



Problem of the Week

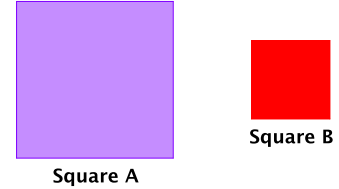
Problem B

“B” There or “B” Square!

Problem

A and B are two squares such that the perimeter of Square A is a multiple of the perimeter of Square B by a whole number.

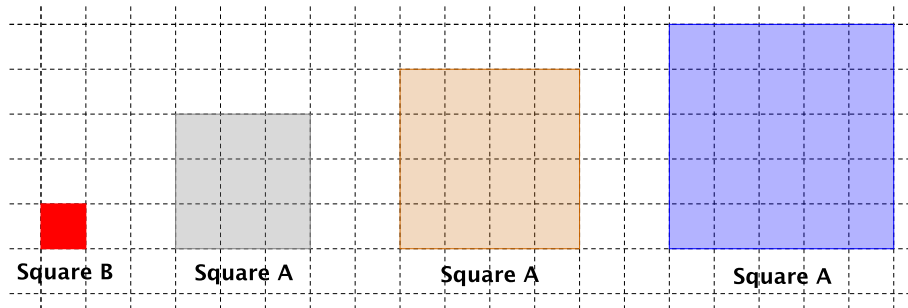
We wish to explore how the areas of the two squares are related.



- a) If the perimeter of Square A is 3 times that of Square B, what is the ratio of the area of Square B to the area of Square A? Illustrate your answer with a diagram on graph paper. Express your answer as both a ratio and a fraction.
- b) What if the perimeter of Square A is 4 times that of B? 5 times that of B?
- c) Explain how you would figure out the area ratio if the perimeter of Square A is 10 times that of Square B.

Solution

- a) The diagram below reveals that when the perimeter of Square A is 3 times that of Square B, then the ratio of the area of Square B to the area of Square A is 1:9, or, in fraction form, $\frac{1}{9}$. This is due to the fact that each side of Square A is 3 times as long as that of Square B, in order to make the perimeter 3 times as long. Thus, if the side of Square B is taken as 1 unit, the side of Square A will be 3, and hence its area is $3 \times 3 = 9$ square units. (3×3 can also be written using exponents as 3^2 . We would say “3 squared”.)



- b) The diagram also illustrates that when the perimeter of Square A is 4 times that of Square B, then the ratio of the area of Square B to the area of Square A is $1 : 16 = 1 : 4^2$, or, in fraction form, $\frac{1}{16}$. Similarly, we would expect that when the side of Square A is 5 times that of Square B, then the areas will be in the ratio $1 : 25 = 1 : 5^2$, or, in fraction form, $\frac{1}{25}$.
- c) Following the reasoning of parts a) and b), when the perimeter of Square A is 10 times that of Square B, then each side will be 10 times as long, and the areas will be in the ratio $1 : 100 = 1 : 10^2$, or, in fraction form, $\frac{1}{100}$.

