

Special Pythagorean triplet

A Pythagorean triplet is a set of three natural numbers, $a < b < c$, for which,

$$a^2 + b^2 = c^2$$

For example, $3^2 + 4^2 = 9 + 16 = 25 = 5^2$.

There exists exactly one Pythagorean triplet for which $a + b + c = 1000$.
Find the product abc .

Solution

Rather than trying to figure out a third equation to determine a , b , and c , just guess and check. The accompanying C program cycles through all integers from 1 to 1000 and sees which ones satisfy $a^2 + b^2 = c^2$ and $a + b + c = 1000$. It yields

$$a = 375 \quad \text{and} \quad b = 200 \quad \text{and} \quad c = 425.$$

Therefore, the product is

$$abc = 375 \times 200 \times 425 = 31\,875\,000.$$