Mathematical mysteries behind Pyramids

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Introduction:

The Egyptian pyramids are ancient stone made structures that many believed were built as tombs for pharaohs but is it solely for that purpose? Pyramids have been around us for thousands of years (built around 2630-2610 BCE). The majority of people only view them as landmarks of Egypt, but is it really that simple? Even in the current AI era, along with all the cutting-edge technologies, the mathematical mysteries behind pyramids remain unsolved. Recent discoveries show that pyramids are closely correlated with mathematics.

Figure 1: The famous Giza Pyramids

Hypothesis:

The mathematical patterns embedded in The Great Pyramid of Giza were intentionally incorporated by builders, implying that The Great Pyramid does not only serve as a tomb but also as a structure encrypting and involving advanced mathematical knowledge and astronomical relationships.

Mystery 1: The height to base ratio

The first mystery is how the dimensions of The Great Pyramid is related to the mathematical value π and Euler's number. To start off, let's look at the dimensions of The Great Pyramid. The base length of The Great Pyramid is roughly 230.4 meters(756 feet) and the height of The Great Pyramid is roughly 146.6 meters(481 feet).

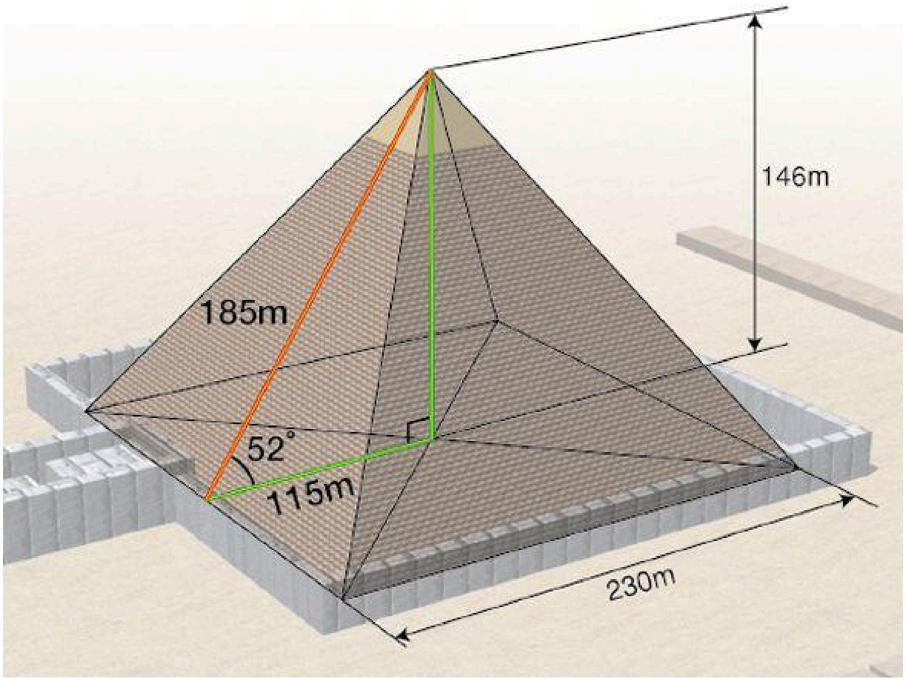


Figure 2: The dimensions of The Great Pyramids

To calculate the base perimeter of this pyramid, we could use the formula:

1 base length×4

230.4×4=921.6m

If we then divide the perimeter by 2, and divide the result by the height of the pyramid, we would get a result that closely resonates with the value or π

$\frac{921.6}{2} = 460.8$

$\frac{460.8}{146.6} = 3.14324693$

$[\pi = 3.141592654]$

Another alternative method to prove this theory is to use the angle between the slanted face and the horizontal axis in The Great Pyramid. To find this angle, we need to do the following calculations:

-Firstly, we need to identify half of the base length

$\frac{230.4}{2} = 115.2m$

-By applying our knowledge of trigonometry, we could find the angle. Because we know the values of opposite and adjacent sides, we could use Tangent to find our angle.

