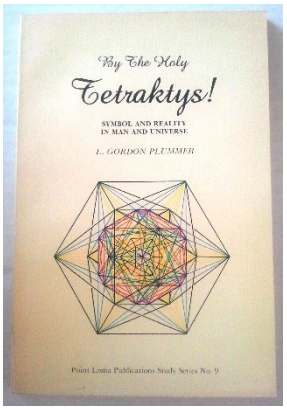
TRIANGLES, BEAUTY AND SCIENCE

In this presentation I want to focus on science and what role triangles as well as beauty play into it. First of all, the Tibetan has written a whole chapter on the Science of Triangles in Esoteric Astrology. There, and at many other places in the blue books, we are told about the scientific foundation of the Triangle work most of us are doing on a daily basis. In many of the Triangle webinars parts of this teachings have been touched upon and obviously this is not the primary focus of today's webinar. What I want to explore in this talk is why it is that three, or triplicity, is playing such an important role in our lives – whether we are aware of it or not. I also want to draw a parallel between science and art both in the broadest sense of these terms. Please keep in mind that the Tibetan reminds us that not all artists are fourth Ray individuals and neither are all scientists necessarily fifth Ray.



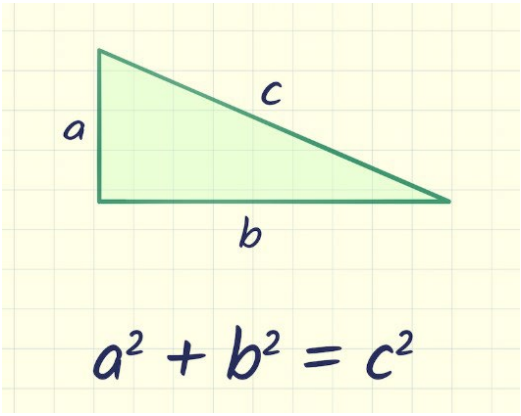
Secondly, after I was a student in physics and mathematics in Amsterdam in the sixties of the last century I have been inspired by a little booklet with the title: *By the Holy Tetraktys – Symbol and Reality in Man and Universe*, written by the Theosophist Gordon Plummer in 1982. As Gordon Plummer was a teacher, he beautifully conveys a bridge between what are called the Platonic Solids and the basics of Theosophy. Very interesting reading, but out of print already for a long time. Unless you are ready to pay a few hundred dollars by Amazon, you won't find it. Thus I thought it a good idea to present a scan of it, which we will put in the chat. Although it goes perhaps a bit beyond the topic of Triangles, we could dedicate a whole webinar to the thoughts explained in that booklet.

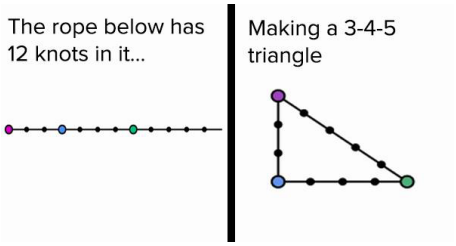
I also want to touch upon the concept of beauty that is imbedded to some extent in science and mathematics. I am aware that some mathematicians would say: *The beauty of mathematics is only revealed when you study mathematics long enough*. I know that for most of you math and physics were probably the most boring if not terrible moments of your high school period. So, I will try, but I won't insist to show that there is beauty in science and especially mathematics.

The triangle, one of the most fundamental geometric figures, has held a central place in mathematics, architecture, art, and symbolism throughout human history. Its simplicity—a polygon with three sides and three angles—belies its profound influence on the development of human knowledge.

The earliest recorded uses of the triangle date back to ancient Mesopotamia and Egypt (about 3000 BCE). In Egyptian architecture, the triangular form was essential in pyramid construction. The Great Pyramid of Giza, for instance, demonstrates an intuitive grasp of the stability and symmetry of triangular forms. Triangles also appeared in Mesopotamian clay tablets, where early mathematicians explored rudimentary geometric principles.

