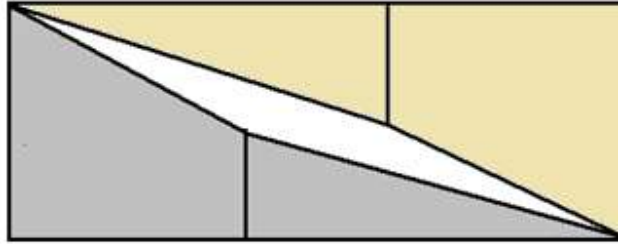


MORE WITHOUT WORDS

Mathematical Puzzles to Confound and Delight



MWW 34: SOLUTION



What you see is an illusion. If you actually cut out the shapes in the first figure and attempt to rearrange them as shown in the second figure, you will see a very tiny slither of space along the diagonal. And the area of the tiny slither of a hole is – surprise - exactly one unit! This accounts for the discrepancy of one unit of area between the two pictures.

Most people usually aren't careful enough with their cutting to see this slither of space, so makes for a very effective hands-on illusion. Make copies an 8×8 grid of squares and have folk cut it into four pieces as given by the first diagram. Now simply ask them to rearrange those pieces into a 5×13 rectangle. Most everyone will be convinced they have done it. Now ask people about the areas of these shapes.

CHALLENGE: Show that a version of this puzzle also works for a 13×13 square made into an 8×21 rectangle. Show that a version also works for a 21×21 square made into a 13×34 rectangle.

In fact ... Take any three consecutive numbers in the famous sequence of *Fibonacci numbers* : 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ... and show how to use them as the basis of one of these puzzles! (We encountered the Fibonacci numbers in WW19, WW23, and WW25.)