Pyramid Paper 1b (1.0)

The Great Pyramid Dimensions, Chronology, and Prophecy

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Version 1.0 (December 15, 2025)

Abstract

The purpose of this paper is to present, concisely, analyses of the design of the Great Pyramid. They precisely determine mathematical expressions for the Great Pyramid's dimensions, which yield accurate dates that align with Biblical chronology. The result is a description of the past, present, and future of God's plan, and reveals Him as the designer.

The analysis is in two parts. The first uses Petrie's "Inductive Metrology", the M-Circle, and the Arclength Theory to define homogeneous mathematical expressions for the dimensions. The latter two, new theories, were of significant assistance.

The analyses use Petrie's dimensions when available and those of other surveyors when necessary. The studies evaluated the dimensions for subsidence-induced deformation and for other reasons, which justified corrections that accurately reflect the Pyramid's intended design.

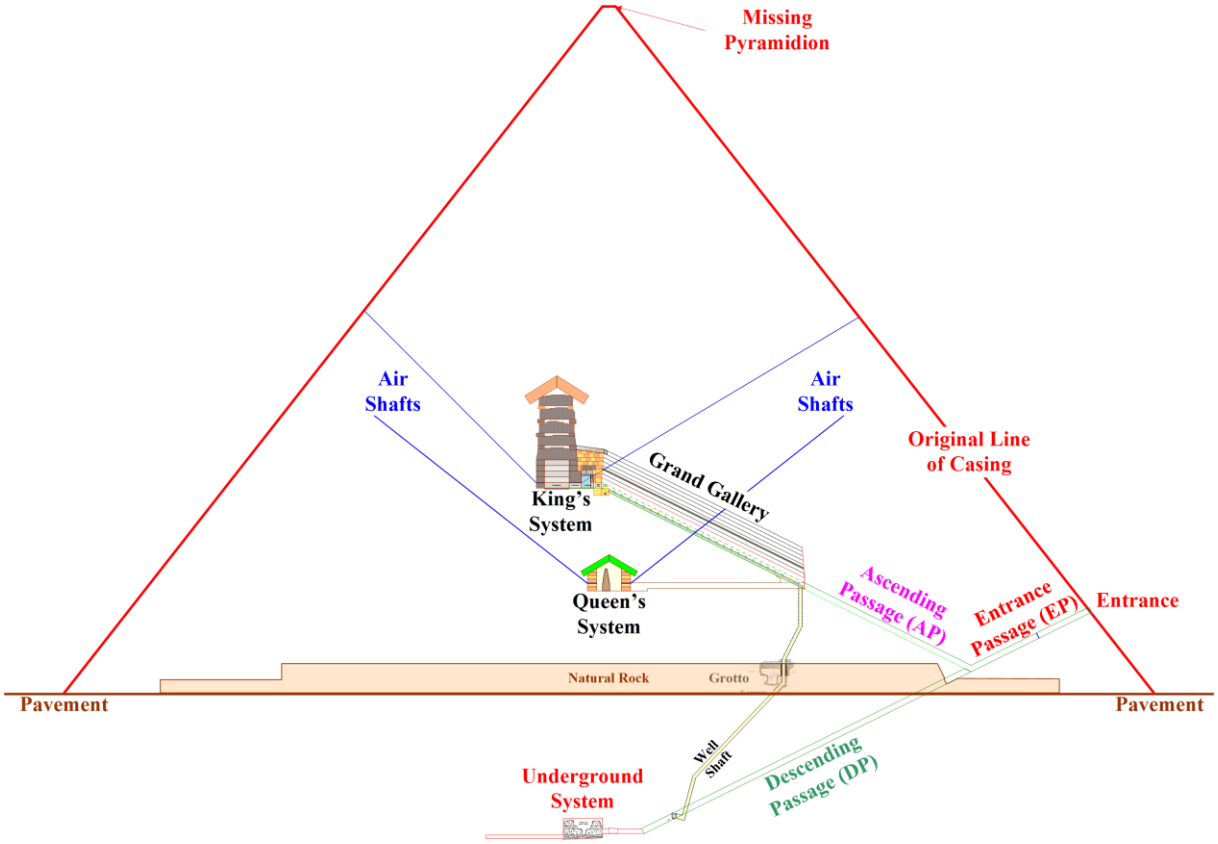
The second converts those dimensions into dates using astronomical software and synchronizes them with Biblical chronology, past, present, and prophetic.

God's plan spans 7000 years, or more than 2.5 million days. The goal is to synchronize the dimensions with historical events to within a day or better, so the mathematical expressions and date conversions need to be logical and precise. The analyses achieved this goal.

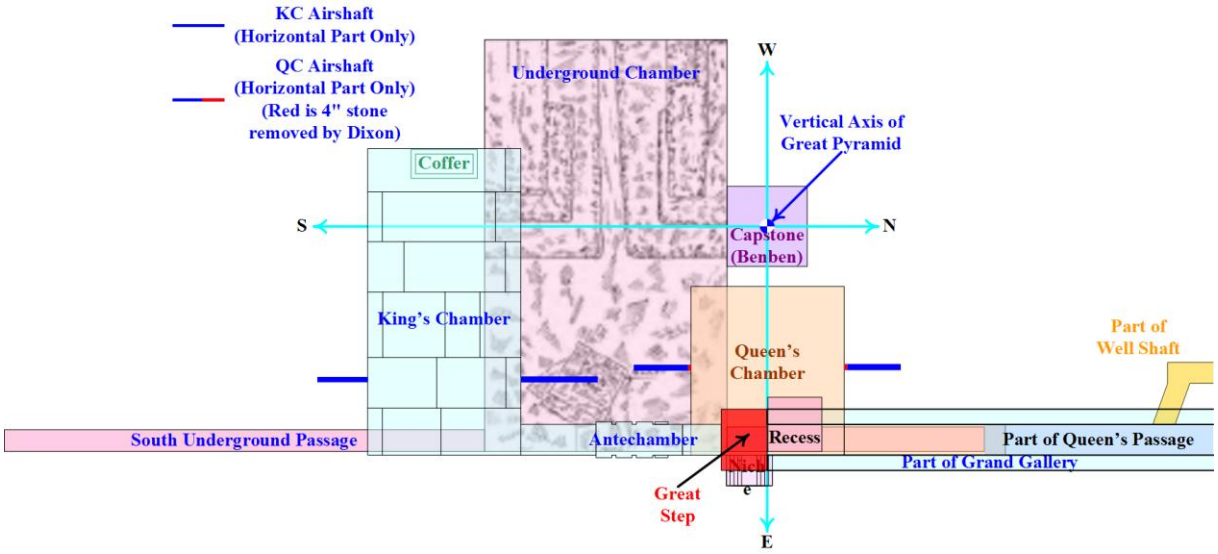
The passage and chamber dimensions define time linearly in Terrestrial Time (TT). However, the world lives by Universal Time (UT), which is subject to irregularities in Earth's orbit around the Sun. To overcome the inaccuracies of a linear conversion, the analyses used Delta Time (ΔT) to convert dimensions to dates, as described by Fred Espenak's article and subsequent links at https://eclipse.gsfc.nasa.gov/SEhelp/deltaT.html.

5. Introduction to the Great Pyramid Chambers and Passages

See Pyramid Paper 4 for details of the two figures below, which show the Pyramid's interior.



The Upper Passages and Chambers are Unique Features of the Great Pyramid

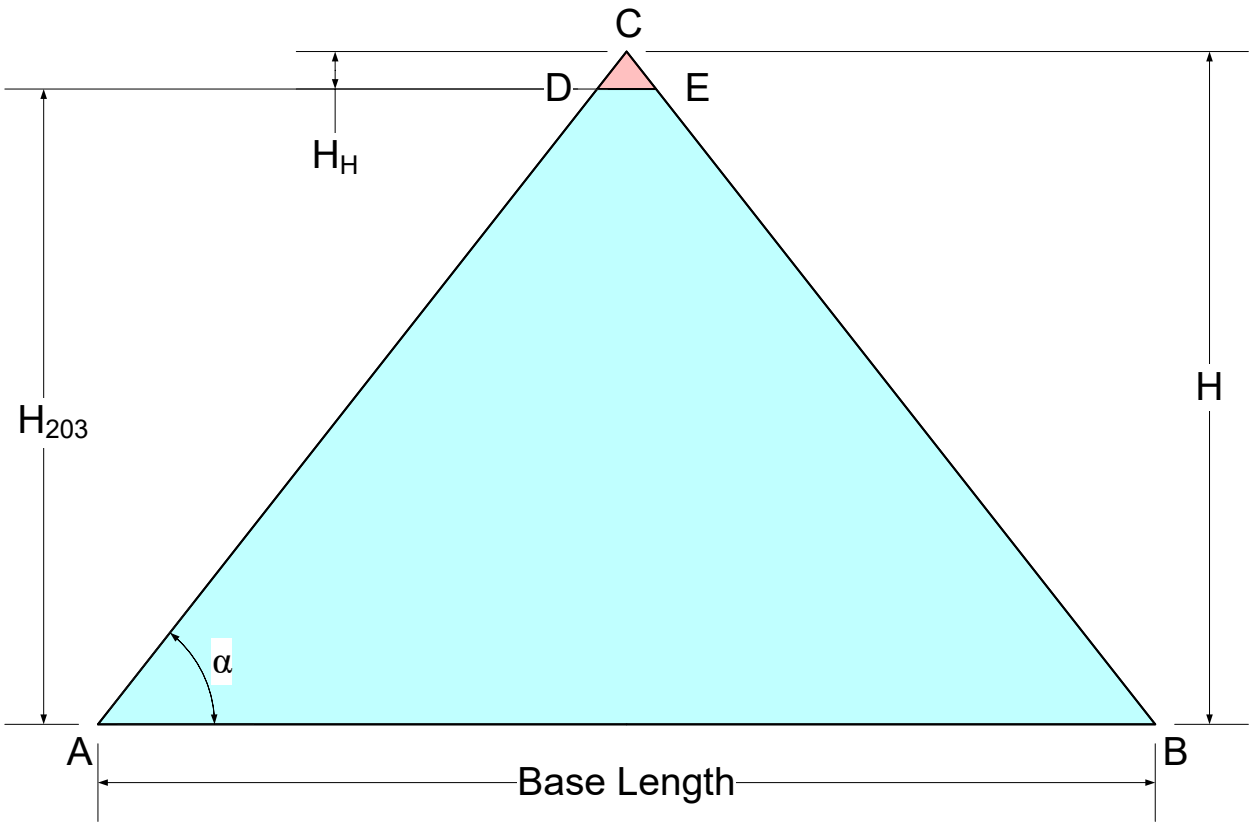


Plan View of the Chambers, Passages, and Capstone of the Pyramid

Dimensional Analysis

Pyramid External Dimensions - The Ratio Clue

In the figure below, CDE is the Head of the Pyramid, from the top of the 203rd course (currently the top course) to the missing Apex, point C. CDE is not the Capstone (Pyramidion).



The Parameters Which Define the Ratio Clue

Let R = the ratio of the height of the Pyramid to the height of the Head = H/H_H

Computations based on Petrie's measurements show that with D and E defining the height of the 203rd course, H_{203}, and when the dimensions are in inches, the following relationships are true:

$$R^2 = H_H$$

and $$R^3 = H$$

But $$H - H_H = H_{203} = R^3 - R^2$$

$\therefore$ $$\mathbf{R^3 - R^2 - H_{203} = 0}$$

Petrie's average of H_{203} is 5451.8" above the Pavement. 17.6^3 (5451.776) is about 5 ppm less, making it the choice to define H_{203}, mathematically, and hence H_H and H.

Excel's "Solver" returns no errors when R, below, is substituted back into the original formula.

R = 17.939 726 146 676 5

∴ The height of the Great Pyramid, $H = R^3$ = 5773.610" (5776.0" ± 7.0")

From Pyramid Paper 4 the base angle = $\tan^{-1}(4/\pi)$ = 51.854° = 51° 51' 14" (51° 52' ± 2')

∴ The base length of the Great Pyramid = $(H \times \pi)/2$ = 9069.165" (9068.8" ± 0.5")

The values in parentheses are Petrie's measurements and uncertainties. There are an infinite number of theories that fit within his measurements, and this is one of them.

An analysis by the author shows that there were possibly 216 or 6^3 courses, consistent with the cube in the equations above.

Pyramidology says that the Timescale for converting lengths to dates is the base perimeter divided by 100 years. An astronomical year is 365.25 days, so the

Timescale = (9069.165 × 4)/36525 = 0.993201"/year.

Multiplying by 25 yields 24.83", which is within the range of Sir Isaac Newton's Sacred Cubit, 24.833" ± 0.11". So, Newton's Pyramid base length would be 365.25 Sacred Cubits.