The Greeks gave the triangle a rigorous mathematical foundation. *Thales of Miletus* (c. 624–546 BCE) investigated similar triangles and proportionality, laying the groundwork for geometric reasoning. *Pythagoras* (c. 570–495 BCE) is famously credited with the Pythagorean theorem, which established a relationship between the sides of a right triangle and became one of the cornerstones of mathematics. Yet, the Mesopotamians I just mentioned already used what we now call Pythagoras' theorem about 3000 years earlier! Euclid's *Elements* (c. 300 BCE) formalised triangle geometry, including properties of equilateral triangles, congruence, and similarity. Triangles became not just practical shapes, but objects of abstract reasoning. The best example is the 3 – 4 – 5 sequence, i.e. so called Pythagorean number because $3^2 + 4^2 = 5^2$. But 3+4+5=12 and this was already used by the Egyptians in their rope with 13 knots – that is to say 12 segments of equal length giving a very simple and yet clever way of constructing a 90° rectangle.



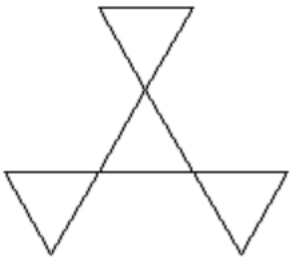


A bit later we have Claudius Ptolemy (c. 100–170 CE) who developed chord tables to study astronomical phenomena. In the Islamic Golden Age (8th–14th centuries), scholars such as Al-Battani and Al-Tusi expanded trigonometry into a systematic discipline, establishing the law of sines and cosines – which you may remember, or not, from your college years. These advances transformed the triangle into a tool for *navigation*, *astronomy*, and *engineering*. It is thanks to the triangle that our discoverers could master the seas and oceans.

In modern mathematics, triangles remain central. In physics the idea of the triangle, or rather triplicity, plays a significant role. And in modern technology triangular waveforms and representations became vital in signal processing.

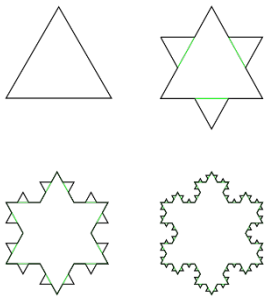
Before going into triangles itself, just a bit of more esoteric context which for most of us is common ground. We are told in the Blue books that the etheric vehicle of the planet was inherited from a former solar system. It has not been built from scratch. Remember that we are now living in the second solar system. The intersecting energies in the etheric body of the planet are at this time a network of squares. When the creative process is complete and evolution has done its work, these squares will become a network of triangles. We are thinking here of very long time scales and when we extend that time scale even further, we are told that the third solar system will start with an etheric vehicle built on triangles, which then will be resolved into a network of interlinked circles or of linked rings, indicating the fulfilment of interlocking relationships. That last and third system is the one in which the Will of God will be worked out.

As far as our system is concerned, the Tibetan hinted at the following picture:

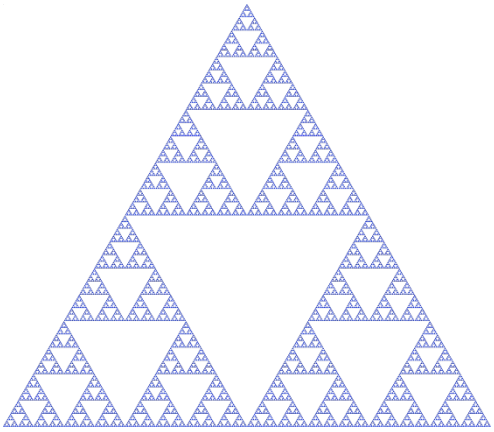


In this present system, the result of evolution, as far as the etheric body is concerned, will be the contact established between all three points of each triangle, making a nine fold contact and a nine fold flow of energy; by the time the destined number of disciples have taken the nine possible initiations, this triangular formation of the planetary etheric body will be complete.

In mathematics, especially the study of **fractals**, there are two remarkable patterns coming close to this triangulation.
One is the so-called Koch curve, named after the Swedish mathematician Helge von Koch. You start with a triangles and by dividing each side of the triangle into three equal parts, smaller triangles occur.

