

# Leaning Squares

11 February 2019

Jim Stevenson

This was a nice geometric problem from Poo-Sung Park @puzzlist (<https://twitter.com/puzzlist>) posted at the Twitter site #GeometryProblem (<https://twitter.com/hashtag/GeometryProblem?src=hash>)

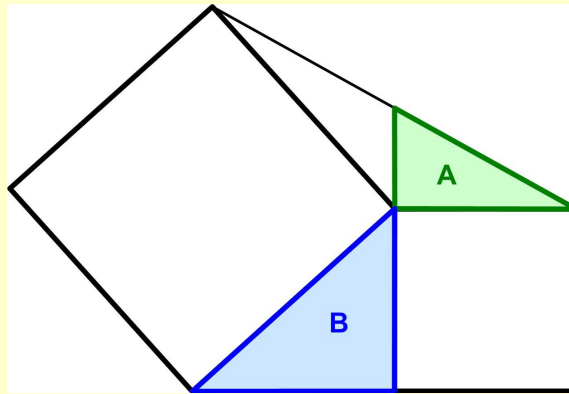
## Geometry Problem 65

Poo-Sung Park @puzzlist

3 February 2019

(<https://twitter.com/puzzlist/status/1092311438792699904>)

Given one square leaning on another, what is the ratio of the triangular areas A:B?



## Solution

First we annotate the areas (Figure 1). Then we rotate the tilted square  $90^\circ$  counter-clockwise with the blue triangle attached (Figure 2). Then line extending the green triangle's hypotenuse to the corner of the leaning square cuts the rotated blue triangle into two triangles. The upper triangle

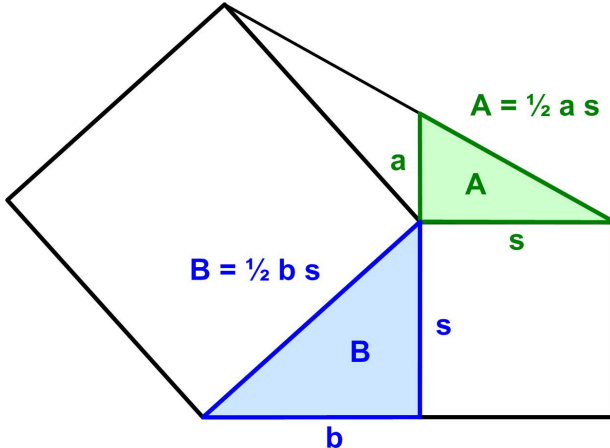


Figure 1 Annotated Areas

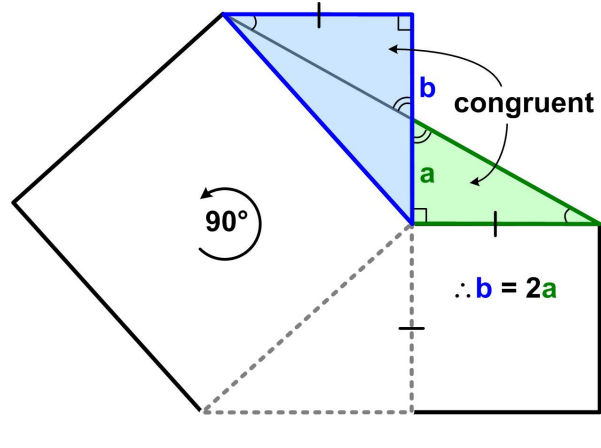


Figure 2 Solution

clearly has the same angles as the green triangle and so is similar. But they also share a side from the smaller square and so must be congruent. That means the extended hypotenuse of the green triangle bisects the side  $b$  of the blue triangle. Therefore,  $b = 2a$  and that means the ratio of the area  $A$  of the green to the area  $B$  of the blue triangle is  $\frac{1}{2}$ .

It looks like a number of geometric problems involving squares are solved by rotating certain figures by  $90^\circ$ .

© 2019 James Stevenson

---