Pyramid Paper 4 shows how the Ratio Clue only works for inches. 17.6 is a unitary value, since it is the number of inches traversed in one second when travelling at a speed of one mile/hour. All the coefficients in the ratio equation above are one. π is also a unitary number in that it is the circumference of a circle with unit diameter. A structure as important as the Great Pyramid ought to contain such values.

Excel calculates with 15 digits, so over 2.5 million days, the resolution is 10 ns. That is more than sufficient for calculations to be accurate to within two minutes.

Subsidence

Time, earthquakes, subsidence, and humans have ravaged the Pyramid. Smyth shows in "Our Inheritance in the Great Pyramid" that this began about 1100 years ago, when

"… *the Caliphs of Egypt, about the year 1,000 A.D., profiting by the effects of a severe, and for Egypt very unusual, earthquake recorded to have happened in 908 A.D., began methodically to strip off the polished casing-stone, bevelled blocks; built two bridges to convey them more easily to the river, after chipping off the prismoidal angles and edges; and then employed them in building mosques and palaces; for the lining of the great "Joseph" well, and for other public structures …*"

It is possible to estimate the impact of subsidence and earthquakes on the interior of the Pyramid by creating a model that reflects the most likely theoretical angles of the chambers and passages, and then comparing that to the measured values. The best model is that the angles of the

ascending and descending passages have the same magnitude but opposite signs (±P). It also assumes that the intent was for the three chamber systems to be horizontal (i.e., 0°).

[(Pxx) references a section number in Petrie's, "The Pyramids and Temples of Gizeh"].

Petrie states (P36) that the mean axis of the Entrance and Descending Passages is 26° 31′ 23″. For the Ascending Passage and Grand Gallery, it is 26° 12′ 50″ (P39). The total angle between them is 52° 44′ 13″. So the sloping passages are at an angle of ± 26° 22′ 7″, about a line that dips 0° 9′ 17″ below the horizontal. Does this dip agree with the survey?

According to Petrie (P40), the Queen′s Passage levels above the Pavement are:

On flat floor	858.4″	52″	along the passage,
Minus step in floor	19.7″	1307.0″	along the passage,
Minus Level of the N side of the Niche	834.4″	1620.7″	along the passage,
For a level change due to subsidence of	4.3″	over 1568.7″	

Therefore, the slope = $\sin^{-1}(4.3/1568.7) = 0.1571° = 0° 09′ 25″$ down toward the Pyramid center, which is a good match to 0° 9′ 17″. This data strongly supports the proposed model and suggests that the sloping passage angles (P) are ±26° 22′ 7″.

However, there is an alternate method of determining the intended passage angle. Petrie says that a design intent is for the face of the Great Step to align with the Pyramid's Vertical Axis. Therefore, the horizontal components of the floor lengths of the Entrance and Ascending Passages, and the Grand Gallery, up to the Great Step, must fit horizontally between Petrie's Entrance X and Y coordinates and the Pyramid's Vertical Axis.

∴ (1110.64 + 1546.8 + 1815.5) × cos(±P) = 4010" (P64) ∴ Passage Angle = 26° 17' 53",

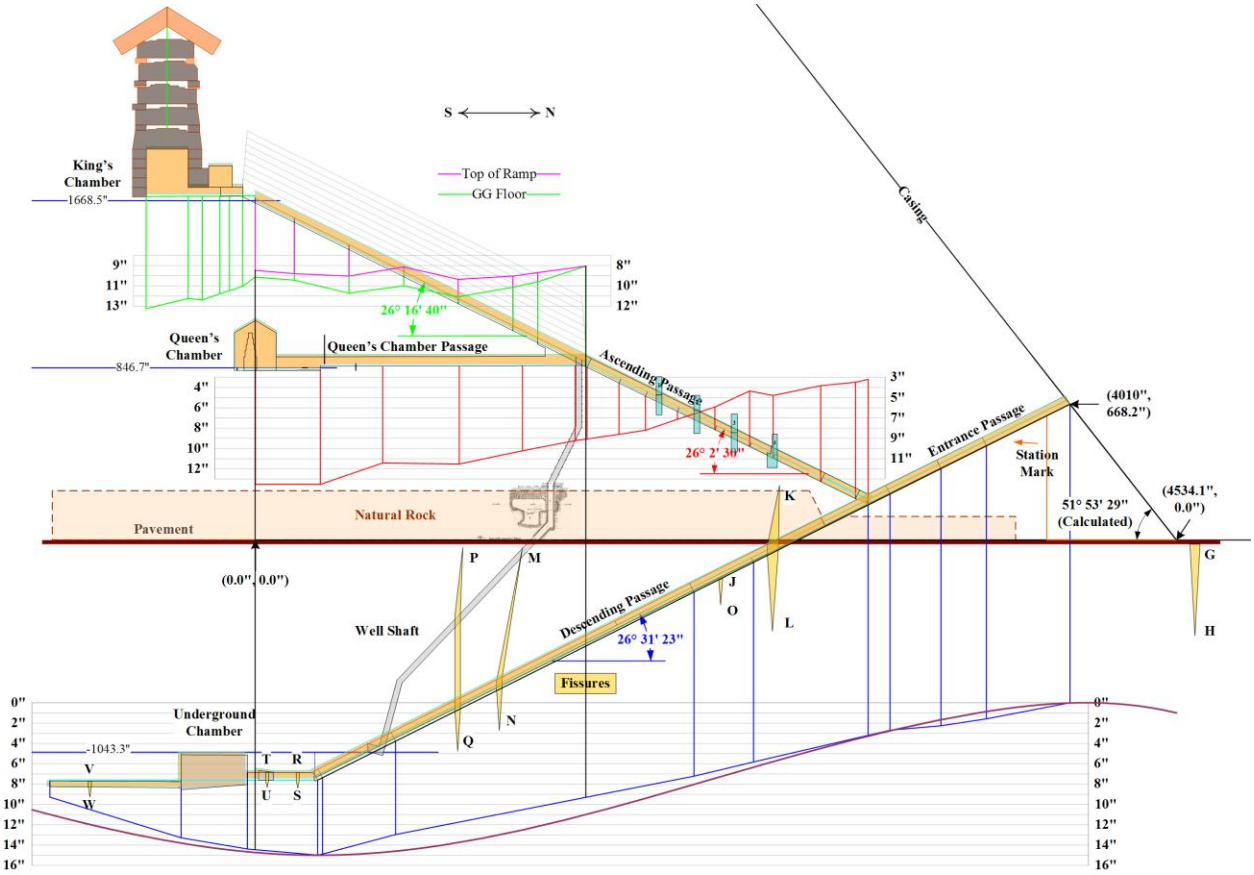
which is 17" less than the pi-based angle $\sin^{-1}(\sqrt{\pi}/4)$, 26° 18' 10". ± 17" is similar to the range of the variation of the Pyramid's base alignments. The base angle of the Pyramid is $\tan^{-1}(4/\pi)$, so for consistency, $\sin^{-1}(\sqrt{\pi}/4)$ is chosen to define the intended passage angle.

Petrie's offset tables, revised due to data anomalies, served as the reference data against which the model was compared. The model uses these offsets, except that P = ± 26° 18' 10". In the figure below, compare the measured passages and chambers, outlined in black with no fill, with the modelled versions, filled with fawn.

The descending passages and Underground System have vertical blue lines which connect each of Petrie's floor offset points to the blue segmented line representing the subsidence. Overlaid on this line is a grid showing the maximum amount of subsidence as 15".

There is a smooth, brown, curved line at the bottom of the figure that shows typical subsidence of an underground mine, adapted from chapter 3, page 5 of the paper PRINCIPLE PARAMETERS OF SUBSIDENCE, Kewal Kohli, Stefanie Self . This line shows that at the mine's outer edge, the ground might form a hump above its original level. If applied to the Pyramid, it explains why the north face is steeper than the rest of its surface. The brown line is a

reasonable match. The Arclength Theory assumes a 1" hump, so all values in the figure should be reduced by this amount. So, for the Underground System, the maximum subsidence is 14".



Pyramid Subsidence at the Underground, Queen's, and King's System's Levels

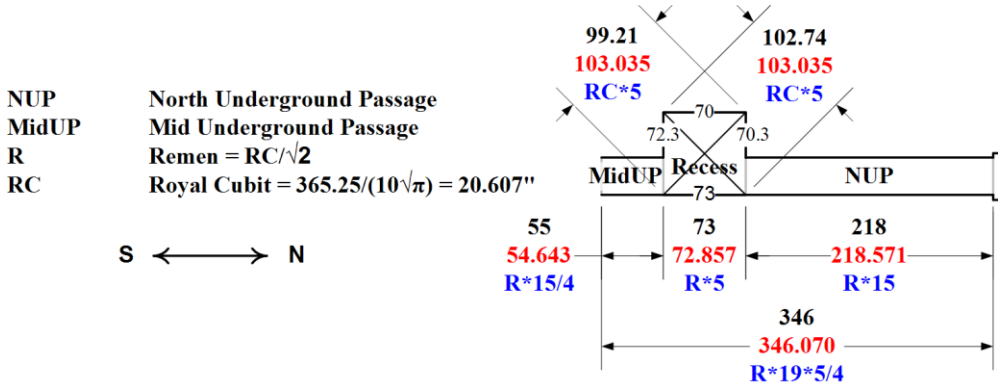
The Ascending Passage and Queen's System subsidence is in red. The maximum subsidence is 13.5", which is 12.5" after correction.

The Grand Gallery and King's System subsidence is in green. The top of the Ramps in the Grand Gallery, magenta, has subsided 7" to 9", and the floor of the King's System by 9" to 12", all after correction. The floor, in green, has subsided between 7" and 10" after correction.

Inductive Metrology for the Underground System

Petrie wrote "Inductive Metrology" to guide understanding of a structure's design criteria. The following is an example of how one of his methods works for the Underground System (USy).

The figure is a plan view of the northern elements of the Underground System. Each dimension has three entries. Black is Petrie's measurement in inches, red is the proposed theoretical dimension based on the mathematical expression in blue. R is Remens.



Plan View of the Northern Three Elements of the Underground System

One of Petrie's methods for discovering the unit of length is to divide all the dimensions by the smallest one to find any whole-number ratios among them.

Feature	Length "	Ratio - Divide by the smallest dimension (55")	Multiply by 3, and round to a whole number
NUP	218	3.98	12
Recess	73	1.33	4
MidUP	55	1.00	3
Total	346		19

The table shows the rounded ratios of the three elements are 12:4:3, totaling 19 units. The total length is 346", so one unit is 18.21". It is not immediately obvious what unit this represents, but the Recess provides a clue. Its roof is formless; only its floor dimensions are useful, and they suggest it should be square. As in other parts of the Underground System, construction failed to match the design. One floor diagonal is 102.74", which is close to 5 Royal Cubits (RC) (103.1"), using Petrie's weighted average of 20.62"/RC. The other diagonal, although only 99.2", forms a cross with the first, suggesting not to use RCs here. Sometimes X does mark the spot.

Petrie found that in a square, like the Recess, where the diagonals are "n" RCs, the sides are "n" Remens. So, 1 Remen = 1/√2 RC = 14.58". Dividing the east wall of the Recess, 73", by 5, results in 14.6", which is close to this value. The east wall is the best to use because it is part of Petrie's measurement chain for the USy's total length. So, the 4 units of the Recess's east wall are 5 Remens in length. Therefore, the equation for the length of these three elements is 19 × 5/4 Remens; and the value of the Remen in the USy is 346/(19 × 5/4), or 14.568". By the least-squares method, the best fit is 14.570", which, when multiplied by √2, results in 20.605"/RC.

The following table shows the equations for all prime elements of the USy, the measured and theoretical dimensions, and the differences between them.

Any difference greater than ± 0.325" is flagged in red. See Pyramid Paper 5 for why ± 0.325" was selected. Only the MUP is flagged, showing that this homogeneous theory is an excellent fit.

