



“Pythagoras is said to have discovered the numerical relationship between the length of the strings used in musical instruments and the harmonic combinations of the sounds. In today’s language, we would describe that relationship by saying that the frequency—the number of vibrations per second—of a string vibrating under fixed tension is inversely proportional to the length of the string. Pythagoras probably did not really discover this—he also did not discover the theorem that bears his name—but there is evidence that some relation between string length and pitch was known in his day. If so, one could call that simple mathematical formula the first instance of what we now know as theoretical physics.”

The Grand Design (pp. 18-19); Stephen Hawking.

In fact, in common with many other physicists who often cite Pythagoras in this connection, this acknowledgement draws well short of recognizing the wider and profound structural implications of this ‘simple formula’.

The ‘string experiment’ demonstrates relativity where if a string of constant length and at constant tension is divided by: -

- ❖ itself, it vibrates at $1/1$ & gives One Fundamental at e.g. 100 Hz
- ❖ two, each $1/2$ vibrates at 200 Hz giving the Perfect Octaves ('Tonic')
- ❖ three, each $1/3$ vibrates at 300 Hz giving the Perfect Octave & a Perfect 5th (the 'Dominant')

7 Perfect Octaves do not commute exactly with 12 Perfect 5ths but do with 12 ‘Well Tempered 5ths’, the differences between which reveal: -

- ❖ an axiomatic Hertz progression from 0 to 0.618
- ❖ which is the neg-entropic derivation of the Golden Section as a rate &
- ❖ GS as a rate is key to the structural dynamics of the known universe

Whether Pythagoras realized any of this or not, this is known as the ‘Pythagorean Comma’, GS was fundamental to Pythagoreanism & is also obviously fundamental to both science & religion.

[The Golden Rate](#)