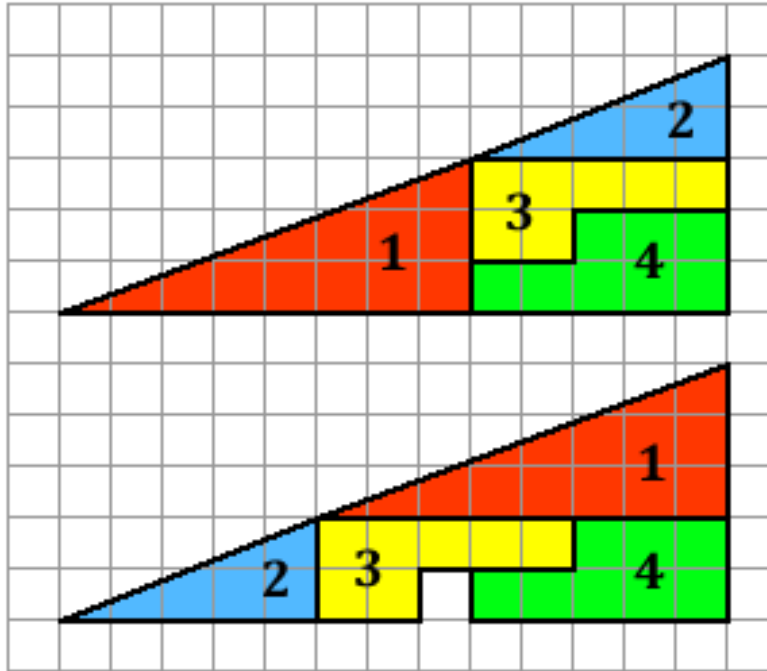


## The Missing Square Puzzle

Consider the following two arrangements of the same four shapes. This looks like a paradox because in the second arrangement there is a “missing square.”



Before flipping to the back of this worksheet, see if you can resolve the paradox. When we simply rearrange shapes, the total area can't change, so something strange must be going on here.

Ask yourself these questions:

- What am I assuming about each of the numbered shapes?
- What am I assuming about the large assembled shape?
- Are these assumptions compatible?

## Assumptions

Fill in the blanks below.

- We are assuming that Shape #1 is a \_\_\_\_\_ with height \_\_\_\_\_ and base \_\_\_\_\_.
- The result of this assumption is that the area of Shape #1 is \_\_\_\_\_.
- We are assuming that Shape #2 is a \_\_\_\_\_ with height \_\_\_\_\_ and base \_\_\_\_\_.
- The result of this assumption is that the area of Shape #2 is \_\_\_\_\_.
- We are assuming that the area of Shape #3 is \_\_\_\_\_.
- We are assuming that the area of Shape #4 is \_\_\_\_\_.
- The result of these four assumptions is that the total area of the assembled shape is \_\_\_\_\_.
- We are assuming that the first assembled shape is a \_\_\_\_\_ with height \_\_\_\_\_ and base \_\_\_\_\_.
- The result of this assumption is that the area of the first assembled shape is \_\_\_\_\_.

These assumptions are not compatible; they lead to a contradiction. You know from Discrete Math that when you make assumptions that lead to a contradiction, one or more of the assumptions must be faulty.

- Assuming that Shape #1 is a triangle, what is the slope of its hypotenuse?
- Assuming that Shape #2 is a triangle, what is the slope of its hypotenuse?
- Under these assumptions, is the first assembled shape really a triangle? Why or why not?