Feature	Equation R=Remen, A=Base Angle	Measured Length "	Length by Equation "	Difference "
NUP	R*15	218.63	218.55	0.08
Recess	R*15/3	73.00	72.85	0.15
MidUP	R*15/4	55.00	54.64	0.36
NUSy	R*19*5/4	346.00	346.03	-0.03
UC	R*19*3/2/tanA	326.00	326.13	-0.13
Depth UC (Avg.)	R*19*2	553.80	553.65	0.15
SUP	R*19*7/3	646.00	645.93	0.07
USy	R*19*(5/4+3/2/tanA+7/3)	1318.00	1318.09	-0.09

N, E, S, W, = North to West, U = Underground, Sy = System, P = Passage, C = Chamber

The following table shows possible equations that define the theoretical dimensions of the width and height of the underground passages to within 0.52", a reasonable match:

Feature	Equation R=Remen	Length "	Length by Equation "	Difference "
NUP and MUP Height	R/19*47	35.75	36.04	-0.29
NUP and MUP Width	R/19*43	32.46	32.98	-0.52
SUP Height	R/19*37	28.78	28.38	0.40
SUP Width	R/19*37	28.65	28.38	0.27
Height and Width of Well Shaft	R/19*41	31.25	31.44	-0.19

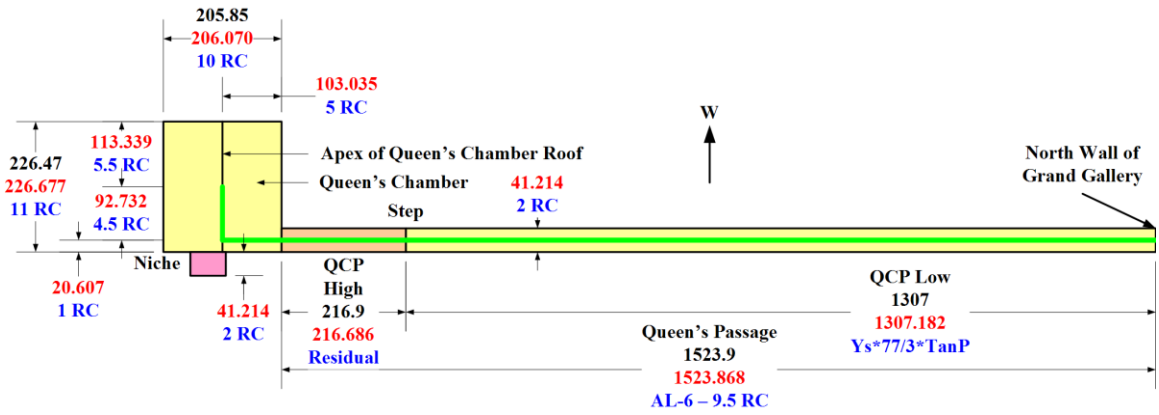
19 is present, making a homogeneous solution. The 12th to 15th prime numbers are also present.

So why is the number 19 used? Clearly, it links the USy, via the Entrance and Descending Passages, to the Pyramid's Entrance, which spans the entire height of the 19th course.

The center of the Pyramid's Entrance is offset to the east of its vertical axis by a theoretical value of 365.25/tan(A), or 286.87", compared with Petrie's 287", where (A) is the Pyramid's base angle. Here, the trig function links the passage offset to the equation R*19*3/2/tan(A) for the Underground Chamber length, suggesting that the section from the Entrance Passage to the Underground Chamber is a system in its own right.

Trig relationships also exist in the King's and Queen's Systems, and their presence indicates the beginning or end of a pathway. For consistency, the above pathway ends in the Underground Chamber rather than the South Underground Passage, which probably exists to fulfill the length of arclength 1 as defined later by the Arclength theory.

Inductive Metrology for the Queen's System



Equations For and Pathway Through the Queen's System, In Green

The primary pathway through the Queen's System, shown by the green line in the above figure, is from the north wall of the Grand Gallery, along the centerline of the low and high portions of the Queen's Passage to the chamber's east-to-west axis, where it turns west and ends at the chamber's center point. The Arclength Theory, described later, provides the theoretical pathway length (QPw), 1719.63". The dimensions show the measured value in inches in black and the theoretical value in red, based on the equation in blue. Because the pathway enters along the passage center line, which is 1 RC from the east wall, the portion running west is half the width of the chamber, minus 1 RC, for a total of 4.5 RC.

Dividing by the smallest number yielded an unusable set of values. Dividing each value by each of the others produced a similar result. However, dividing the values by the lengths of the diagonals of the Recess, one of which is 5 RCs (Ys), yielded several mathematical expressions with 11 or 77 as the numerator. Dividing those equations, which lacked 11 or 77, by the tangent of the passage angle, P, resulted in a nearly homogeneous set of equations.

Feature	Equation	Measured Length "	Length by Equation "	Difference "
Length QPw†	Arclength 6 ÷ 4	1719.46	1719.63	0.17
Length QPL	Ys × 77/3 × tan(P)	1307.00	1306.98	-0.02
Length QPH	QPw-QPL-Ys-Ys*0.9	216.90	216.92	0.02
Length QC	Ys × 2	205.85	206.04	0.19
Depth QC	Ys/5 × 11 or RC × 11	226.47	226.64	0.17
Height QCWalls	Ys × 77/43	184.47	184.48	0.01
Height QCApex	Ys × 77/16 × tan(P)	245.10	245.06	-0.04
Height QC Low	Nothing homogenous	46.30		
Height QC High	Nothing homogenous	66.10		

†QPw = Arclength 6/4 = (QPL+QPH+Length QC/2+(Depth QCD-2RC)/2).

Since there are no red values, this is an excellent, homogeneous solution for the Queen's System. The best fit for Y_S is 103.019" by the least-squares method, corresponding to 5 RCs of 20.604", as used in the above table.

The Queen's Roof angle (Q) is defined by:

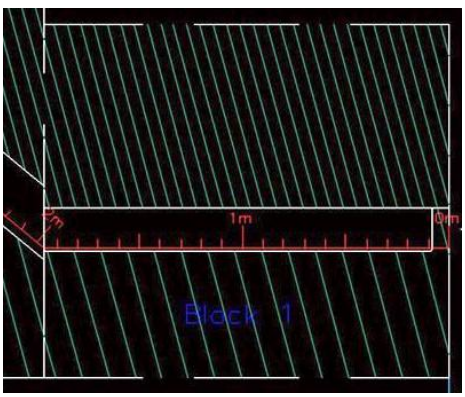
$(QCApex - QCWalls)/(QC/2) = \tan^{-1}(77 \times \sqrt{(\pi/(16-\pi))}/16\text{-}1/43) = 30.4585°$ (30.4375° avg., P42)

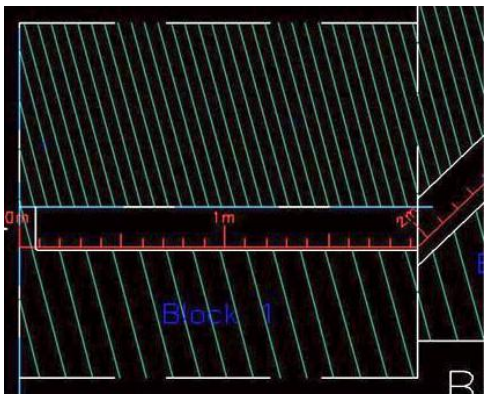
Like all passages, other than in the Underground System, the width of the Queen's Passage is 2 RCs. Homogeneous equations could not be found to define the height of the high and low parts of the Queen's Passage. Petrie thinks the height of the low part is the same as one course in the walls of the King's Chamber, which is 47.04", a poor match with his average of 46.3".

11 and 77 occur in the equations because the Queen's Chamber width is 11 RCs, and it comprises seven planes: one floor, four walls, and two for the gabled roof. 77 is also biblically significant.

Using Arclength 6 to define the pathway places the centerline of the Queen's Chamber 0.7" north of the riser of the Great Step. Petrie says it should align with the Great Step and the Pyramid's vertical axis. For a while, this was a show stopper, but closely examining Petrie's measurements showed that the Queen's Chamber roof apex is 0.3" north (P40) of the Pyramid's vertical axis, while the riser of the Great Step is 0.4" south (P46), a difference of 0.7".

This offset is intentional because the horizontal part of the north Airshaft is shorter than the south, so that the slopes of the north and south Airshafts are the same. Petrie measured these lengths, P(44), as 80″ for the south and 76″ for the north Shaft. The difference is 4", and the offset is half that, or 2". Gantenbrink's measurements, derived from the figure below, are 77.17" (1.96 m) for the south Shaft and 75.98" (1.93 m) for the north, a difference of ~1.2", corresponding to an offset of 0.6". Petrie's 2.83" difference for the south Shaft is probably caused by him pushing his measuring device in until it reached the sloping portion of the Airshaft to the south (left), but only to the end of the horizontal part of the north Airshaft. Gantenbrink had a camera attached to his robot, so he could see what he was doing, but Petrie couldn't.





Gantenbrink's Images of the South and North Queen's Chamber Airshafts

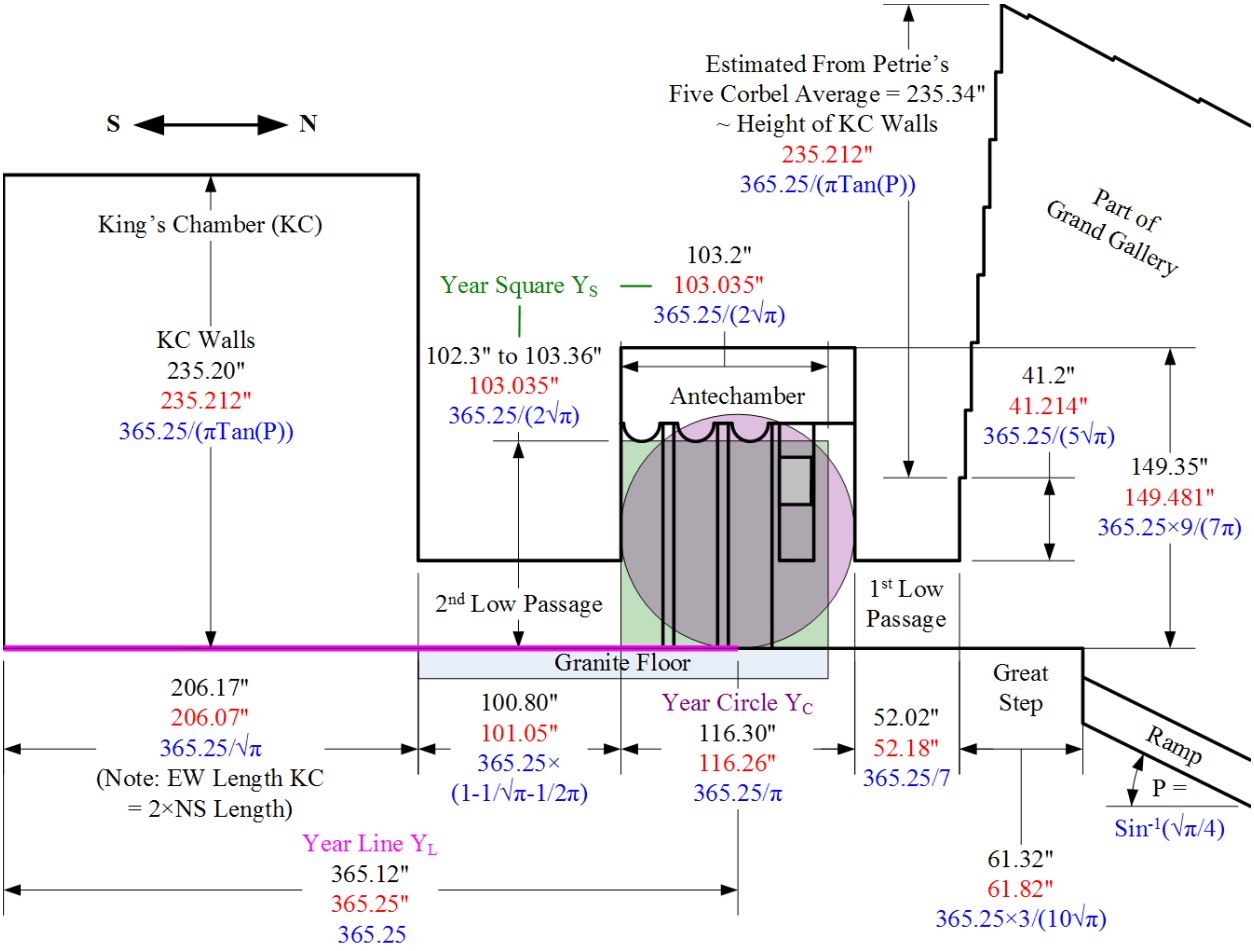
So, the Arclength Theory successfully challenges Petrie's assertion that the Queen's Chamber Roof Apex aligns with the Great Step riser and the Pyramid's vertical axis. It is 0.7" to the north.

Inductive Metrology for the King's System

As shown in the figure below, a Year Line (Y_L), a Year Circle (Y_C), and a Year Square (Y_S) coincide at the vertical axis of the Antechamber. The figure shows the measured dimensions in black and the theoretical dimensions in red, calculated using the equation in blue.

The length of the Year Line, magenta in the figure, is 365.12" ≈ 365.25". It begins at the Antechamber vertical axis and ends at the south wall of the King's Chamber.

The Year Circle, purple in the figure, is centered on the Antechamber vertical axis. Its theoretical diameter, 365.25/π" = 116.26", is 0.04" less than the Antechamber length, 116.3", a good match.



