

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:*

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