The PytEuk Puzzle

A mathematical exhibit around Pythagora's theorem

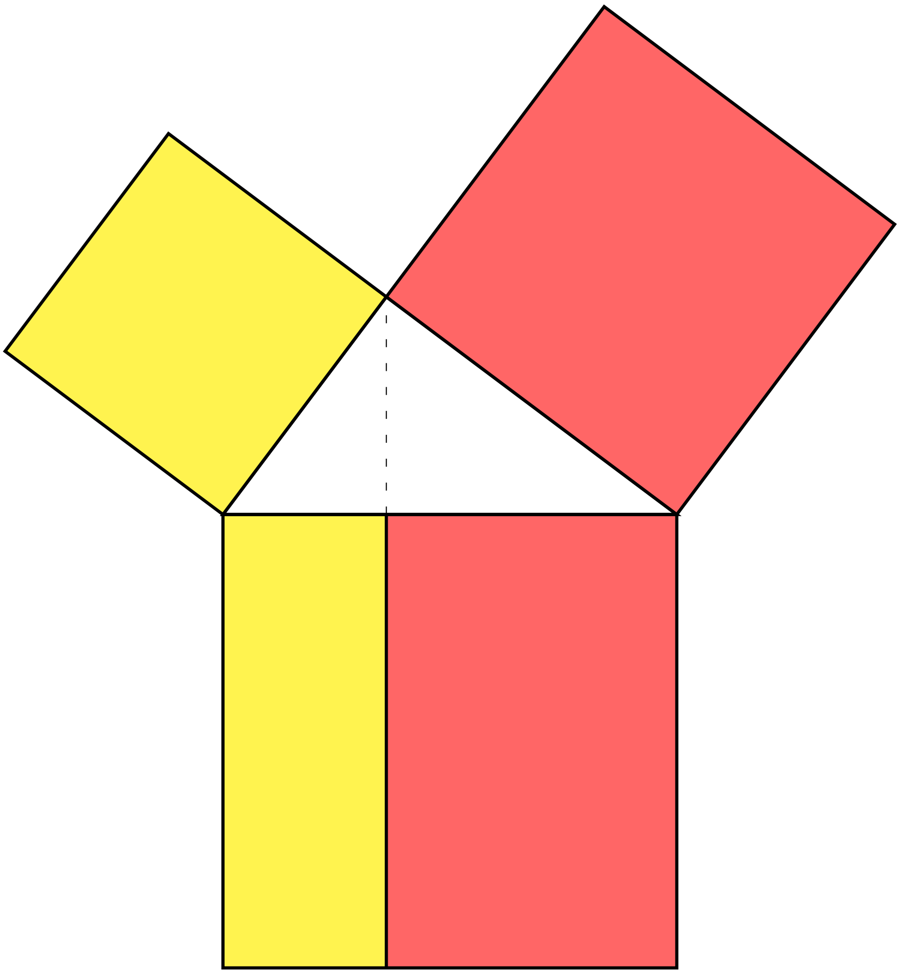

Figure 1. The puzzle shows more than Pythagoras' Theorem

There are several mathematical exhibits of various kind visualising Pythagoras' Theorem in a particular case. These exhibits do not show that the square on the hypothenuse, when cut by the altitude line, consists of two rectangles that have the size of the two squares on the cathetes. Both Pythagoras' Theorem and the stronger assertion can be visualized by the PytEuk puzzle for the right triangle with side-lengths 3,4, and 5 (the unit lenght can of course be arbitrarily chosen). Consider up to scaling the right triangle with side-lengths 15,20, and 25.

There are yellow pieces and red pieces. The yellow pieces form either a 15×15 square or a 9×25 rectangle. The red pieces form either a 20×20 square or a 16×25 rectangle. The 9×25 rectangle and the 16×25 rectangle taken together form a 25×25 square.

All pieces are rectangles such that one side has lenght 5.

The puzzle consists of 15 rectangular pieces (7 yellow pieces and 8 red pieces).

- The yellow pieces are: 3 pieces of size 9×5, 2 pieces of size 6×5, 2 pieces of size 3×5.
- The red pieces are: 4 pieces of size 16×5, 4 pieces of size 4×5.

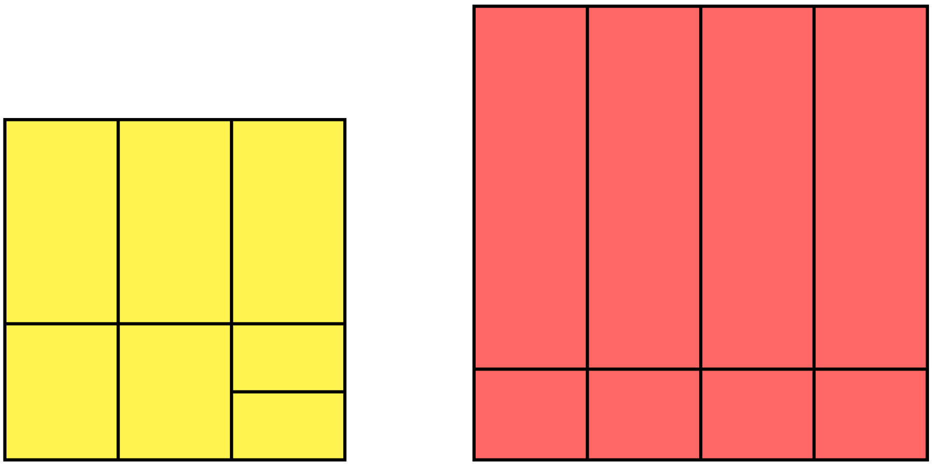

FIGURE 2. First possibility for the puzzle as two squares

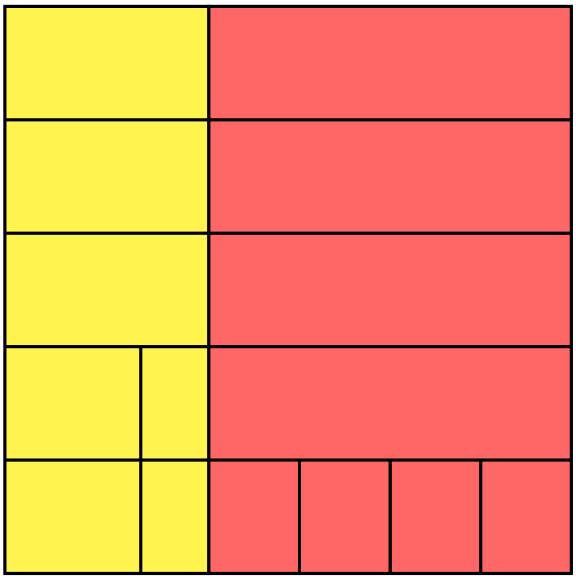

FIGURE 3. Second possibility for the puzzle as one square

We would restrict to **pieces which are rectangles and whose side-lengths are integers** (such pieces are very suitable to compare areas). Which variant is best depends on different criteria and it is also a matter of personal preference. For example one can try to *minimize the number of pieces*, possibly under the constraint that *all pieces must be squares*.