King's Chamber Measured and Theoretical Dimensions and Locations of Y_L, Y_C, and Y_S

The Year Square, green in the figure, has the same area as the Year Circle and occupies the lower-south corner of the Antechamber. The length of the granite portion of the floor in the Antechamber defines its width, and the bottom of the three semi-circles of the west Wainscott defines its height above the floor. The average measured length of its sides is 103.015", which is 0.02" less than the theoretical value of 365.25/(2 × √π)" = 103.035", which is a good match. The theoretical value calculation used the selected conversion factor of the RC below, 20.607".

The differences between the measured and theoretical dimensions are 0.13" for the length of Y_L, 0.04" for the diameter of Y_C, and 0.02" for the length of the sides of Y_S. Given the beating the King's System has taken from earthquakes and subsidence, this accuracy is remarkable. In the author's view, the King's System supports the use of Imperial inches in the design and construction of the Great Pyramid. Other units are the Remen and the Royal Cubit.

Inches are a somewhat covert unit of measurement in ancient history, as follows:

In Babylon, there was a standard weight, which the Jewish Encyclopedia calls the Shekel by the Common Heavy Talent. Its weight is 16.37 grams. At a density of 997.9079 g/mL at 21.4 °C, this weight of pure water occupies a volume of 16.404 mL. The cube root of this value defines a cube with side lengths of 2.541 cm, which is 1 part in 2500 more than 1".

The Indus foot, dating from the Harappan Civilization, 3300 BC to 1900 BC, is 13.2". Over millennia, it migrated by land and sea to Britain, and became the Saxon foot with the same length. The Composition of Yards and Perches Act, circa 1300, redefined the yard, foot, inch, and barleycorn to 10⁄11 of their previous values. Hence, the Indus foot became today's 12".

In the King's System, the Year Square is in the Antechamber, and also in the length and depth of the King's Chamber, which are 10 and 20 RCs, respectively. By the least squares method, the best fit for the RC is 20.604" after correcting the length of the Great Step to 3 RCs, as explained in the Arclength Theory.

Royal Cubit Conversion Factor For the Great Pyramid Interior

Petrie calculated the conversion factor of the Royal Cubit as 20.632"/RC, based on the bottom course of the King's Chamber walls. His measurement required correcting for 28 gaps and their associated errors. In chapter 20, he modified this to 20.62" by taking a "strictly weighted mean" of the Pyramid's internal dimensions.

Petrie should have used his mean perimeter of the King's Chamber walls, 1236.77". Dividing by 60 RC yields a conversion factor of 20.613"/RC. The following table shows a revised weighted mean based on this value and the Inductive Metrology values from the three chamber systems.

Location	Cubit Length "	Uncertainty (Petrie's σ_i)	$1/\sigma_i^2$	Weight Factor $1/\sigma i^2/\Sigma(1/\sigma i)^2$	Weighted Value "
Mean Perimeter of King's Chamber Walls	20.613	0.004	62500	0.489	10.073
King's System †	20.604	0.004	62500	0.489	10.068
Queen's System †	20.604	0.020	2500	0.020	0.403
Underground System †	20.605	0.050	400	0.003	0.064
† By Inductive Metrology		$\Sigma_i(1/\sigma_i^2)$	127900	0.511	**20.608**
		$\sigma^2=1/\Sigma(1/\sigma_1^2)$	7.8E-06		
		σ	**0.003**		

The measured conversion factor is therefore 20.608" ± 0.003"/RC, as shown in red in the table.

The equation chosen for the RC conversion factor is 365.25/(10 × √π)"/RC = 20.607"/RC, because it is consistent with the King's System dimensions containing 365.25", and is within the range in the table. The equation differs by less than 1 part in 20,000 from the mean value.

Since internal measurements of the Pyramid define this factor, it may or may not apply to any structure outside the Pyramid, as Petrie's discussion of cubits in P(136), Chapter 20, shows.

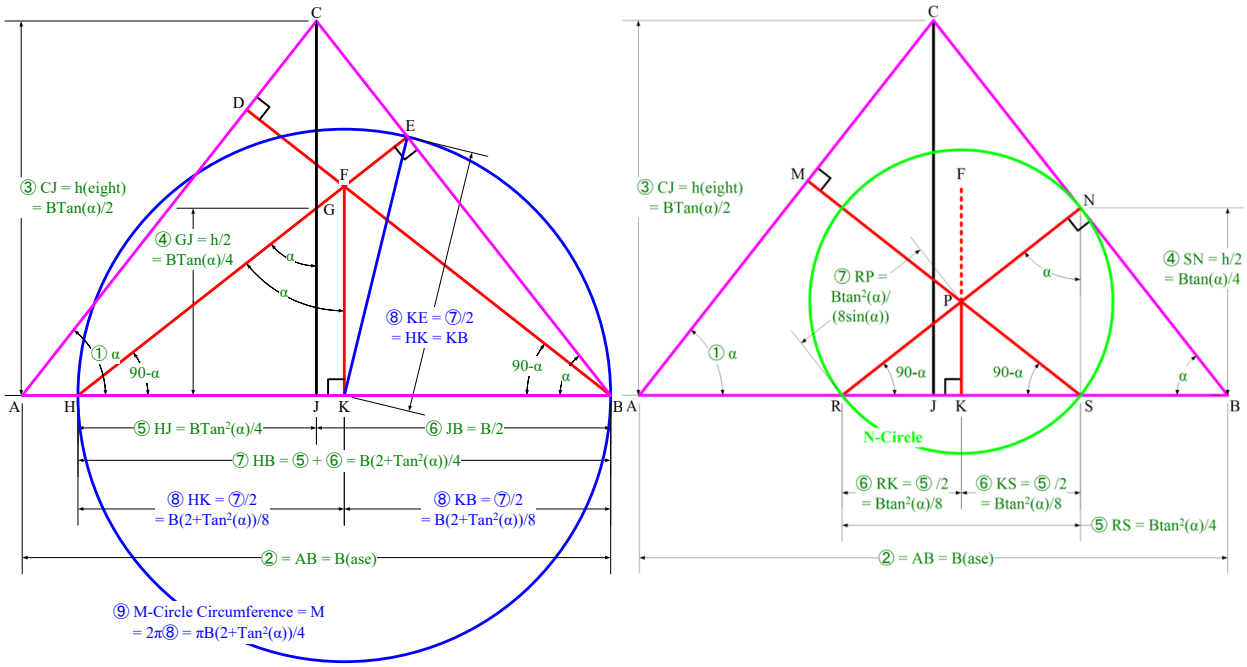
The M-Circle

The M-Circle identifies the upper and lower ends of the Well Shaft and provides a means of reverse-engineering the internal dimensions, resulting in a precise chronology.

Constructing the M-Circle

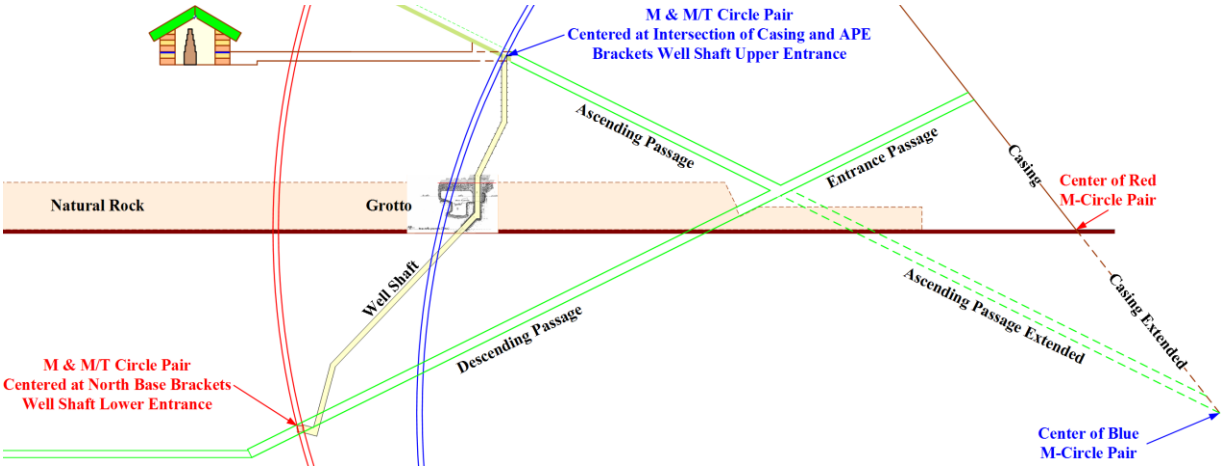
The left-hand side of the figure below shows the construction of the M-Circle. Pyramid Paper 4 provides the details, but the red lines are perpendicular to the Casing. The last of a sequence of 9 equations in the figure defines the M-Circle circumference as 25793", which depends only on the base length and angle, and that the Pyramid is an isosceles triangle.

The N-Circle, as shown in green on the right-hand side of the figure below, with a diameter of 4673.7", can be constructed similarly. Dividing by four reduces this to 1168.4", which is within the range of Petrie's measurement of the diameter of the Sarsen Stones at Stonehenge, 1167.9 ± 0.7". The Pyramid Papers suggest this is a possible relationship between the two structures. There are other possible relationships between the dimensions of these two structures.



Construction of the M and N Circles (Equation Solutions Begin at ①)

Let's pair the M-Circle with a second concentric circle of radius M/T, where M is the radius of the M-Circle, and T is the Timescale (0.993201). Locate the center of one pair at the north base of the Pyramid and a second pair at the intersection of the downward extensions of the north Casing and Ascending Passage. The figure below shows that the two pairs bracket both ends of the Well Shaft, indicating that the Well Shaft and M-Circle are intentional parts of the design.



M & M/T Circle Pairs Bracket the Upper and Lower Well Shaft Openings

The M-Circle is also used to define the following, with Petrie's measured values in parentheses:

- The theoretical perpendicular height of the sloping passages is 47.666" (47.24").
- The theoretical height of the small Step into the King's Chamber is 0.756" (0.8").
- The theoretical distance of the Scored Lines from the Entrance is 481.35" (481.59").

The M-Circle is also the basis of the Arclength Theory.

The Arclength Theory

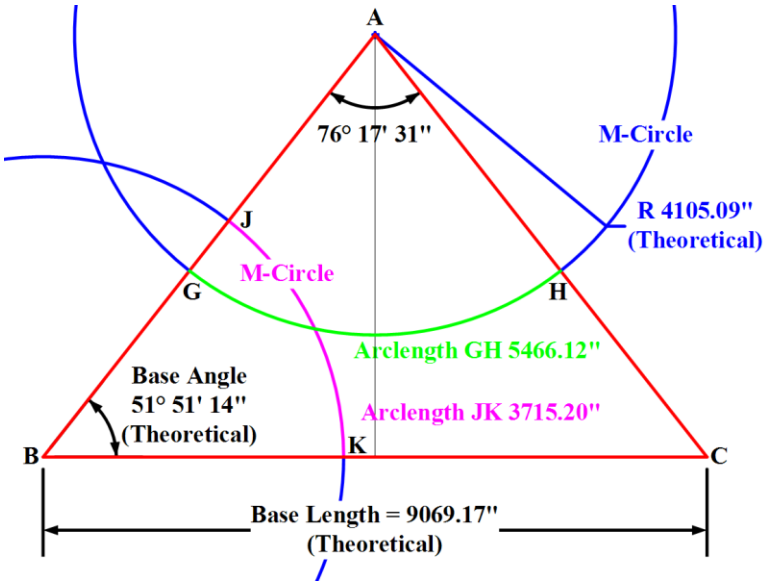
The Arclength Theory provides the theoretical lengths of nine arcs along the circumference of the M-Circle, each subtended by a Pyramid angle.

The figure below shows two of these angles, the isosceles triangle ABC, which is the Pyramid's Right-Cross-Section (RCS), and parts of two M-Circles, one centered at A and the other at B.

The angle BAC subtends the green arc GH, the length of which = 2πCR/360, where:

C is the angle of the arc, BAC, 76° 17' 31."
R is the radius of the arc, 4105.09."

The M-Circle's circumference is 2πR, 25793", and the fractional part of the circle, represented by the Apex Angle, 76° 17′ 31", divided by 360, defines the arclength as 5466.12".



M-Circle Arclengths Based on the Theoretical Pyramid Dimensions

It is 0.02" less than the combined measured length of the Entrance Passage, Descending Passage, and Underground Chamber and Passages, as calculated in the table below:

Location	Length B″	Notes
Entrance Passage	1110.64	Petrie
Descending Passage	3037.50	Edgars (More accurate than Petrie)
North Underground System	346.00	Petrie
Underground Chamber	326.00	Petrie
South Underground Passage	646.00	Petrie
Which is a total of	5466.14	Sum of Measurements

The arclength, 3715.2″, derived from the base angle, JBK, is shown in magenta in the figure above. Initially, this did not match any dimension of the Pyramid. Later, it was determined to match the unsubsided roof level of the Underground Chamber. In this manner, the Arclength Theory was born, using nine angles to help reverse-engineer all major passage lengths.