$tan\theta = \frac{146.6}{115.2}$

$\theta = tan^{-1}\left(\frac{146.6}{115.2}\right) = 51.839°(3\ d.p.)$

$tan(51.839) = 1.2726(4\ d.p.)$

-After finding the angle, Tangent could then be used to convert to a slope of 1.2726, which is extremely close to the value of $\frac{4}{\pi}$ which is 1.27324

The sum of angles in a triangle is equal to 180°, to calculate the upper angle of the pyramid, we need to use this property of triangle:

180-(2×51.839)=76.322

-Then if we times the angle between slanted face and horizontal axis by 4 and divide it by 76.322°, we would get a result that is immensely close to the value of e(Euler's number)

$$\frac{4\times51.839}{76.322} = 2.7169(4\ d.p.)$$

Euler's number calculation:

The letter e represents Euler's number. It is given that if we take the derivative of e^x, we would get an equation like this:

$$\frac{d}{dx}\left[e^x\right] = e^x$$

If we express e^x as a polynomial, we would get

$$e^x = a_0 + a_1x^1 + a_2x^2 + a_3x^3 + a_4x^4 + ... + a_nx^n$$

If we now let x be 0, we would be left with

$$e^x = a_0 = 1$$

Now we have the equation

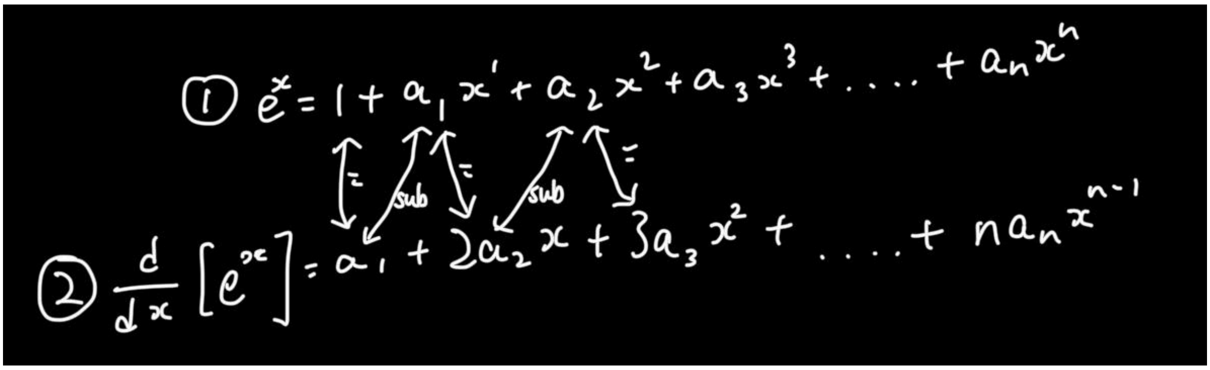
$e^{x} = 1 + a_{1}x^{1} + a_{2}x^{2} + a_{3}x^{3} + a_{4}x^{4} +..... + a_{n}x^{n}$

If we then now take the derivative of e^{x}, we would get

$\frac{d}{dx}\left[e^{x}\right] = a_{1} + 2a_{2}x + 3a_{3}x^{2} + 4a_{4}x^{3} +..... + na_{n}x^{n-1}$

If we want the derivative of e^{x} equal to e^{x}, these 2 polynomial has to be equal to each other

If we look at the first term in both equation, a_{1} (from the derivative equation) has to be equal to 1 (from the equation of e^{x})



Now we know that $a_{1} = 1$, if we substitute this into $a_{1}x^{1}$ (from equation 1), we would get $(1)x^{1}$. If we continue this trend, we would get these results:

$a^{1} = 1$

$a_{1} = 2a_{2} \rightarrow a_{2} = \frac{1}{2}$

$a_{2} = 3a_{3} \rightarrow a_{3} = \frac{1}{6}$

We will eventually get these 2 final formulas that could up to infinity

$$e^x = 1 + 1x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + ... + \frac{1}{n!}x^n + ...$$

$$\frac{d}{dx}\left[e^x\right] = 1 + 2\left(\frac{1}{2}\right)x + 3\left(\frac{1}{6}\right)x^2 + ... + \frac{1}{(n-1)!}x^{n-1} + ...$$

This leaves us with a formula for all these coefficients

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!}$$

For the final step, we need to set $x = 1$

$$e^1 = 1 + 1(1) + \frac{1}{2}(1)^2 + \frac{1}{6}(1)^3 + \frac{1}{24}(1)^4 + \frac{1}{120}(1)^5 + \frac{1}{720}(1)^6 + ... (to\ infinity)$$

This eventually gives us $e = 2.71828....$

Going back to our previous pyramid calculations, we got a set of numbers 2.7169 which is very close to our calculated value of e.

