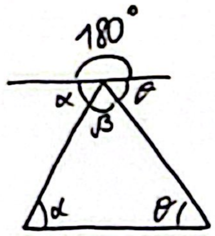
a triangle's interior angles



for any n, the product of four consecutive numbers plus one is always a perfect square

$$n(n+1)(n+2)(n+3) = (n^2+3n) \cdot (n^2+3n+2)$$

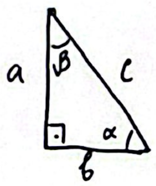
let be t

$$\Rightarrow t(t+2)+1 = t^2+2t+1 = (t+1)^2$$

$$\Rightarrow (n^2+3n+1)^2$$

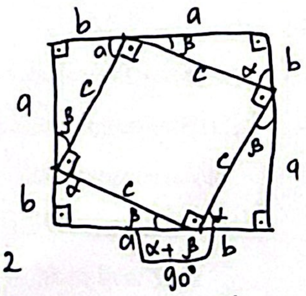
■

$a^2+b^2=c^2$ (?)



$\alpha+\beta+90° = 180°$

$\alpha+\beta = 90°$



$A_{big} = (a+b)^2$ = sum of all figures

$$(a+b)^2 = 4 \cdot \frac{ab}{2} + c^2$$

$$a^2 + \cancel{2ab} + b^2 = \cancel{2ab} + c^2$$

$$\boxed{a^2+b^2=c^2}$$

■

prove $\sqrt{2}$ is irrational.

→ Let's suppose that $\sqrt{2}$ is rational.
meaning $\sqrt{2} = \frac{a}{b}$ a, b (primes)

$$(\sqrt{2})^2 = \left(\frac{a}{b}\right)^2 \Rightarrow 2 = \frac{a^2}{b^2}$$

$$2 \cdot b^2 = \frac{a^2}{b^2} b^2 \Rightarrow 2b^2 = a^2$$

since, a^2 equals 2 times some integer. So, a^2 is even number. And odd numbers' square is odd, even numbers' are even.

a has to be even.

$a = 2k$

$$2 = \frac{(2k)^2}{b^2} \Rightarrow 2b^2 = 4k^2$$

$$b^2 = 2k^2$$

Again, meaning b is even number.

a and b both are even. Meaning they have a common factor. Therefor, the assumption that $\sqrt{2}$ is rational is wrong.

Thus, $\sqrt{2}$ is, in fact, irrational.

■

Are there infinitely many primes?

→ Assume there are finitely many primes. $p_1, p_2, p_3, \dots, p_n$.

So, lets consider $p = p_1 \cdot p_2 \cdot p_3 \cdots p_n + 1$.

and p is obviously bigger than other primes.

Now let's divide it by any prime

$$\frac{p_1 p_2 p_3 \cdots p_n + 1}{p_1} = p_2 p_3 \cdots p_n + \frac{1}{p_1}$$

remainder

It's not divisible by p_1 or p_2 or any primes

So, none of primes are factor of that P number. So, p is prime. Contradiction. Initial assumption is false. Thus, there are infinitely many primes.

■