A comparison of the nine arclengths with the Pyramid chamber and passage lengths found six matches. The three remaining arclengths match two internal levels and one external level.

Deriving the Theoretical Dimensions of the Pyramid's Interior Using the Arclength Theory

The Arc Length Theory uses the base and apex angles from the Pyramid's Right Cross Section (RCS), the Face Cross Section (FCS), the Diagonal Cross Section (DCS), and the Base Cross Section (BCS). It also uses the passage angle, and the Queen's Chamber roof angle (Q).

Assuming the base angle is $\tan^{-1}(4/\pi)°$ and the passage angle is $\sin^{-1}(\sqrt{\pi}/4)°$, each of the nine angles is defined by a unique function of π, as shown in the table below.

AL	Angle	Degrees °	Equation (° unless otherwise stated)
1	RCS Base	51.854	$\mathrm{Tan}^{-1}(4/\pi)$
2	RCS Apex	76.292	$2\mathrm{Tan}^{-1}(\pi/4)$
3	FCS Base	58.298	$\mathrm{Tan}^{-1}(\sqrt{(16+\pi^2)}/\pi)$
4	FCS Apex	63.405	$2\mathrm{Tan}^{-1}(\pi/\sqrt{(16+\pi^2)})$
5	DCS Base	41.997	$\mathrm{Tan}^{-1}(4/(\pi\sqrt{2}))$
6	DCS Apex/4	96.006	$2\mathrm{Tan}^{-1}((\pi\sqrt{2})/4)$
7	Base	90.000	$\pi/2$ radians
8	Passage	26.303	$\mathrm{Sin}^{-1}\sqrt{\pi}/4$
9	QC Roof	30.459	$\mathrm{Tan}^{-1}(77\sqrt{(\pi/(16-\pi))}/16\text{-}1/43)$

This π-based approach provides a homogeneous solution for reverse-engineering the Pyramid dimensions, yielding exact definitions of sloping passage lengths and chamber levels corrected for subsidence. The table below shows how the angles above translate into arclengths.

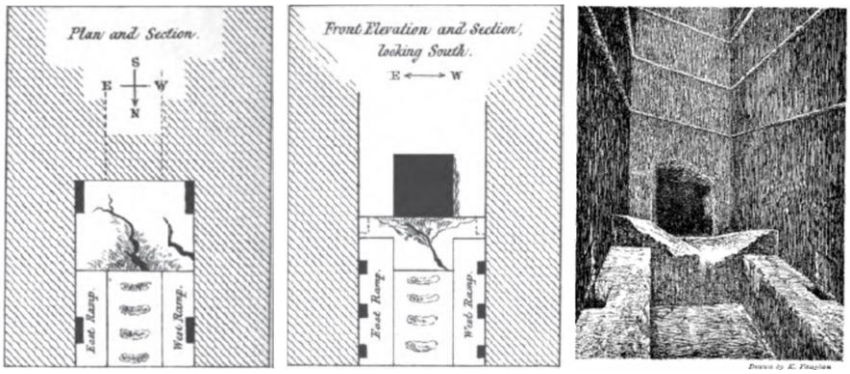
Note that the table above, and the one below, are color-coded to highlight the pairing of six arclength pairs by the cross-sections that originated them. The first two rows, in blue, indicate that Arclengths 1 and 2, from the RCS, relate to the dimensions of the Pyramid's Underground System. The following two red rows show that Arclengths 3 and 4, from the FCS, relate to compound Timeline Lengths. The blue rows, Arclengths 5 and 6, from the DCS, relate to the Queen's System. Arclength 7 is not paired. Arclengths 8 and 9 help define the theoretical lengths of the passages. The pairing of data in this fashion is not random because a knowledgeable and intelligent designer reveals Himself through this type of relationship.

AL	Angle	Degs °	Arc Length ″	Measured Value ″	Diff ″	Relationship
1	RCS Base	51.854	3715.20			Level of Underground Chamber Roof.
	Level		-1043.27	-1056.00	-12.7	Subsided 12.7"
2	RCS Apex	76.292	5466.12	5466.14	0.0	Entrance + Descending Passages + Subterranean System
3	FCS Base	58.298	4176.87	4174.36	-2.5	Ascending Passage + Grand Gallery + King's Chamber
4	FCS Apex	63.405	4542.77	4541.04	-1.7	Entrance + Ascending Passages + Grand Gallery
5	DCS Base	41.997	3008.99			Level of Queen's Chamber Floor
	AL6-AL5		3869.55			(AL6 - AL5) converted to level.
	Level		846.74	834.40	-12.3	Subsided 12.3 B″.
6	DCS Apex	96.006	6878.54			North Wall of Grand Gallery to Queen's Chamber Center
	Divide by 4		1719.63	1719.47	-0.2	When Divided by 4
7	BCS Base Corner	90.000	6448.26	-	-	Supports $\tan^{-1}(4/\pi)$ Base Angle
	Level		1668.52			
	Balance to Apex		4105.09			Level is M-Circle Radius Below Apex
8	Passage	26.303	1884.52	1883.60	-0.9	Defines and corrects the length of the Grand Gallery
9	Queen's Chamber Roof	30.459	2182.27	-	-	Refines all Passage and chamber lengths.

Derivation of the Arclengths

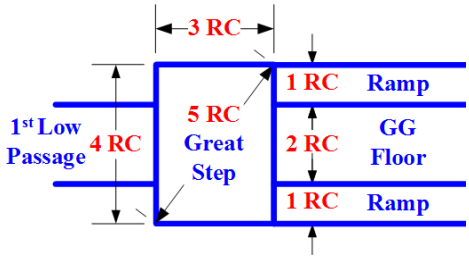
Arclength 8

The Great Step was severely fractured, likely by an earthquake, but it has since been restored.



Severe Fractures in The Great Step, as Shown by Smyth (Left Two) and the Edgars (Right)

Before this fracturing, the most likely intended length of the Great Step was 3 RCs (61.82"), since nearly every dimension in the Grand Gallery is a multiple of the RC or its digit. The length of 3 RCs projects onto Petrie's sloping "virtual floor" as 68.96". When added to his measured length of the sloping floor of the Grand Gallery, from the end of the Ascending Passage to the riser of the Great Step, 1815.5", the result is 1,884.46", which is 0.01" more than Arclength 8, 1884.45". This match provides significant credibility to the Arclength Theory.



The Fractured Great Step Length Restored to 3 RCs – Could it be Any More Correct?

Arclength 4 and Revising the Entrance Coordinates

Arclength 4 defines the theoretical length of the passages from the Entrance to the south end of the Grand Gallery as 4542.77". The horizontal component of this, at the passage angles, is 4010.61", after subtracting the 3 RCs of the tread of the Great Step, because it is in the southern half of the Pyramid. This length must fit, horizontally, from the vertical axis to the north Casing.

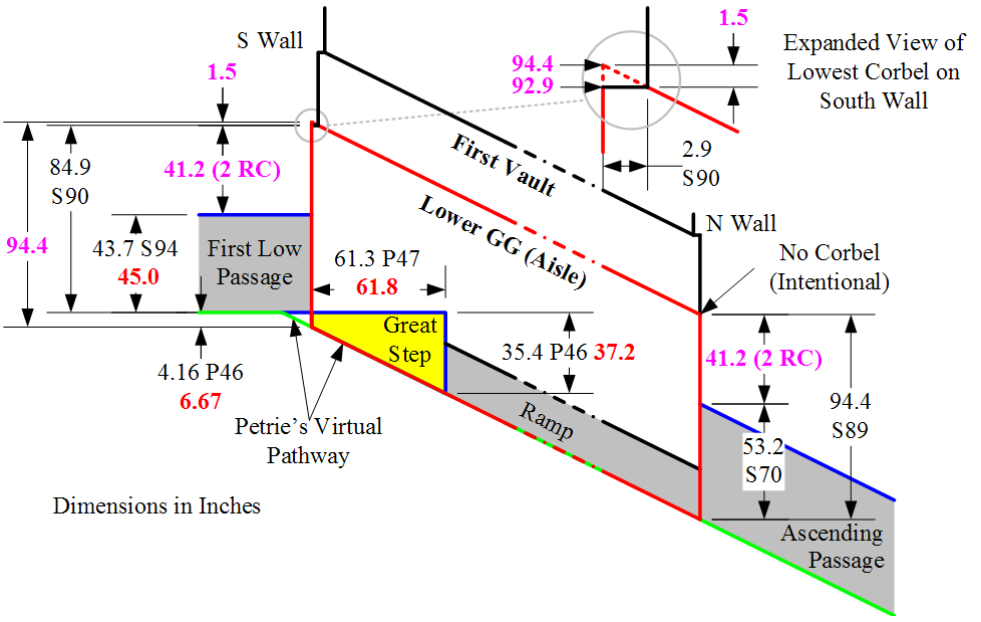
So, the theoretical X coordinate becomes 4010.61" (4010"), and its Y coordinate becomes 667.14" (668.2"), at the Casing. Petrie's average value for the top of the 18th course, which is the Entrance Passage floor, is 666.95", 0.19" less than the theoretical coordinate. It supports the notion that subsidence created about a 1" hump at the northern edge of the Pyramid, which pushed the north face up, making it steeper at that point. The hump also pushed the Entrance about 0.6" toward the center. Changing the Entrance coordinates to 4010.61", 667.14" is reasonable. The hump raises the entire initial subsidence analysis by 1".

Arclengths 2, 3, 4, 5, 6, and 9

To find the lengths of all the Timeline passages that are unknown, it is necessary to lock a point along the Entrance or Ascending Passages, the Grand Gallery, or the King's System to the Pyramid. An analysis of four points at the north end of the Grand Gallery found one that worked the best, as described in Pyramid Paper 5. Using arclengths 2, 3, 4, 5, 6, 8, and 9, the analysis concluded that the point where the south side of the Well Shaft intersects the top of the Ramp in the Grand Gallery is the correct point. It yielded the following chamber and passage lengths using numerical analyses in Excel:

Feature	Theoretical Length "	Measured Length"	Difference "
Entrance Passage (Roof)	1110.90	1110.90	0.00
Ascending Passage (Roof)	1547.35	1547.00	-0.35
Grand Gallery (Corrected for Fractures)	1884.52	1884.52	0.00
King's System	745.01	743.96	-1.05
Descending Passage (Edgars Adjusted)	3036.99	3036.92	-0.07
Underground System	1318.23	1318.00	-0.23
Queen's System	1719.63	1719.47	-0.16
Ascending Passage Extended (APE)	2520.77		

The Great Step fractures and level changes cause the largest difference in the table above, which is between the measured and theoretical lengths of the King's System: -1.05". Petrie reports that the south end of the virtual floor of the Grand Gallery is 4.16" below the floor of the 1st Low Passage (P46). An analysis aimed at correcting the dimensions of the Great Step and the south end of the Grand Gallery shows that the intended dimension is either 6.67" or 8.00", as follows:



Correcting the South End Dimensions of the Grand Gallery Using a Parrallelogram (Red)

In the figure above, Petrie's sloping green virtual pathway exits in the First Low Passage, where it becomes horizontal. Its sloping length, rather than its horizontal component, in blue, is used to avoid a discontinuity in the pathway. This is consistent with how the length of the red virtual pathway, passing through the Great Step, was added to the Grand Gallery length.

Dimensions in black are from Smyth's "Life and Work..." volume 2 (Sxx) and Petrie (Pxx). The dimensions in magenta are calculated directly from the measurements.

The red parallelogram above indicates that the most likely design intent was for the slope of all sidewall corbels to match that of the Gallery floor. The author names the area within the parallelogram "Aisle", and its north and south walls are vertical and of equal height. The north end is undamaged and serves as the reference for the south end.

Smyth's height for the south wall, from the floor of the Gallery, which is the top of the Step, to the first side corbel, is 84.9" (S90). Adding 1.5" to this for the hidden height of the first sloping corbel (see the expanded insert in the figure) yields 86.4". Subtracting this from Smyth's 94.4", (S89), reference at the north end makes the end of the Gallery 8" below the floor of the 1st Low Passage. Petrie calculates this as 4.16" (P46). Smyth's value is 7.5" (S90).

The 8" was reduced to 6.67" by the "four-points" analysis, as shown in Pyramid Paper 5. As a result, the 1st Low Passage height should be 45.0", 1.3" more than was measured, 43.7". But, it falls within the range 43.7" (1.11 m) to 45.3" (1.15 m) per Maragioglio and Rinaldi's drawings.

Using the 6.67" dimension above, instead of Petrie's 4.16", reduces the -1.05" error to -0.46". An analysis, Pyramid Paper 5, pages 28 to 30, of the King's System floor lengths showed that for several reasons, Petrie's measured length was short of the intended length by 0.37". This reduces the -0.46" error to -0.09", which is an acceptable difference.