Mystery 2: The golden ratio

The Great Pyramid's dimension is a demonstration of the golden ratio.
The golden ratio refers to the perfect golden balanced proportion

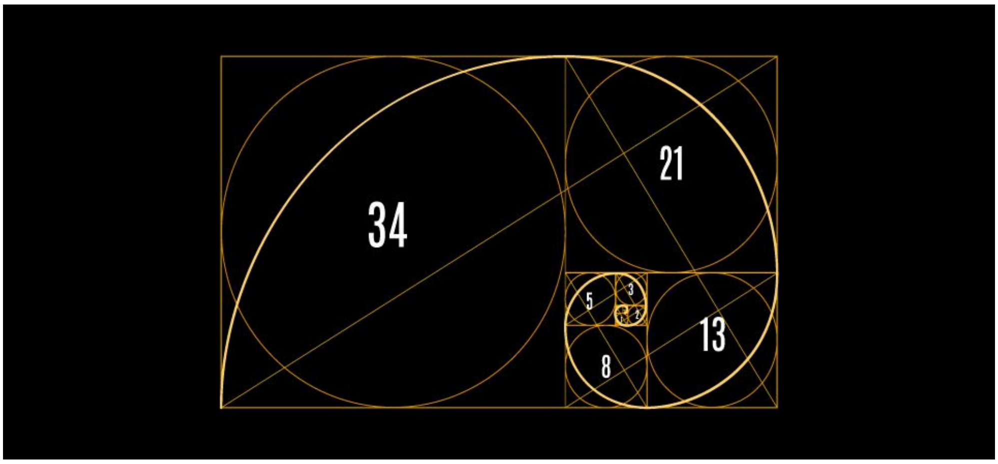


Figure 3: a photograph of the golden ratio

We could use the Kepler triangle to derive the golden ratio.

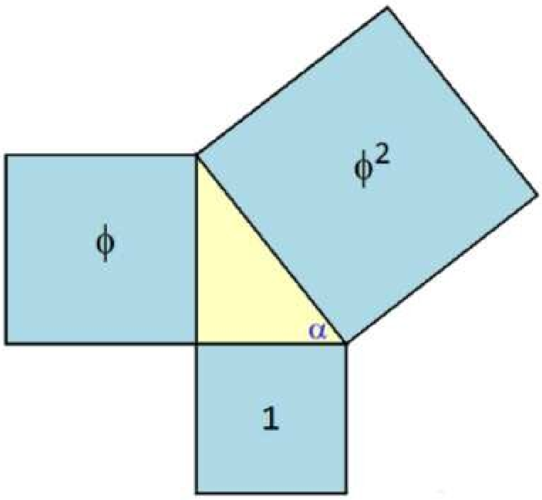


Figure 4: a photo of the Kepler triangle

-The Kepler triangle shows that the adjacent side is 1, opposite side is ϕ and hypotenuse side is ϕ^2. This could give use the equation (using Pythagoras theorem):

$1^2 + (\phi)^2 = \left(\phi^2\right)^2$

$1 + \phi^2 = \phi^4$

If we root the whole equation, we will get:

$1 + \phi = \phi^2$

If we rearrange this equation:

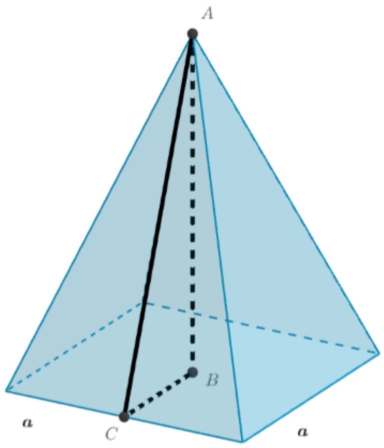
$\phi^2 - \phi - 1 = 0$

This gives us a quadratic equation

$\frac{-(-1)\pm\sqrt{(-1)^2-4(1)(-1)}}{2(1)} = \frac{1\pm\sqrt{5}}{2} = 1.6180(4\ d.p.)\ or\ -0.6180(4\ d.p.)$

-Therefore, we found that the golden ratio(ϕ) is 1.6180, as -0.6180 is rejected.

