

# THE PYTHAGOREAN PHILOSOPHY OF NUMBERS

*Silvano Leonessi, adapted by Mary Jones, S.R.C.*

**P**ythagorean thought deeply influenced Greek philosophy. Aristotle dedicated a portion of his *Metaphysics* to the subject of the philosophy of numbers, and this recalled the Pythagorean approach to numbers and their meaning.

In his work *Metaphysics* (ca. 350 BCE), Aristotle proposed three questions: What is existence, and what sorts of things exist in the world? How can things continue to exist, and yet undergo the change we see about us in the natural world? And, thirdly, how can we understand this world? He wrote in response to the first two questions on existence and being:

“...the so-called Pythagoreans, who were the first to take up mathematics, not only advanced this study, but also having been brought up in it they thought its principles were the principles of all things. Since of these principles numbers are by nature the first, and in numbers they seemed to see many resemblances to the things that exist and come into being—more than in fire and earth and water (such and such a modification of numbers being justice [for example], another being soul and reason, another being opportunity...and similarly almost all other things being numerically expressible)....”

He continues to expand on the third question on understanding nature:

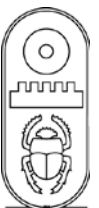
“...since again, they [the Pythagoreans] saw that the modifications and the ratios of the musical scales were expressible in numbers; since then, all other things seemed in their whole nature to be modeled on numbers, and numbers seemed to be the first things in the whole of nature, they



*Portrait of Aristotle.* Marble, Imperial Period, first or second century. Copy of a lost bronze sculpture made by Lysippos. Louvre, Paris. Photo © 2005 by Eric Gaba/Wikimedia Commons.

supposed the elements of numbers to be the elements of all things, and the whole heaven to be a musical scale and a number. And all the properties of numbers and scales which they could show to agree with the attributes and parts and the whole arrangement of the heavens, they collected and fitted into their scheme; and if there was a gap anywhere, they readily made additions so as to make their whole theory coherent.”<sup>1</sup>

It is clear that they conceived number as the first principle (Greek: *Arché*), and that the substance of the entire universe is identified with numbers. Number is conceived not as a mental abstraction but something which exists in and composes all things. Philolaos of





Iamblichus of Chalcis, Assyrian Neoplatonic Philosopher and Neopythagorean.

Tarentum (ca. 475 BCE), in his book on Pythagorean Numbers states: "All things, at least those we know, contain Number; for it is evident that nothing whatever can either be thought or known without Number."

The Neoplatonist Iamblichus reinforced this when he stated that the causal approach to nature consisted "in positing mathematical things as causes" from which the objects in the perceptible world arise. He subscribed to the Pythagorean belief that only what was possible in mathematics was possible in the structure of nature, and that nothing could exist that implied a mathematical impossibility. These are advanced thoughts for such an early era in our history.

### Number Philosophy

A metaphysical philosophy lay at the heart of Pythagoras's thought and teachings. His understanding of numbers was quite different from the understanding of today. To Pythagoras and his followers, the idea of number was a living, qualitative reality that had to be experienced. To them, it was not something to be used, but rather something whose nature was to be discovered.

Nowadays, we think of number as a sign to denote a specific amount or quantity. We use numbers as tokens to represent things. The Pythagoreans saw number as a universal principle, such as light or electromagnetism or sound. As modern physics has demonstrated, it is precisely the numeric, vibrational frequency or wavelength of electromagnetic energy that determines its particular manifestation.

### Two Principles

According to Aristotle, the Pythagoreans traced the origin of all things back to two principles: the even and the odd. He wrote:

"Evidently then, these thinkers also consider that number is the principle both as matter for things and as forming both their modifications and their permanent states, and hold that the elements of number are the even and the odd, and that of these, the latter is limited, and the former unlimited; and that the One proceeds from both of these (for it is both even and odd), and number from the One; and that the whole heaven, as has been said, is numbers."<sup>2</sup>



Harm Kamerlingh Onnes, *Einstein's Portrait*, 1920. Painted on the occasion of Einstein becoming extraordinary professor at the University of Leiden. Academic Historic Museum Leiden.

For the Pythagoreans, the elements of number are the even and the odd, or the limited and the unlimited; this is because numbers derive from the One, and the One from the even (unlimited) and the odd (limited). Aristotle tells us that the Pythagoreans saw the unlimited as evil, and limited as good. It seems that they also identified the number one (the monad) with the limited, and two (the dyad) with the unlimited. The emergence of the One appears to follow the Law of the Triangle in that it comes from the odd and even and itself produces number or the whole of nature.

Accepting that “Number” constitutes the essence of everything, it is overshadowed by the concept of a material reality quite separate and distinct from what we might consider to be a purely abstract number, and even today in atomic physics laboratories, reality is composed of complex numerical interactions in dealing with subatomic particles and fields. Einstein says that the universe is “Number,” which accords with the ancient Pythagorean vision.