The corrected dimensions in red in the above figure define the design intent, whereas the measured dimensions in black and magenta reflect subsidence damage. The use of the corrected, or theoretical, dimensions is therefore the choice for the grand Gallery and King's System.

Subtracting the Gallery length from Arclength 4 results in the combined length of the Entrance and Ascending Passages, 2658.25". Petrie makes this length 2657.4", by the floors, 0.85" less, and 2657.9 by the roofs, 0.35" less. The table above uses the roof lengths, and all the 0.35 difference moves to the Ascending Passage. Spalling is a reasonable cause of this difference.

Pressure, aided by moisture, causes spalling, in which the stone's surface flakes off. Because the south end of the Ascending Passage subsided more than the north end, its angle decreased, and it tried to occupy a greater horizontal space. The core masonry resisted this, putting pressure on the passage. Bats provided the moisture.

Spalling can occur at the joints between stones. The flakes can't fall far, but the material will migrate from the high to the low spots, especially during earthquakes, and the pressure will force the faces closer together. Smyth, Petrie, and the Edgars all complain about flaking and the difficulty of seeing the joints. Spalling is the likely cause. A reduction of 1/80th " in each of the 28 joints in the Ascending Passage accounts for 0.35" shrinkage, and this value is assumed.

Overall, the dimensions in the table above reflect the intended dimensions of the passages and chambers, with minimal differences after correcting for subsidence and spalling.

Arclengths 1, 5, 6, and 7

Arclengths 1, 5, and 7 define levels inside and outside of the Pyramid. An arclength level is the height within the Pyramid at which a horizontal line of that arclength fits between the vertical axis and either Casing. The equation for a positive or negative level is:

± Height of Pyramid × (1-(arclength × 2)/base length), which makes the

UC Roof level = Level for arclength 1 = -5773.61 × (1 - (3715.20 × 2)/9069.17) = -1043.27"

The theoretical height of the Underground Chamber is determined by calculating the lowest level of the descending passages and subtracting it from its theoretical level. The lowest theoretical point of the passages is the length of the Entrance and Descending Passages multiplied by sin(P), subtracted from the Y offset of the Entrance, which is equal to:

667.14 - (1110.90 + 3036.92) × sin (26° 18' 10") = -1170.81"

The theoretical Underground Chamber height is, therefore, (-1043.27) - (-1170.85) = 127.57". It is 0.03" less than the maximum measured height of 127.6" (P37), which is remarkable given the rough finish of the Underground System. Was the roof "cut away higher, just in the corner" (P37) to make the above mathematics precise to avoid finishing the whole roof at that height? Given the rough construction of the Underground System, this would not be surprising.

The theoretical level of the Queen's Chamber floor is the theoretical level of the upper end of the Ascending Passage floor, 860.53" plus 5.8", which Petrie measured 52" along the Queen's Passage, and then subtract the measured height of the step in that passage, 19.7". The result is 846.63" above the Pavement. The difference between Arclength 5 and Arclength 6 is 3869.55", representing a level of 846.74", which is an acceptable 0.11" higher than 846.63".

Arclength 7 defines the third level. Since its value, 6448.26", is longer than half the base length, it is divided by two, which equates to a level of 1668.52". This is about 1" less than the average height of the top of the 49th course, 1669.6". However, it is more important to realize that this level is 4105.09" below the theoretical Pyramid Apex, which is precisely the radius of the M-Circle, and this supports the notion that the Pyramid base angle should be $\tan^{-1}(4/\pi)$.

Conclusions From the Dimensional Analysis

This paper presents new Pyramid theories concisely and therefore does not include all details, which are provided in Pyramid Papers 4-8. Inductive Metrology, the M-Circle, and the Arclength Theory define all theoretical passage and chamber lengths, and most heights and depths, which are, for the most part, excellent matches to the measured values, after justifiable corrections.

The analyses show the most significant difference between theoretical and measured Timeline lengths is for the King's System, -1.05". The Great Step length difference is -0.5", and for the Ascending Passage length it is -0.35". In these cases, justified corrections have been made,

especially regarding the Great Step, because they are reasonably attributable to subsidence or spalling. The USy MUP differs 0.36" from the theoretical value due to slipshod construction.

Theoretical dimensions of the wall features and other dimensions in the Antechamber are not provided because two sets of expressions were discovered, and it is not clear which one to use. Fortunately, this does not interfere with the dimensions along the Timeline.

The studies are independent of unrelated sources, such as the Egyptian Book of the Dead and the Egyptian King Lists. Only dimensions from the Great Pyramid are used in these analyses; hence, their origin and applicability to the Pyramid are not in doubt.

Chronological Analysis

Matthew 7:7-8 (KJV)

"*7 Ask, and it shall be given you; seek, and ye shall find; knock, and it shall be opened unto you: 8 For every one that asketh receiveth; and he that seeketh findeth; and to him that knocketh it shall be opened.*"

It is necessary to define the following before developing the Pyramid Chronology.

- The pathways along which the chronology flows.
- How the Pyramid portrays time.

Pathways

The trigonometric functions discovered in the Inductive Metrology analyses help determine how the passages and chambers form three different pathways.

The first trig function encountered is at the Entrance, which is 365.25/tan(A), where A is the base angle. As far as the tan(A) component is concerned, its only match is the Underground Chamber equation, R*19*3/2/tan(A). However, 365.25 is not involved, so this is not a time-related path but a supporting one.

The 365.25 coefficient in the Entrance equation matches 365.25 in the equation for the height of the five courses of the King's Chamber walls, 365.25/(π × tan(P)), and other King's System dimensions, which relate the path between the Entrance and the King's Chamber to time.

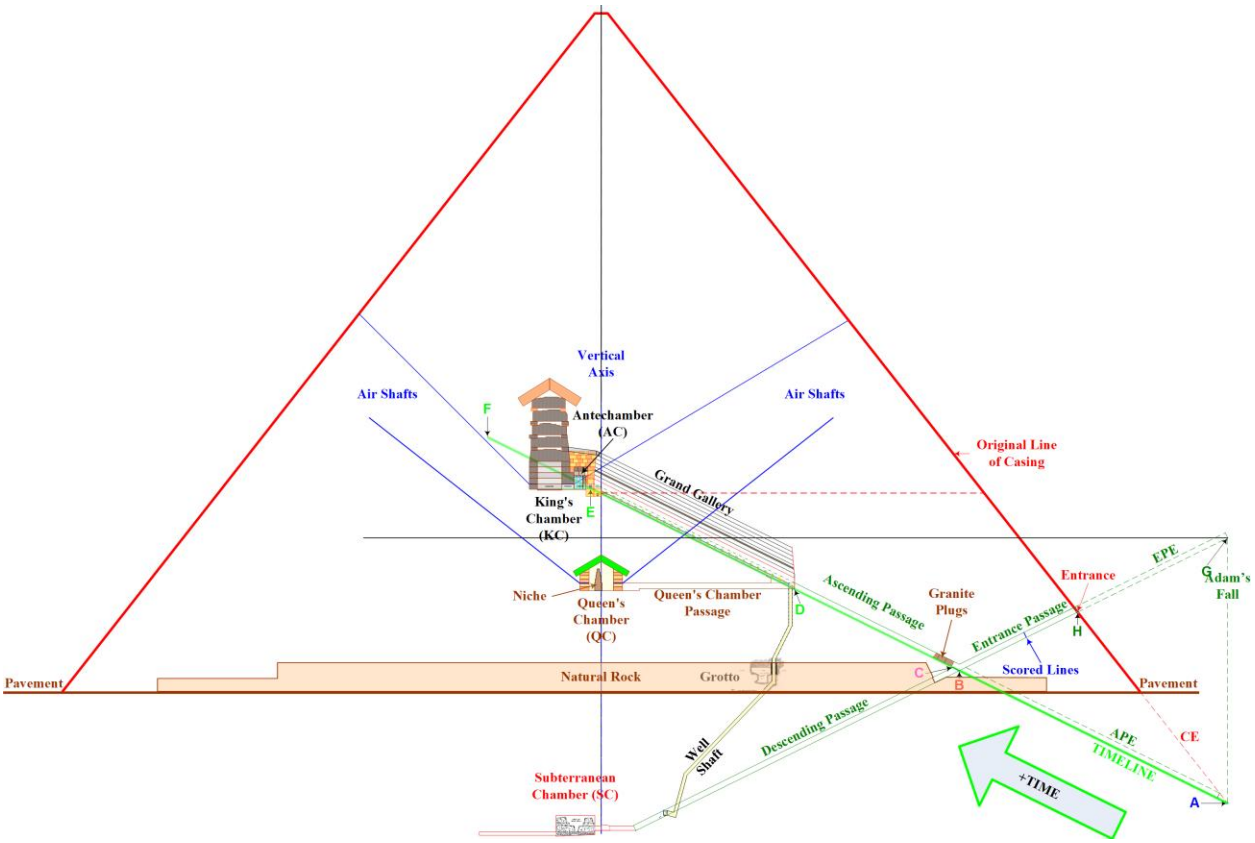
The Queen's System also has a matching pair of expressions containing a trig function. The expression for the low part of the Queen's Passage is Ys*77/3*tanP, and for the height of the Apex it is Ys*77/16*tanP, a ratio of exactly 16 to 3. These two expressions define the beginning and end of the Queen's System pathway, thereby separating it from the other paths. This path is not time-related, because the expressions do not contain 365.25.

The orientation of the trig-related dimensions, horizontal or vertical, north, east, south, and west, is also symbolic. Understanding these relationships helps define the Bible story in the Pyramid. However, only the time-related pathway is presented in this Paper. The symbolism of and the story told by the supporting pathways are in Pyramid Paper 1.

Bible chronology, from Adam and Eve to 2025, is about 6100 years, with another 900 expected. If we add the passage lengths from the Entrance to the King's Chamber, the total is 5287.78" or 5324 years, so additional passage and chamber length is needed to match 7000 years.

Replacing the Entrance Passage with the length of the Ascending Passage extended (APE) down to its junction with the downward extension of the Pyramid's north Casing is one increase. Also, the outside and inside vertical heights of the Coffer should be projected onto the sloping passage, as should the horizontal length of the King's System.

By adopting these suggestions, the length of the Timeline-related passages and chamber above becomes 6952.47", along the slope, which, after dividing by the Timescale, is 7000.06 years.



The Single Upward Sloping Timeline (Green Line) Passes Through All Points From A to F.

In the figure above, the Timeline is a single green line, sloping at the passage angle from A, at the bottom-right corner, to E, where the floor becomes horizontal through the King's System, except for vertical components at the Coffer. From E to F, the floor of the King's System and the Coffer dimensions project onto the sloping line. The sloping line physically turns west at the centerline of the King's Chamber, but this is ignored in the figure to simplify visualizing the Timeline. The future date at which it turns back to the west is biblically very significant.

The Bible does not provide a detailed Timeline for creation, so Point A, when Adam sinned, is shown to be the first identifiable time in the Bible, and, as will be seen, in the Pyramid as well.

Point F is the end of the first Hebrew month at 18:59, Wednesday, April 30, 2921.

The Entrance Passage extends (EPE) upward to the north until it intersects a vertical line from point A, and the latter symbolizes the fall of Adam.

All pathways are assumed to follow the center line of each passage or chamber. The King's Chamber is therefore entered one RC from the east wall and, at the chamber centerline, the pathway turns right (to the west). It continues west across the Chamber floor to the Coffer, up the outside face of the repositioned Coffer, across its top, then down the inside face and across to the center of its floor. The Coffer is moved back to its likely original position, with its center on the Chamber's centerline and one RC from the west wall, matching the one RC at the east wall.

Time in the Pyramid

The Dimensional Analysis revealed the Pyramid's Timescale value, 0.9932"/year, and equations that contain the constant 365.25, which is the number of days in an astronomical year. Dividing the distance between the beginning of the pathway to any given feature by the Timescale, then multiplying by 365.25, obtains the number of days since the start of the chronology. However, 365.25 days in a year is not accurate and could lead to an overall error of 54 days compared with using the average value of the tropical year, 365.24219, from Wikipedia Year.