-Imagine if we slice The Great Pyramid by half and make a cross-sectional right angled triangle like so



If we now check the dimensions of this cross-sectional right angles triangle, its slanted height to half of base ratio=186.4:115.2≈1.6185. This answer only vary by 0.0267% from a perfect golden ratio

Mystery 3: The accuracy of the alignment of the pyramids

The pyramids are aligned within 3/60th of a degree to north, this coordinate is more accurate than any other structures on Earth. The four edges of the pyramids also correspond to the 4 cardinal points(North, East, South and West). These pyramids were built back then when compasses weren’t even a thing. The accuracy and precision of the placement and orientation of the pyramids are truly fascinating.
Dr. Spence made some discoveries about how the pyramids are pointing right at certain stars or even zodiac signs. This leads to the conclusion that pyramids might be served for religious purposes.

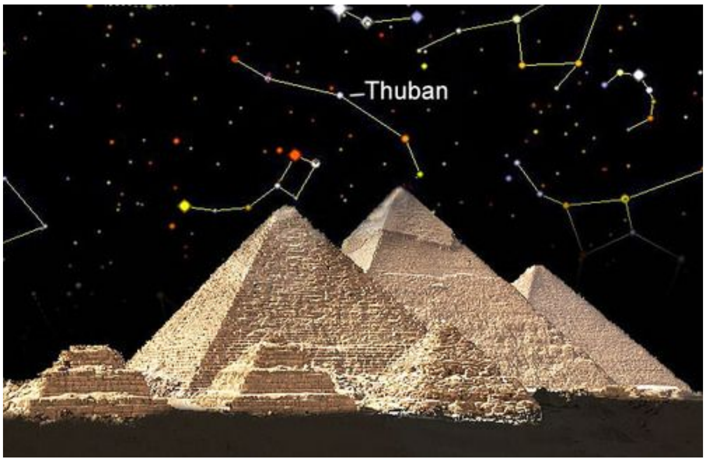
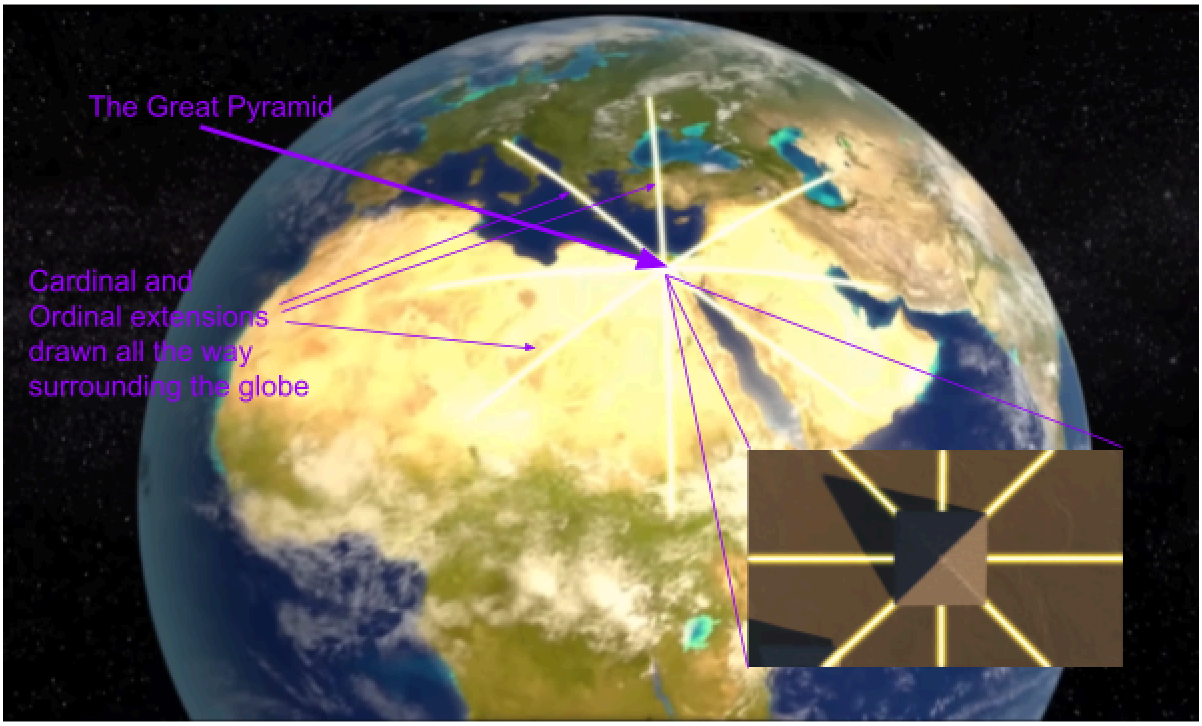


