There are many positive integer solutions to the equation

$$x^2 + y^2 = z^2$$

which can be rewritten as

$$z = \sqrt{x^2 + y^2}$$

For example $(3, 4, 5)$ or $(5, 12, 13)$. Such solutions are called *Pythagorean triples*.

However, for higher powers the situation is very different, and we have:-

Theorem: Fermat-Wiles

For all natural numbers $n \geq 3$, there are no integers x, y, z satisfying the equation

$$x^n + y^n = z^n$$