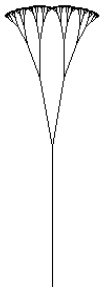


Another type of triangulation is described by the Polish mathematician Wacław Sierpiński who described the Sierpiński triangle in 1915. You start with one triangle and then subdivide it into four smaller congruent equilateral triangles and remove the central triangle. And repeat the process:

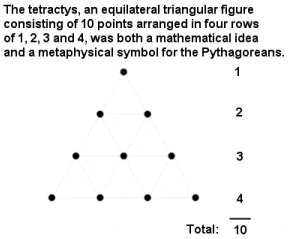


The triangle is the most elementary shape that encloses space. While geometrically simple, it is structurally rigid, symbolically rich, and mathematically deep. The triangle is both the simplest and one of the most profound shapes: easy to draw, difficult to exhaust. Understanding the history of the triangle is, in part, understanding the evolution of mathematical thought itself. Across time, the triangle has served religious, artistic, architectural, and scientific purposes. Its recurrence in human culture and its foundational status in mathematics make it one of the most important shapes in human history.

A final animation, showing another fractal relationship between squares and triangles.



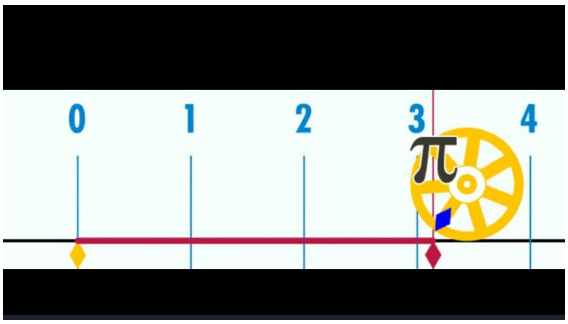
Let's look a bit more at numbers. Pythagoras discovered that a complete system of mathematics could be constructed, where geometric elements corresponded with numbers, and where integers and their ratios were all that was necessary to establish an entire system of logic and truth. Can Pythagoras not really be credited for his 'theorem', also



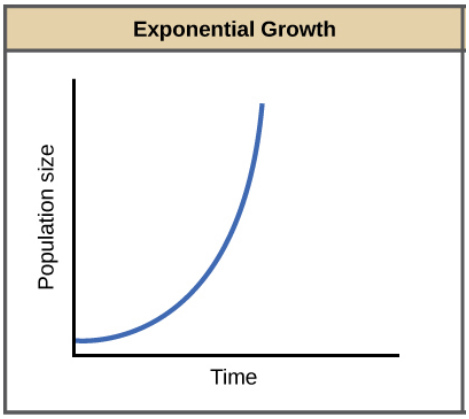
this so called Pythagoras Triangle has deeper roots. H.P. Blavatsky reminds us in the first Volume of the Secret Doctrine: *From the very beginning of Æons – in time and space in our Round and Globe – the Mysteries of Nature (at any rate, those which it is lawful for our races to know) were recorded by the pupils of those same now invisible "heavenly men," in geometrical figures and symbols. The keys thereto passed from one generation of "wise men" to the other. Some of the symbols, thus passed from the east to the west, were brought therefrom by Pythagoras, who was not the inventor of his famous "Triangle." The latter figure, along with the plane cube and circle, are more eloquent and scientific descriptions of the order of the evolution of the Universe, spiritual and psychic, as well as physical, than volumes of descriptive Cosmogonies and revealed "Geneses."*[1]

Let us focus a bit more on numbers in mathematics. We all know the natural or integer numbers, i.e. 1, 2, 3, 4, 5, … We also know rational numbers, which are obtained by dividing one integer by another: ¾ = 0.75 etc. Yet, there is also a class of so-called irrational numbers, which cannot be written as a ratio of integers. Although in principle there are many, there are three that stand out as they directly relate to our daily life. I will only shortly indicate them.

One is 'pi' **π**, also called **Archimedes constant**. Its approximate value is 3.14159265359… . As soon as we have to do with circles or circular forms, pi comes into the picture. A simple graphical animation shows the relation of the circumference of a circle of diameter 1 and pi. For the mathematically skilled amongst us: 2 π R = circumference of a circle with radius R.



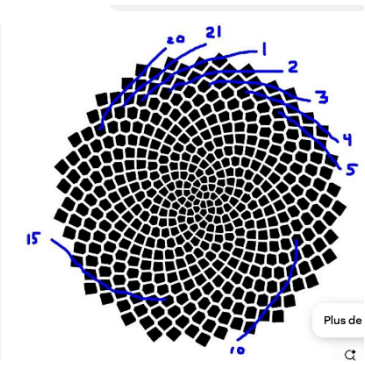
A second constant is the number **e** (sometimes called **Euler's number**) approximately equal to 2.71828 that is the base of the natural logarithm and exponential function. I will not go too much in the details of this, but as soon as we speak of 'exponential growth' this constant is indirectly in the background. Exponential growth starts slowly but the further we go, the faster it increases. Many processes in nature do not evolve linearly, but exponentially and are thus more difficult to manage.