Figure 5: a photo of how pyramids are aligned with stars

If we draw lines starting from the pyramid's cardinal and ordinal direction all the way through the globe, we would see that the lines pass through more land mass than any other places on Earth.



The measurements of length(3043.433 feet) and width(3023.139 feet) of The Great Pyramid exactly correspond to 1 fraction of the latitude and longitude measurements of the equator.

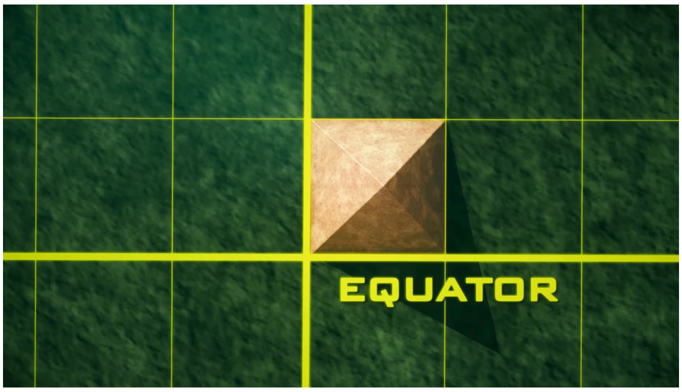


Figure 6: a photo of The Great Pyramid occupying 1 fraction of the equator

Mystery 4: Speed of light

The speed of light, most commonly known to be $3 \times 10^{8}\,ms^{-1}$. The King's Chamber of The Great Pyramid lies on a set of coordinates, 29.9792458°N. To be more precise, the speed of light is $299,792,458\,ms^{-1}$. This value of speed of light exactly matches the coordinate of The Great Pyramid.

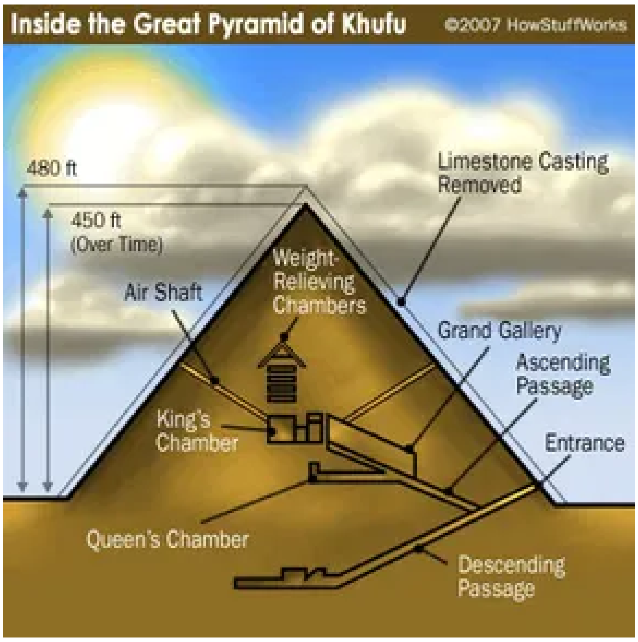
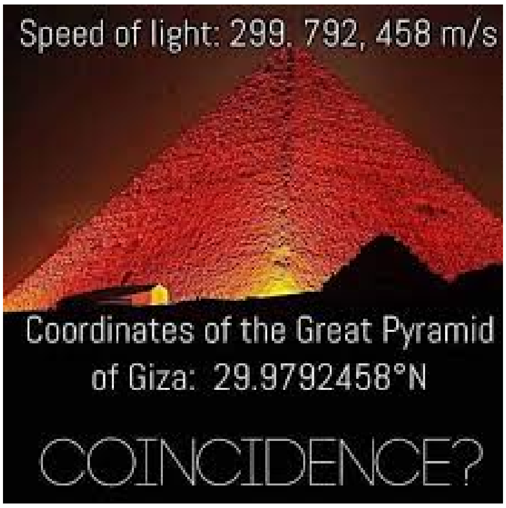