Even the tropical year is not highly accurate, since it doesn't account for variations in Earth's rotation around the Sun and on its own axis. https://eclipse.gsfc.nasa.gov/SEhelp/deltaT.html explains some of these variations. This article also introduces Universal Time (UT) and Terrestrial Time (TT). It describes their relationship using Delta Time (ΔT) as follows:

"*For many centuries, the fundamental unit of time was the rotational period of the Earth with respect to the Sun. Universal Time or UT (colloquially called Greenwich Mean Time or GMT) is based on mean solar time from Greenwich, England. Unfortunately, Universal Time is not a uniform time scale because Earth's rotational period is gradually increasing.*"

"*Terrestrial ~~Dynamical~~ Time (T~~D~~T) is an atomic time scale. It can be thought of as the time that would be kept by an ideal clock. Most astronomical calculations (including eclipses) use Terrestrial ~~Dynamical~~ Time since the orbits of all the planets can be accurately described with it.*"

"*Although solar eclipse predictions are based on Terrestrial ~~Dynamical~~ Time, the position of the central eclipse path still depends on Universal Time. To convert T~~D~~T predictions to UT, one must know the difference between Terrestrial ~~Dynamical~~ Time and Universal Time. This parameter is known as delta-T or ΔT (ΔT = T~~D~~T - UT).*"

"*Stephenson and collaborators have produced a number of seminal works in the field of Earth's rotation over the past several millennia. In particular, they have identified hundreds of eclipse and occultation observations in early European, Middle Eastern and Chinese annals, manuscripts, canons and records. In spite of their relatively low precision, these data represent our only record to the value of ΔT during the past several millennia.*"

NASA provides a set of polynomial tables that define ΔT to convert TT to UT. Implementing them in Excel converts the results of division by the Timescale and multiplication by 365.25 (TT) directly to Julian Day (Wikipedia) numbers in UT. A quote from that article:

" *The Julian day is a continuous count of days from the beginning of the Julian period; it is used primarily by astronomers, and in software for easily calculating elapsed days between two events (e.g., food production date and sell by date).[1]*

The Julian period is a chronological interval of 7980 years, derived from three multi-year cycles: the Indiction, Solar, and Lunar cycles. The last year that was simultaneously the beginning of all three cycles was 4713 BC (−4712),[2] so that is year 1 of the current Julian period, making AD 2025 year 6738 of that Period. The next Julian Period begins in the year AD 3268. Historians used the period to identify Julian calendar years within which an event occurred when no such year was given in the historical record, or when the year given by previous historians was incorrect."

The analyses used the above method to calculate ΔT for the Chronology's origin, JD231279.707 (UT+2:21), which was 111325 seconds, or 1.29 days. UT+2:21 refers to the fact that all times generated in this analysis are those at the Temple Mount in Jerusalem, which is 2 hours and 21 minutes ahead of the Prime Meridian at Greenwich. There is no accounting for daylight saving or time shifts, as these were unknown for most of the chronology period.

Although the method corrects for ΔT, there is still uncertainty (standard error) throughout the polynomial tables; NASA provides Huber's mathematical expressions to calculate it for any given JD. It is 16955 seconds (4.7 hours) for the start date above. At the end of the chronology, JD2788053.292 (UT+2:21), the uncertainty is 1647 seconds, or 27.5 minutes. So, according to NASA, the worst-case uncertainty across all times and dates in these analyses is 4.7 hours.

7000 Year Calendar

As it turned out, a list of Julian Day numbers provides very little help in synchronizing the Pyramid dimensions with Bible chronology. Converting them to proleptic Gregorian dates helped a little. Eventually, it became apparent that the most helpful method was to convert all dates to the proleptic Gregorian Calendar and also to the Hebrew Calendar. The latter immediately provided an excellent means of interpreting the symbolism of junctions within the Pyramid's passages and chambers. The conversion was manual, by comparing Hebrew dates with the Bible's and Jewish definitions of God's Holy Days.

For this purpose, a 7000-year calendar was created in Excel that defined the beginning of each Hebrew month from:

JD 224028.26494 (UT+2:21), 1st Nisan 4100 BC, 18:21:31, Mon -4099/05/10 to
JD 2816668.26935 (UT+2:21), 1st Elul, AD 2999, 18:27:52, Tue 2999-09-03

Excel searches the calendar to find the nearest beginning of a month before the Julian Day of interest. It returns the corresponding Hebrew month and day. A manual comparison against a list determined whether it was a Holy Day. In many cases, there was a match within ±1 day.

The selection of the Hebrew Calendar method was necessary because there are no unbroken records, stretching back to Adam, of the appearance of the first green barley or of the first visible crescent of the new moon. The decision was to define the first day of each month astronomically, on the strength of Genesis 1:14.

"*And God said, Let there be lights in the firmament of the heaven to divide the day from the night; and let them be for signs, and for seasons, and for days, and years."*

Astronomical software determined when the first visible crescent of a New Moon would be visible at the Temple Mount, regardless of atmospheric conditions such as smoke, clouds, or sandstorms. The first month of the year began at the first New Moon after the Vernal Equinox, which the astronomical software could also calculate.

Synchronizing the Pyramid Dimensions to Bible Chronology

To synchronize the Pyramid's passages and chambers with Bible chronology, it is necessary to create a list of the most useful dimensions and convert them into years from the origin, point A. The following table provides those details:

Pyramid Feature	Distance From Origin "	Cumulative Years (TT)
Point G - Adam Sinned (Floor of APE and Casing)	0.00	0.00
Point B – Junction of EP and AP Floors	2520.77	2538.03
Point C – Junction of AP Floor and EP Roof	2580.77	2598.43
Point D – North GG	4068.12	4095.97
End of 1st Virtual Corbel from North GG	4071.40	4099.27
End of 2nd Virtual Corbel from North GG	4074.68	4102.58
End of 3rd Virtual Corbel from North GG	4077.97	4105.88
End of 4th Virtual Corbel from North GG	4081.25	4109.19
End of 5th Virtual Corbel from North GG	4084.54	4112.50
End of 6th Virtual Corbel from North GG	4087.82	4115.80
End of 7th Virtual Corbel from North GG	4091.10	4119.11
South End of Grand Gallery	5952.63	5993.38
North End of Antechamber	6010.84	6051.99
South End of Antechamber	6140.53	6182.57
Entrance to King's Chamber	6253.25	6296.06
Turn Right at King's Chamber Centerline	6368.18	6411.78
Center of Coffer Floor	6952.47	7000.06

The north wall of the Grand Gallery comprises six unevenly spaced corbels. In contrast, the other three walls have seven evenly spaced corbels. What if there were seven equally spaced corbels

on the north wall? These seven virtual corbels, shown in the table above, have an incremental length of 1RC/(7 × cos(P)), along the slope, which is 3.284" or 3.306 years.

(Note: The author identifies the seven "Vaults" created by the seven sets of corbels as symbolizing the churches to which Jesus sends letters, as described in Revelation 1-3. The vertical faces of the corbels represent the golden candlesticks in the letters. As can be seen from Revelation 2:5 (KJV), Jesus says to the first church, at Ephesus:

"*Remember therefore from whence thou art fallen, and repent, and do the first works; or else I will come unto thee quickly, and will remove thy candlestick out of his place, except thou repent.*"

The absence of the lowest corbel on the north wall shows that the candlestick of Ephesus has indeed been removed from its place in the virtual set of seven corbels on the north wall.

The corbels of each Vault overlap the one below by 1/7 of an RC, symbolizing Revelation 2:7

"*He that hath an ear, let him hear what the Spirit saith unto the churches; To him that overcometh will I give to eat of the tree of life, which is in the midst of the paradise of God.*"

Jesus sends a similar verse to each of the churches, including the parts about overcoming and hearing. Apparently, the acoustics in the Grand Gallery are unusual. Ancient Origins GP GG

The grooves in the lower part of the third Vault symbolize the "Two-Edged Sword" of the Church of Pergamus. The opening in the south end of the seventh Vault, also accessible from the sixth Vault, represents the door in the letters to the churches of Philadelphia and Laodicea.)

The corbels on the north wall occur about 4100 years after Adam's sin. At that point, the 47.6" high Ascending Passage opens up to 330". This sevenfold increase suggests that the Messiah had fulfilled His mission and that it was time for the seven churches to spread the gospel.

The seven virtual corbels allude to the last week of Daniel's 70-week prophecy. Daniel 9:20-27:

"*And he shall confirm the covenant with many for one week: and in the midst of the week he shall cause the sacrifice and the oblation to cease…*"

In this verse, "he" is the Messiah whose crucifixion removed the need for the daily sacrifice and oblation in the Temple. Therefore, the middle corbel of the seven, which spans 3.3 years and marks the midst of the week, symbolizes Jesus's ministry.

Daniel 9:25 (KJV) describes an event that defines the year in which Daniel's 70 weeks begin.

"*Know therefore and understand, that from the going forth of the commandment to restore and to build Jerusalem unto the Messiah the Prince shall be seven weeks, and threescore and two weeks: the street shall be built again, and the wall, even in troublous times.*"

The year was the 7th year of the reign of Artaxerxes 1, 457 BC, and the Messiah would come (7 + 62) × 7, or 483 years later, which was AD 27 since there is no year zero. That is when Jesus

began His ministry, lasting about 3½ years (3.3 by Pyramid reckoning). His crucifixion occurred on Friday, 7th April AD 30, which was Passover, the 14th day of Nisan, the first Hebrew month.

If projecting the beginning or end of the fourth virtual corbel as a date onto the slope matches a Bible date, then a synchronization point between the passages and the chronology is established. An analysis of various end dates for Jesus' ministry shows that selecting the first Pentecost identifies the remaining Pyramid junctions as relevant dates in Bible Chronology. It is fortuitous that both the time and date of the event are identifiable. In Pyramid Paper 6, the end date is calculated as 08:22, Sunday, May 28, AD 30, or Julian Day 1732162.849 (UT+2:21), which is Shavuot and Pentecost. Peter provides the time as the third hour, 8:20 AM, using the Roman method of counting hours between sunrise and sunset prevalent at that time. Acts 2:15 (KJV).

"*For these are not drunken, as ye suppose, seeing it is but the third hour of the day.*"

The Pyramid shows that in the "midst" of Daniel's 70th week, the Messiah causes the cessation of the daily sacrifice and oblation. There is no gap in the seven virtual corbels, indicating that the seventieth week ended in AD 33, not at some future date.

From the table above, the fourth corbel ends 4081.25", or 4109.19 years from when Adam sinned. Working backwards using NASA's ΔT polynomials yields the Julian Day number for the origin as JD 231280.897 (TT), which is JD 231279.707 (UT+2:21). It corresponds to 04:57, Monday, March 18, 4080 BC. This date doesn't mean much until converted into the Hebrew Calendar, where it is the 16th day of the month Shevat. The day before is Tu BiShvat, the New Year for Trees, a Jewish holiday celebrated on the 15th day of Shevat.

Hillel and Shammai's Dispute about the Fruit Tree's New Year describes a discussion about the date of the New Year for Trees, centered around the Tree of Life and the Tree of Knowledge of Good and Evil. The debate clearly shows Jewish beliefs about the meaning of these trees and their association with everlasting life and sin, which relates the above date to Adam's fall.

Genesis 3:8 (KJV) says:

"*And they heard the voice of the LORD God walking in the garden in the cool of the day: and Adam and his wife hid themselves from the presence of the LORD God amongst the trees of the garden.*"

It is this verse that the origin refers to. Adam sinned on Tu BiShvat, and he and Eve confessed the first sin to God at the next "cool of the day,". This time was about 7:00 AM, 30 minutes after sunrise, on the 16th of Shevat. After all the math, polynomials, etc., it is gratifying to find that the start of the Pyramid's chronology is the first identifiable date and time in the Bible, Gn 3:8.

The polynomial tables, adapted from "Five Millennium Canon of Solar Eclipses" [Espenak and Meeus], only define dates from 500 BC. Before that time, they are approximated by a straight line, and, amazingly, that line passes through the date of the first sin in 4080 BC.

More Pyramid Chronology Matches

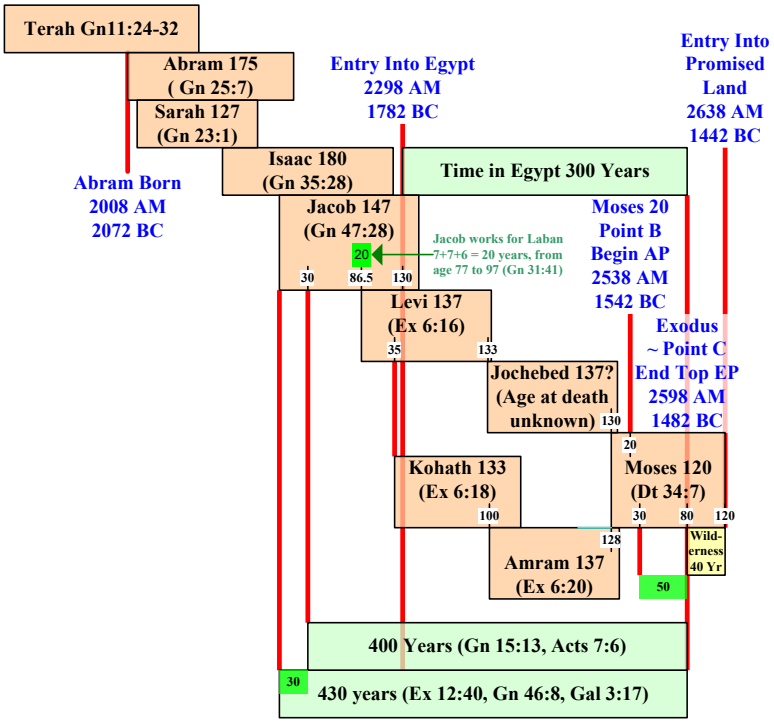
The table above shows that the distance from the origin, point A, to the junction of the Entrance Passage Roof and the Ascending Passage floors, point C, is 2580.77" or 2598.43 years.