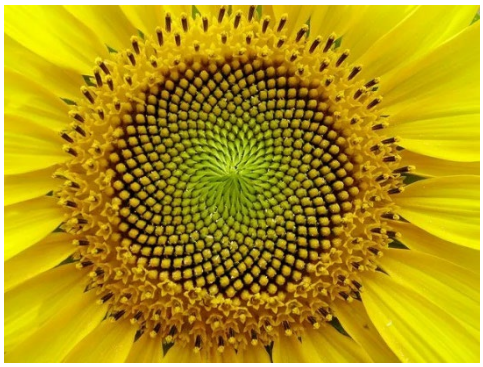


The third constant brings us closer to beauty, which I also wanted to talk about. It is the **Golden Ratio** – normally written as **Φ** = 1.618… - and which is closely related to Fibonacci numbers. The Fibonacci sequence is a series of numbers wherein each number is added to the last. The Fibonacci numbers are 0, 1, 1, 2, 3, 5, 8, 13, 21, and so on. The ratio of each number and the previous number gradually approaching 1.618, or phi. We

[1] H.P. Blavatsky, The Secret Doctrine, Vol I, p. 612.

could dedicate a whole webinar to this single number. Let me just mention that the golden ratio is found in many places: in the form of nature like sunflowers or sea animals, but also in the relative dimensions of the human body etc. etc.

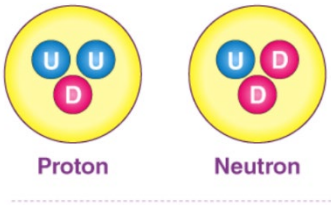


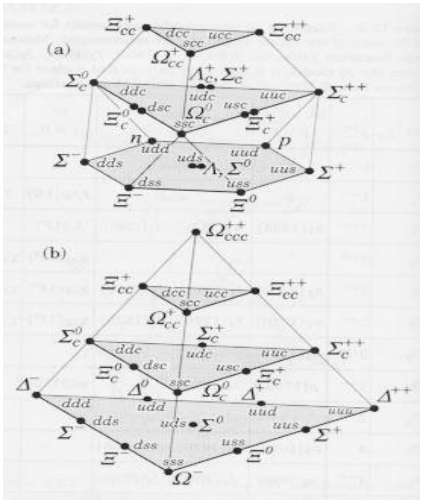


To conclude this part on beauty I want to mention an Indian mathematician, Srinivasa Ramanujan who lived from 1887-1920. In music we have geniuses like Mozart or Bach who heard the music in their mind and 'only' needed to write it down. In mathematics Ramanujan was similar in the sense that he saw many formulas in his mind which he wrote down without proof. Sometimes it has taken years of work by other mathematicians to prove they were right. I admit that this example will probably not evoke the same emotions as a sonate by Mozart or a prelude by Bach. But for mathematician there is a certain beauty hidden in these formulas.

$$\frac{1}{\pi} = \frac{2\sqrt{2}}{9801} \sum_{k=0}^{\infty} \frac{(4k)!(1103 + 26390k)}{(k!)^4 396^{4k}}$$

To conclude a few words about particle physics. The current so called Standard Model classifies many elementary particles in geometrical patterns. The underlying thought is that certain symmetries of specific quantum numbers give rise to these geometrical patterns. But most of these particles are synthetic in the sense that they are created by collisions in high energy accelerators. The more natural particles, i.e. the atoms you and me are built of, consist of only three particles – the proton, the neutron and the electron. And according to that model the proton and neutron each exist again of three particles, in this case called quarks. Nobody knows exactly why this is so, but it is a fact that much of the matter we find in the universe is modeled on this triangular pattern. And that brings me back by the thought of H.P. Blavatsky that in the "Pythagorean triangle" (the triangle with 10 points) we find the uninterrupted series of the genealogies from the first Heavenly man to the terrestrial man – what now we would call a human being.





Thank you!