Example

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1.1 Subsection

1.1.1 Subsubsection

This is the *Pythagorean theorem*:

$$a^2 + b^2 = c^2 \tag{1}$$

where a, b are *right-angle sides* and c is *hypotenuse*.

This image illustrates the theorem:

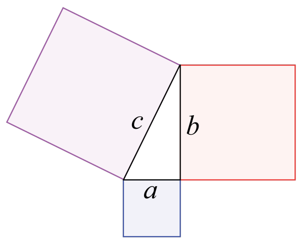

Figure 1: Pythagorean Theorem

In Figure (**??**), the sum of the area of the red and blue rectangles equals that of the purple rectangle. Eli Maor has introduced the history of the theorem and its significance in his book [**?**]: The Pythagorean Theorem: A 4000-Year History and Kadison described the finite case in his article [**?**] The Pythagorean Theorem: I. The finite case. This table gives some common pythagorean numbers:

a	b	c
3	4	5
5	12	13
7	24	25

Table 1: Pythagorean numbers

James Abram Garfield[1] gave his proof of the theorem like this:

In Right trapezoid ABDE:

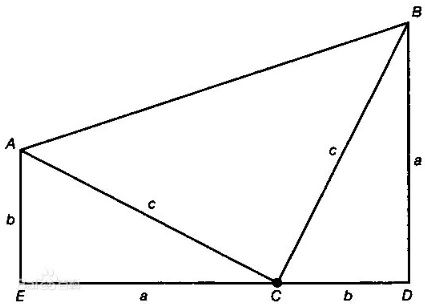

Figure 2: President's proof

$$\angle AEC = \angle CDB = 90^\circ \quad \Delta AEC \cong \Delta CDB \quad AE = CD = b \quad CE = BD = a \quad AC = BC = c$$

$$S_{\Delta AEC} = S_{\Delta CDB} = \frac{ab}{2}$$
$$S_{\Delta ACB} = \frac{c^2}{2}$$
$$S_{AEDB} = \frac{(a+b) \times (a+b)}{2}$$

Since

$$S_{\Delta AEC} + S_{\Delta CDB} + S_{\Delta ACB} = S_{AEDB}$$
$$\Longrightarrow \frac{ab}{2} + \frac{ab}{2} + \frac{c^2}{2} = \frac{(a+b)^2}{2}$$
$$ab + \frac{ac}{2} = ab + \frac{a^2 + b^2}{2}$$

Therefore

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

[1]Garfield became US president five years after he gave this proof

We can also use Pythagorean Th. to tell the shape of a triangle i.e.

$$\text{Given any triangle } \Delta ABC \begin{cases} \text{right triangle} & \text{if } c^2 = a^2 + b^2 \\ \text{acute triangle} & \text{if } c^2 < a^2 + b^2 \\ \text{obtuse triangle} & \text{if } c^2 > a^2 + b^2 \end{cases}$$

To know more about Pythagorean Th., please refer to wikipedia