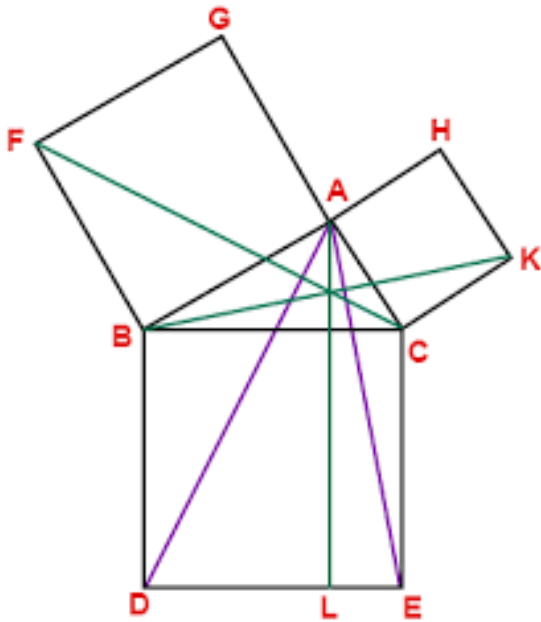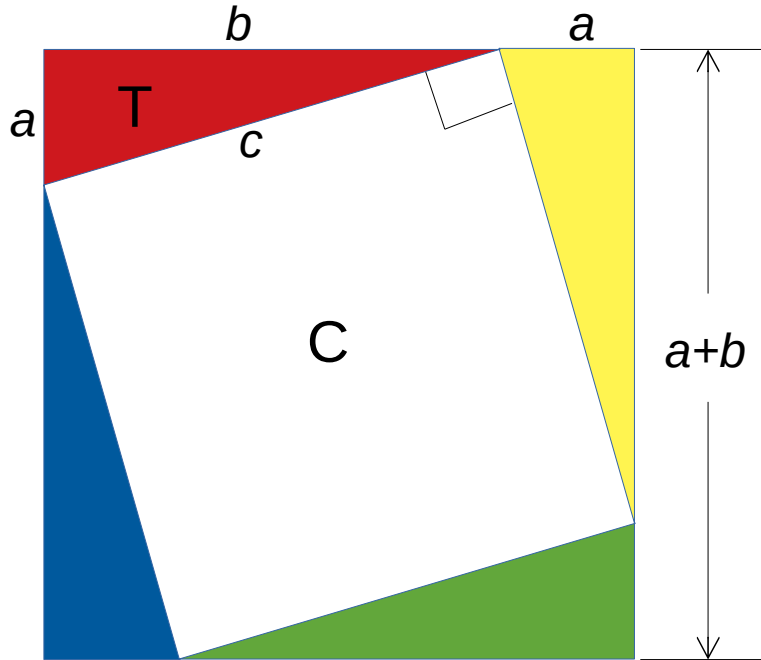# Pythagoras Made Easy

Help! I almost flunked Geometry because I couldn't understand the proof of the Pythagorean Theorem.

Why? Euclid's Proof.

- Requires too many steps.
- Relies on complicated constructions, similar triangles, ratios, etc...
- Is unnecessarily complex and mystifying.
- The theorem can be proven in just three simple steps.

Step 1

Big Square 1

- Layout four, congruent right triangles in a big square as shown to the left.
- Let a and b be the legs and c be the hypotenuse.
- Let T be the area of each triangle. (T = ½ ab)
- Let C be the square on the hypotenuse.
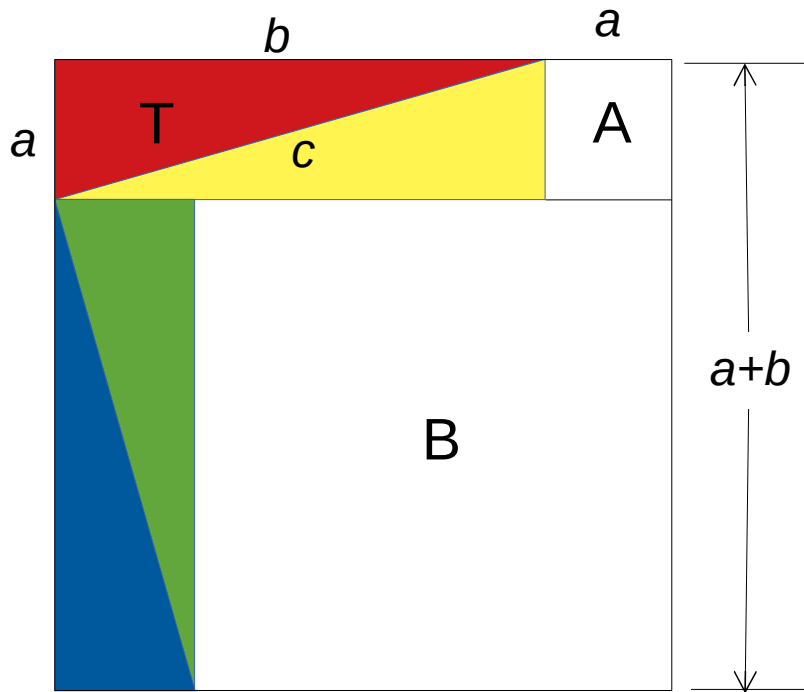- Note that the area of Big Square 1 is the sum of the four triangles plus square C. That is,