Figure 7: The interior of The Great Pyramid showing the position of King's Chamber



The Great Pyramid was built way before without compasses or any knowledge about latitude and longitude. The people who built The Great Pyramid were also unaware and didn't know about the magnitude of speed of light. So are all these coincidences?

Mystery 5: Cubits

A cubit sounds unfamiliar to most people nowadays. It seems to come from the word cubic or is some cubic objects, but it is actually a measurement unit used in ancient times and used in the construction of The Great Pyramid.

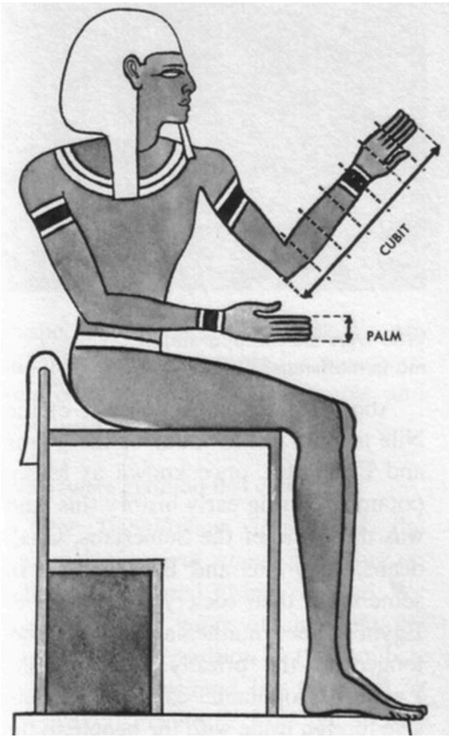


Figure 8: a diagram showing what a cubit is

A cubit is a derived word from the Latin word cubitis, which means forearm. Cubit is a measurement taken from the distance between an elbow to the finger tip of the middle finger, typically has a range from 44.4 cm to 52.92 cm or approximately 17.5-21 inches. But then how is this related to The Great Pyramid? you might think. Let's break it down. If we take the distance from the Earth's north pole to the Earth's south pole and divide it by 25 million, we would get a result that is very similar to the length of one royal cubit

The distance between North and South pole of Earth is 12,713.6 km

$$\frac{(12{,}713.6\times 100000)}{25000000} = 50.8544$$

Conclusion:

In conclusion, The Great Pyramid of Giza demonstrates an extraordinary presence of mathematical patterns. This includes how The Great Pyramid's dimensions relates to π, Euler's number or even the golden ratio(ϕ). The precision in the placement and alignments of The Great Pyramid with possible astronomical relationships suggests that The Great Pyramid's design was involving sophisticated calculations. Considering the vast amount of mathematical proofs involving The Great Pyramid, it is unlikely that all of these were coincidental. Instead, it suggests that ancient Egyptians possessed advanced mathematical knowledge and incorporated them into The Great Pyramid. But interpreting such complex mathematical rules with such immense precision is not something even our modern world with bleeding-edge technologies could achieve. This leaves us with a question, were they helped by higher intelligence? No one knows. Myth remains a myth, truth is yet to be revealed.

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