Question 9

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.

$$a + b + c = 1000 \qquad a^2 + b^2 = c^2$$

$$\text{check if} \qquad\qquad a < b < c$$

$$a + b + c = 1000$$

$$\text{check if}$$

$$a^2 + b^2 - c^2 = 0$$

$$\left.\begin{array}{l} a^2 + b^2 - c^2 = 0 \\ a + b + c = n \end{array}\right\} \begin{array}{l} \text{There must} \\ \text{be some relation} \end{array}$$

$$\text{Euclid Formula}$$

$$a = m^2 - n^2 \quad b = 2mn, \quad c = m^2 + n^2$$

$$\text{where} \quad m > n > 0$$

$$\text{Example}$$

$$m = 2 \quad n = 1$$

$$a = 4 - 1 \quad, \quad b = 2 \cdot 2 \cdot 1 \qquad c = 4 + 1$$
$$\underline{= 3} \qquad\qquad \underline{= 4} \qquad\qquad\quad \underline{= 5}$$

$$\text{where is condition to exit}$$

$$i = n$$
$$j = n + 1$$

$$\text{if } a + b + c > 1000$$
$$\qquad \text{break}$$
$$\text{clif } a + b + c == 1000$$
$$\qquad \text{result} = a \cdot b \cdot c$$