$$\text{Area}_{\text{Big Square 1}} = 4T + C$$

Mezzanine Step
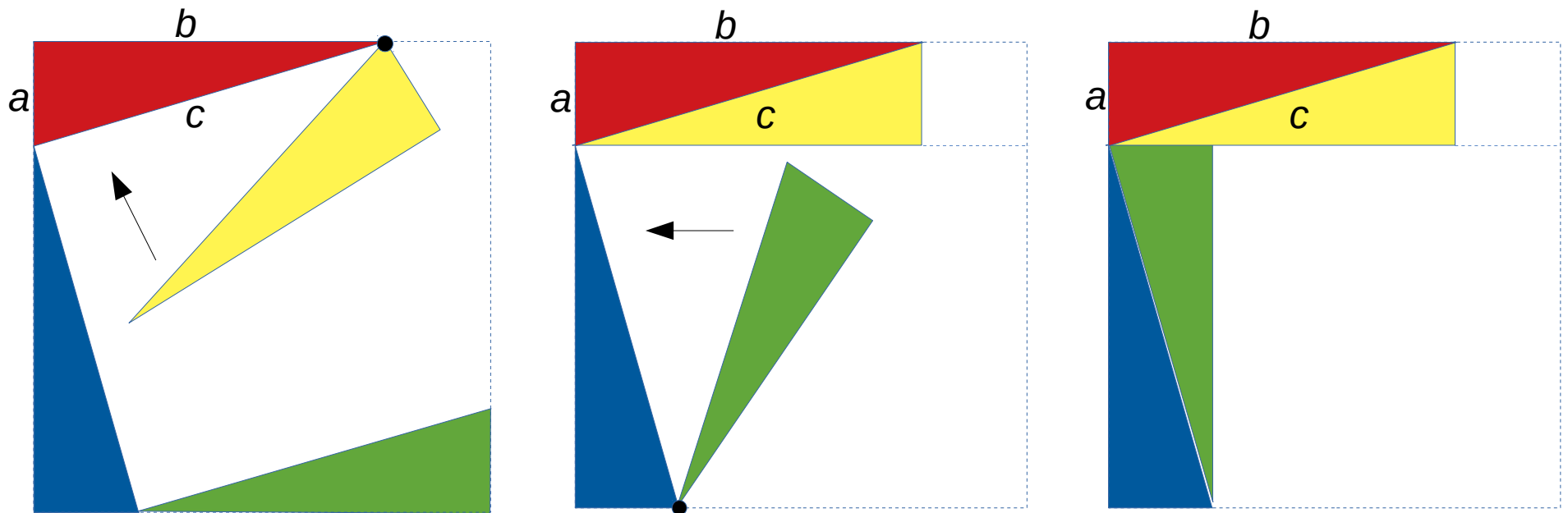
Rotate the Yellow and Green triangles as shown above.

Step 2

Big Square 2

- Let A be the square on side a.
- Let B be the square on side b.
- Note that the area of Big Square 2 is the sum of the four triangles plus square A plus square B. That is

$$\text{Area}_{\text{Big Square 2}} = 4T + A + B$$

Step 3

- Note that Big Square 1 is the same size as Big Square 2. (The length of the side in each case is $a + b$.) Therefore

$$\text{Area}_{\text{Big Square 2}} = \text{Area}_{\text{Big Square 1}}$$

- Substituting from steps 1 and 2

$$4T + A + B = 4T + C$$

- Subtract out the four triangles from each side of the equation

$$A + B = C$$

which expressed algebraically is

$$a^2 + b^2 = c^2 \quad \textbf{QED}$$

On Github

This presentation available on Github at

https://github.com/fractalxaos/barcamp/PythagorasMadeEasy.pdf