Chinese Proof of the Pythagorean Theorem

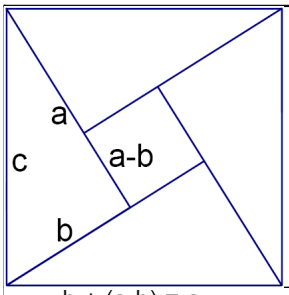
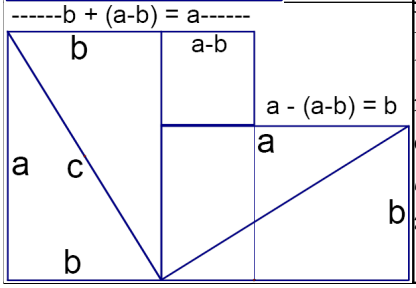
History

Little is known how or when the Chinese proof of the Pythagorean Theorem developed. Estimates for this event are as early as 1100 BCE, though the sixth century BCE is generally accepted as the best estimate[1]. The first known mention of this proof is in *Zhou bi suan jing* (Arithmetic Classic of the Gnomon and the Circular Paths of Heaven).

Summary

This proof involves rearranging shapes. The size of the shapes does not change when they are rearranged. A length of a particular side in one arrangement is the same as the length of the corresponding side in another arrangement.

Details

	This proof is a geometric proof*. To show the proof, draw a square, then four equivalent right triangles in the square with the hypotenuse on the outer edge of the square. If the length of one side of the right triangle is a, and the length of the second is b, the length of each side of the square in the middle will be $a - b$.
	Now we rearrange the shapes as shown in the diagram. Note that the length of the top is $b + (a - b)$ which simplifies to a. This means the size of the larger square is $a \times a$ or a^2. Similarly, the size of the smaller square is $b \times b$, or b^2. Since the original square is $c \times c$, or c^2, and the reformed shape is two squares, one of size a^2, and one of size b^2, we can conclude that $a^2 + b^2 = c^2$.

Glossary

*Geometric Proof: A proof that uses geometric shapes for the proof.

Additional Resources

- Ancient Chinese Mathematics: Right Triangles and Their Applications, Teresa Gonczy, Student at University of California, San Diego, Spring 2003, http://math.ucsd.edu/programs/undergraduate/history_of_math_resource/history_papers/math_history_01.pdf. Last accessed 9/7/2020.
- Mathematics In China, David E. Joyce, Professor, Clark University, Initial work December, 1994. Latest update Sept 17, 1995, http://aleph0.clarku.edu/~djoyce/mathhist/china.html. Last accessed 9/7/2020.
- The Ten Mathematical Classics, J J O'Connor and E F Robertson, December 2003, http://www-history.mcs.st-and.ac.uk/HistTopics/Ten_classics.html. Last accessed 9/7/2020.
- Science and Mathematics in Ancient China, Sacramento Chinese Culture Foundation, http://www.sccfsac.org/science_math.html. Last accessed 9/7/2020.

[1] Sweltz, Frank J., and T. I. Kao. Was Pythagoras Chinese? An Examination of Right Triangle Theory in Ancient China. University Park: Pennsylvania State UP, 1977.