to calculate the gradient of slope surfaces. This theorem is therefore very useful, but who actually discovered this? The name clearly portrays that it was Pythagoras, but there is historical evidence that it has been discovered much before Pythagoras.

Pythagoras of Samos was a Greek philosopher from 570 to 495 BC. Although not much is known about him, he was the founder of the Pythagorean ‘cult’ or the Pythagoreanism movement. His teachings are very famous especially in Western politics and religions. He is often credited with the discovery of this famous theorem. He used algebra to construct Pythagorean triples. Interestingly there is no actual reference to Pythagoras for this discovery until 5 centuries later, by Greek authors Plutarch and Cicero attributing this theorem specifically to Pythagoras.

However, Pythagoras’ Theorem is often linked to the Babylonians. There are implications of the theory on a fragment of a clay tablet from Babylonia in the Plimpton 322, dating back to approximately 1800 BCE, nearly 4000 years old, in the reign of Hammurabi the Great. The clay tablet had been translated and it contained: “4 is the length and 5 is the diagonal. What is the breadth? Its size is not known. 4 times 4 is 16. And 5 times 5 is 25. You take 16 from 25 and there remains 9. What times what shall I take in order to get 9? 3 times 3 is 9. 3 is the breadth.” This tablet also showed many of the possible Pythagorean triples.
This evidence was regularly proven by many different pieces of evidence. This clay tablet shown below was written using the Babylonian numerical system of Sexagesimal or Base 60, carved into the tablet. When translated, the evidence of the calculation proved that the Babylonians were aware about the relation between the length of the diagonal of a square and one of its side, as the calculation done was the square-root of 2 which is 1.414213… (commonly referred to as Pythagoras’ constant). This meant that they understood the Pythagorean theorem. There are suggestions that as Pythagoras travelled around the world and had been to Babylon, he may have learnt about this theorem from there.

Pythagoras’ theorem is also portrayed by an Indian scholar called Bhaudanya, who lived in around 8th century BC, and wrote the famous Vedic mathematical texts called the Sulba Sutras. In the Apastamba Sulba Sutra (circa 600 BC), he refers specially that “in a right-angled triangle, the square, the square of the length of the hypotenuse is the sum of the square of the length of the two legs”, using an example with a rope; it also contains a numerical proof of the general theorem using an area computation. It additionally has a list of Pythagorean triples and a geometrical proof specifically for the theorem applied to an isosceles right-angled triangle. Thus, we could say that this theorem has been discovered in India.

दीर्घस्याक्ष्या रज्जुः पाश्ववर्त्ती तिर्यंकरूपमानी
च यत् पृथग्भूते कुरूतस्तदुभयं करोति ॥

Baudhayana Shulba-Sutra:
The diagonal of a rectangle produces both areas which its length and breadth produce separately.
It could be argued that China equally partook in the discovery of this mathematical concept. It was written about in the book, ‘Zhou Bi Suan Jing’, a Chinese text about astronomy, physics and maths, presumably written in the western Han dynasty around the first century BCE. It has many authors, but the Pythagorean theorem is rather referred to as the Gou Gu Xian theorem all across China. The phrase ‘Gou Gu Xian’ literally translates into “the distance to the sun”. It too gives the theorem but also uses a visual description of this, using four 3, 4, and 5 sided right-angled triangles. Hence, it could be argued that China discovered this theorem.

Egypt can also be given some credit for this. The square tool they used for helping to build the pyramids was 12 knots, spaced evenly to form the famous Pythagorean triple of 3,4 and 5 at a 90-degree angle in the shape of a triangle. They weren’t specifically aware about the whole theorem; they only knew about the 3-4-5 triangle. Pythagoras had also been to Egypt in his lifetime, therefore suggesting perhaps that Pythagoras may have gotten the idea from the Egyptians.

To conclude, the Pythagorean theorem has a very interesting history. It has been thought of by many great mathematicians and scholars all around the world at various time phrases, sometimes perhaps one getting the idea from the other (there are implications that the Babylonians may have conceived the idea from the Egyptians). One could question why it is not called the ‘Egyptian-Babylonian-Bhaudanya-Gou Gu Xian-Pythagorean Theorem’ for example. That is a very long name firstly to say! Additionally, it can be said that the Egyptians had an idea about this formula related to triangles, the Babylonians, the Chinese and the Indians further explored these ideas, but ultimately the knowledge was finally brought to the western half of the world through Pythagoras, this was probably more important, due to the Western dominance around the world; it was also considered much more developed and most of the ideas were properly documented unlike the Eastern world. Thus, it is called Pythagoras’ theorem. The information that this theorem shares is invaluable mathematically and has helped shape and formulate maths around the world, helping it progress to where it is today. That is why I feel that the knowledge of the roots of the Pythagorean theorem is equally important as the actual theorem.