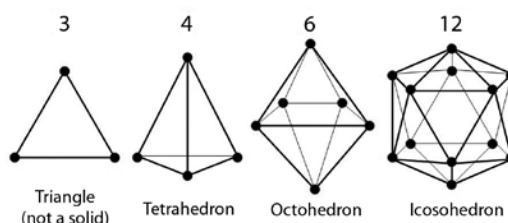
According to Richard Feynman (1918-1988), the discovery of the theory of relativity came about because of a Greco-Pythagorean mode of investigation based on the interaction of sets of axioms with subsequent logical



... the discovery of the theory of relativity came about because of a Greco-Pythagorean mode of investigation based on the interaction of sets of axioms with subsequent logical deductions.



### Platonic Solid Vertices



The geometric figure is a number of points in space: the actual number determines the shape or object itself.

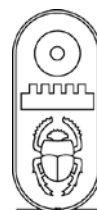
deductions. The strength of the foundations of scientific Pythagoreanism is from the methodological approach, rationally analyzed and developed with great discipline and, at the same time, transcended by a powerful initiatory and ontological global system.

### Geometry

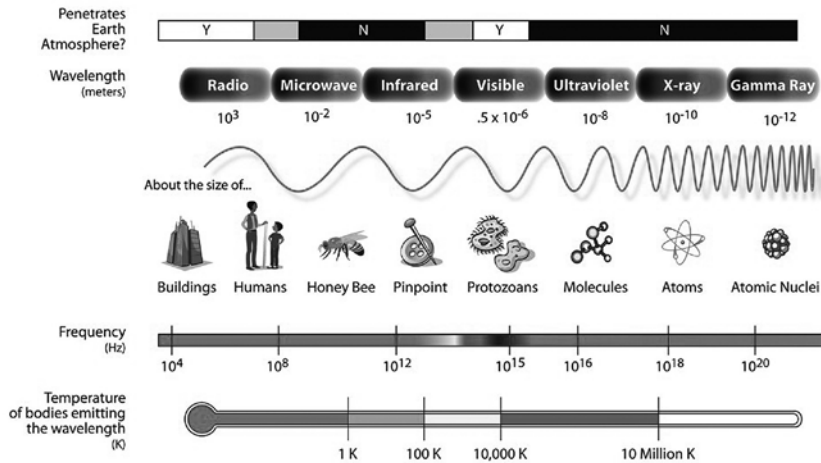
It should be noted that mathematics and geometry were considered to be intimately related, since geometry necessarily requires knowledge of mathematics and since numbers, consisting of single points, combine to form geometric figures, so that we can talk about triangular, square, rectangular, and cubic shapes. Number was considered an essential part of the Monad, and the Monad was considered identical to a geometric point.

A number then was a geometric figure and a geometric figure was a number. The geometric figure is a number of points in space: the actual number determining the shape or object itself. The concept that is the basis of the Pythagorean principle that things are numbers is therefore, a measurable one. From this, we can infer that since the whole world is made of numbers it follows that the true nature of the world is a sort of geometry in numbers and is therefore measurable. This allows an explanation of things such as the seasonal motion of the celestial bodies, musical harmonies, the cycle of vegetation, as well as abstract qualities and things such as justice, the intellect, and the soul.

The properties and elements of numbers correspond to the properties of things. So, something that seems far removed from



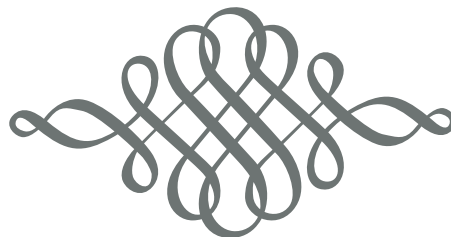
## THE ELECTROMAGNETIC SPECTRUM



Pythagoreans saw number as a universal principle such as light, electromagnetism, or sound. From the Rosicrucian archives, © 2009, Supreme Grand Lodge of AMORC.

number is, on closer inspection, traceable to a quantitative and measurable structure. Simple mathematical operations like addition, subtraction, multiplication, and division allows the search for equality and harmony in One and the one in multiplicity. This was of great importance to the Pythagoreans, who were the first to measure the real and the abstract in nature in these terms, and recognize the unity and harmony of the world and its beauty.

For Pythagoras, mathematics was a bridge between the visible and invisible worlds. It was a way of understanding and working with nature, leading to the contemplation of eternal things that never vary. By focusing on the elements of mathematics, one could calm and purify the mind and ultimately experience true happiness. One, the original number, is what is in everything, and everything is combined in the One.<sup>3</sup>



## ENDNOTES

<sup>1</sup>Both quotations from Aristotle, *Metaphysics*, Book 1, Part 5, translated by W.D. Ross, <http://classics.mit.edu/Aristotle/metaphysics.l.i.html>.

<sup>2</sup>Ibid.

<sup>3</sup>This article originally published in *Rosa+Croce*, No. 30 (Winter 2007), 30-33; first English-language translation in *Rosicrucian Beacon*, 18:2 (March 2009), 13-16.