There are differences of opinion about this period. Archbishop Ussher says that the Children of Israel's 430-year sojourn began when God promised Abraham, at age 75, that his seed would become a great nation. Clearly, Ussher does not believe that the sojourning applies only to the time in Egypt, and neither does the author.

In the author's opinion, the 430 years began when Jacob was born. Exodus 12:40 states that the sojourning of the children of Israel, who dwelt in Egypt, was to last 430 years. The children of Israel, who sojourned in Egypt at some point in their lives, were from Jacob to those who left Egypt with Moses at the Exodus. Jacob was renamed Israel by God, and is one of the children of Israel because he is described as such by **Genesis 46:8**:

"*And these are the names of the children of Israel, which came into Egypt, Jacob and his sons: Reuben, Jacob's firstborn…*"

Since the promise did not apply to Abraham but to his seed, and Isaac never went to Egypt, then the 430 years must have begun with Jacob. More details of this rationale are in Pyramid Paper 6.



Bible Timeline from Terah to the Entry Into the Promised Land

The above Timeline is the chronology from Terah to the entry into the Promised Land. It is important to note that the lifetimes of Moses' parents, Jochebed and Amram, are consistent with the declining lifespans of Israel at that time. Note that the Israelites were in Egypt for 300 years.

To match the 2598.43 years in the above table, it is necessary to determine which Hebrew or Greek manuscript to use, as they all have different chronologies. The table below shows, for five manuscripts, the period from Adam's sin to the giving of the law on Mount Sinai.

Manuscript/ Event	Masoretic Text (KJV)	Samaritan Pentateuch Sigalov	LXX Thompson	LXX Benson	Josephus Whiston
Adam's sin to the Giving of the Law	2598	2899	4084	4064	4169

The Masoretic Text is the only one that matches the desired period. Any match is remarkable because it provides significant evidence for the validity of the Arclength Theory!

The Julian Day number for point C is JD 1180358.483 (UT+2:21), 23:35, Friday, August 24, 1482 BC. This has to be the year of the Exodus, because it occurred a few months before the giving of the law, symbolized by the Granite Plugs.

There is much discussion about the date of the Exodus, ranging from 1446 BC to 1225 BC, though others place it outside this range. It is reasonable to expect that the Bible provides the Exodus date, and it does. In Joshua 10:12-14, there is a day unlike any other, which, when identified, defines the year during which the Israelites entered the Promised Land. The year of the Exodus was forty years earlier.

Joshua 10:14: *And there was no day like that before it or after it, that the LORD hearkened unto the voice of a man: for the LORD fought for Israel.*

Because of this unique day, the hypothesis is that Joshua 10:1-14 provides astronomical alignments that can filter out all years except the year of entry into the Promised Land.

Pyramid Paper 8 describes how the Sun and Moon "stayed still", meaning that a summer solstice and a lunistice occurred at the same time, at midnight, since "midst" can be translated as such. The Israelites were chasing the enemy across mountains that night, which would be dangerous without sufficient light. Hence, a full moon was necessary as well. The "stones" that fell, in Joshua 11, were not hail but meteorites, so that all these astronomical events would be visible.

Solex 12.1 calculated the times of the summer solstice, the lunistice, and the full moon. Excel searched the results and found only one match close to midnight, in 1442 BC. The Bible shows that the entry into the Promised Land occurred 40 years after the Exodus, which therefore had to be in 1482 BC, and this agrees with the earlier analysis above. Having two mathematical witnesses is very compelling.

The Exodus began early in the morning of the 15th day of the first Hebrew month, Nisan. This day began on JD 1180243.266, which is 18:23, Tuesday, 1st May 1482 BC. Comparing this with point C shows there is a difference of 1180243.266 - 1180358.483 = 115.217 days.

Exodus, chapters 16-32, provides details of events after the Exodus that lead to point C. A six-page daily calendar of these events, beginning on page 29 of Pyramid Paper 6, shows that on day

115 after the Exodus (point C), Moses returned from his 40-day sojourn up Mount Sinai with the tablets of the law. Exodus 32:19 says

"*And it came to pass, as soon as he came nigh unto the camp, that he saw the calf, and the dancing: and Moses' anger waxed hot, and he cast the tables out of his hands, and brake them beneath the mount.*"

There is a tale that says that when Al-Mamoun's crew was digging into the Pyramid, they heard a stone fall into a nearby hollow and dug toward it. (Page 83 of Smyth's "Our Inheritance in the Great Pyramid"). They discovered the Entrance Passage and also the "Prism Stone" that had fallen from its ceiling, revealing the Granite Plugs and the Ascending Passage.

The southern end of this stone, before it fell, was point C, the junction of the roof of the Entrance Passage and the floor of the Ascending Passage, identified above as the day Moses threw down the stone tablets of the law. It is hard to believe that a fallen stone and the breaking of the tablets on the same day are a coincidence. It verifies that Pyramid chronology matches that of the Bible.

Working backward from point C to point B reveals the latter's date as JD 1158294.740, Saturday, March 29, 1542 BC, the sixth day of the 13th Hebrew month, Adar 2. The Megilla says, page 50, that Moses was born on the sixth of Adar, not the seventh:

"They cast Pur, that is the lot. A Tanna taught: When the lot fell on the month of Adar, he rejoiced greatly. saying, The lot has fallen for me on the month in which Moses died. He did not know, however, that Moses died on the seventh of Adar and was born on the sixth of Adar."

Since Moses was 80 years old at the time of the Exodus, point B, being 60 years earlier, represents his 20th birthday, the day when the Israelites were obligated to fight for their nation.

The start of the Grand Gallery at point D is JD 1727332.295, Saturday, March 6, AD 17, or 19th Adar AD 17. The author speculates that this is John the Baptist's 20th birthday. Based on this, without going into details, the date of Jesus' birth is Tishri 15th, September 22, 4 BC, which fulfills God living with man at the Feast of Tabernacles, just as His death fulfilled the Passover.

The date of the face of the Great Step is JD 2395004.173, Thursday, March 13, 1845. At this point, the pathway transitions from a sloped to a horizontal floor. It continues horizontally, except for the vertical walls of the Coffer, to the end of God's plan, JD 2788053.292, Wednesday, April 30, 2921. The period is slightly more than 1076 years and represents the Millennium. The inside face of the Coffer represents approximately 78 years. It is identified herein as "Satan's Little Season" (Rev 20:3) because time flows in a negative direction. The rest of the horizontal and Coffer portions are 998 years, close to a millennium.

The date of the south end of the Grand Gallery is JD 2420364.572, Thursday, August 20, 1914. During this month, the combatants in World War I declared their intentions. The First Low Passage continues south from the Grand Gallery. Pyramid Paper 6 lists 23 wars that occurred during the time of this passage, which ends on March 27, 1973, two days before the last US soldier left Vietnam. Definitely, it was a time of tribulation, but not the Great Tribulation of Matthew 24:27, represented by the 2nd Low Passage.

The Timeline shows that 2025 is about halfway through the first portcullis slot in the Antechamber. Two sets of mathematical expressions exist for the Antechamber, but it is not clear which one to use. However, the start of the granite floor provides one firm date in the Antechamber: Tu Bi'Shvat 1988. It was the 6066th anniversary of the date that the serpent beguiled Eve, so expect to see an increase in the works of Satan during the Antechamber period.

The next identifiable date is the south end of the Antechamber, which is the north end of the 2nd Low Passage and the beginning of the Great Tribulation. It is 11:25, Friday, October 26, 2103, 78 years from now. This day is the 23rd of the seventh Hebrew month, Tishri, the day after the 8th and last day of the Feast of Tabernacles. The 1st of Tishri, sunset October 3 that year, is the Feast of Trumpets, identified herein as the "last trump", occurring on October 4, 2103, which is still the 1st of Tishri. See 1 Corinthians 15:51-52.

To provide credence for this date, consider that Hamas attacked Israel on the first day of the holiday, Shmini Atzeret, on October 7, 2023, 80 years, or 2 × 40, before the above date. This holiday celebrates the 8th day of the Feast of Tabernacles. It is just one day in Israel, but it is two days in the rest of the world. Israel retaliated by attacking Iran on the second day of the same holiday the following year, on October 25, 2024. Then, on October 13, 2025, the 7th day of the Feast of Tabernacles, Hamas released the remaining hostages. Are these three events a harbinger of the Pyramid's prophecy that the Great Tribulation will begin on the 2nd day of Shmini Atzeret on October 26, 2103, and involve the whole world? Maybe we will see more in 40 years!

At the south end of the 2nd Low Passage, 19:30, Wednesday, April 23, 2217, which marks the end of the Great Tribulation and the beginning of the King's Chamber, three events are identified. The first is that April 23 is St. George's Day, and it was he who killed a dragon. This represents the chaining of Satan and his casting into the Bottomless Pit (Rev 20:1-3). Secondly, with the Prince of this world chained, Jesus will enter the King's Chamber to the Supper of the Lamb and become King. The third is that this date is the 3698th anniversary of the Exodus. Factorizing this number yields, remarkably, 43 × 43 × 2. Remember, it was exactly 430 years, 43 × 5 × 2, from the birth of Jacob to the first Exodus, Exodus 12:41 says

"*And it came to pass at the end of the four hundred and thirty years, even the selfsame day it came to pass, that all the hosts of the LORD went out from the land of Egypt.*"

Although there are other dates seen along the passages and chambers, I will end with point R, which is where the Timeline turns right at the centerline of the King's Chamber. This point is JD 2573182.642, Friday, January 13, 2333. This point lies within the 2300th year from the end of Daniel's 70-week prophecy in AD 33, Daniel 8:14:

"*And he said unto me, Unto two thousand and three hundred days; then shall the sanctuary be cleansed.*"

When the pathway of the Timeline enters the Pyramid, it is offset to the left (east) by 365.25/tan(A)" due to Adam's sin. It has been leading us to Jesus, at the right hand of God. At point R, the Timeline turns right (west), back toward the center and back toward God, thereby signifying that all sin is cleansed.

Two other clues at point R support the concept that it relates to Daniel and the end of his 2300-year prophecy. They reinforce that it began in AD 33 at the end of his seventy-week prophecy, and that it relates to the cleansing of the Sanctuary.

The Israelite Jubilee Cycle is the first clue. A Sabbatical cycle is seven years. A Jubilee, or 50th year, is declared halfway through the seventh year of the seventh sabbatical cycle during Tishri. Since there is no instruction in the Bible to delay the next sabbatical cycle, the Jubilee year overlaps the first half of the first year of the next sabbatical and Jubilee cycle. God commanded the Jubilee cycle to begin when the Israelites entered the Promised Land, which, as seen, was 1442BC. Tishri 1393 BC is therefore the beginning of the first Jubilee. AD 30, the year of Jesus' crucifixion, was the 30th Jubilee year. January AD 2333 falls within the 77th Jubilee year.

Leviticus 4:6 associates the number seven with sacrifices for the sin of ignorance:

"*And the priest shall dip his finger in the blood, and sprinkle of the blood seven times before the LORD, before the vail of the sanctuary.*"

And Leviticus 16:14 for atonement:

"*And he shall take of the blood of the bullock, and sprinkle it with his finger upon the mercy seat eastward; and before the mercy seat shall he sprinkle of the blood with his finger seven times.*"

Note that God's plan ends in 2921, during the 89th Jubilee.

The Olympiad Cycle is the second clue. It is a four-year cycle beginning in the summer of 776 BC. So, the fourth year of the 777th cycle falls in AD 2332-2333, since there is no year zero.

The end of Daniel's seventy-week prophecy marks the beginning of the 2300-year prophecy. It is extraordinary that it ends with the 77th Jubilee and the fourth year of the 777th Olympiad.

The number seven symbolizes perfection and completion, as seen in the creation story where God created the world in six days and rested on the seventh, marking the completion of His work. Here, the Timeline turns in the right direction, bringing His people back to Him, and is marked by many sevens, supporting the contention that the Sanctuary will have been cleansed.

Conclusion

The author has successfully derived homogeneous, mathematically precise definitions of the Great Pyramid's dimensions that reflect the Designers' intentions by analyzing and justifiably resolving subsidence- and spalling-related differences.

Alignment of the resultant dates with Bible chronology was to within 2 minutes in one case. A convincing explanation for each junction in the Pyramid leaves no doubt that the date presented herein matches the related Bible event. The precision with which the calculated dates match the narrative in the Bible is nothing short of miraculous, lending significant credence to the prophecies.

Thank you, God, for your guidance.

