PROVE: that $\sqrt{2}$ is irrational.

ie prove there is no Repeating pattern in the decimal.

Maybe it's just Real long, and you didn't notice it, stupid human.

Assume: $\sqrt{2}$ is Rational.

Then $\sqrt{2} = \frac{a}{b}$ [definition of Rational] for some pair of a & b AND where $\frac{a}{b}$ is simplified to lowest terms

It follows that $2 = \frac{a^2}{b^2}$ (squared both sides)

Note: that an odd * odd = odd; even * even = even } always

if $2 = \frac{a^2}{b^2}$ then multiply by b^2 ((both sides)) to get: $2b^2 = a^2$

a^2 must be even, since it is equal to 2 times something (b^2)

if a^2 is even, then a is even. (No way odd * odd = even)

if a is even, then by definition, $a = 2K$ (any even is 2 * some #)

go back to original claim: (Substitute) $2 = \frac{a^2}{b^2} \Rightarrow 2 = \frac{(2K)^2}{b^2} \Rightarrow 2 = \frac{4K^2}{b^2}$

$2b^2 = 4K^2$

$b^2 = 2K^2 \longrightarrow$ Means b^2 is even, so b is even

WAIT! if a and b are both even $\longrightarrow \frac{a}{b}$ was NOT simplified!

$\therefore$ Contradiction: $\sqrt{2}$ is Not Rational!