

THE 5.5 CODE: UNCOVERING π , ϕ , AND THE MATHEMATICAL BLUEPRINT OF THE GREAT PYRAMID OF GIZA AND THE PYRAMID OF BAKA

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Abstract

This Perspective re-examines the proportional architecture of the Great Pyramid of Giza and the unfinished pyramid at Zawyet el-Aryan through a harmonic framework centered on a 5.5 ratio. This ratio may be expressed as a symbolic 5.5-cubit rod measuring 113.355 inches (2.88 meters, 9.45 feet), derived from dividing Earth's symbolic diameter (7,920 miles) by the total minutes in a day (1,440), thereby linking cosmic scale with temporal rhythm. Far from requiring a physical artifact, this construct serves as an analytical lens that reveals deep coherence among Earth-based geometry, ancient metrology, and symbolic design. When applied to the Great Pyramid's canonical dimensions (base = 440 cubits, height = 280 cubits), it yields highly accurate approximations of the mathematical constants π and ϕ . A hypothetical reconstruction of the Baka pyramid's foundation (base $\approx$ 660 ft) indicates that both monuments share a seked-derived slope of approximately 51.84° , suggesting continuity in harmonic proportion. Interpreting these relationships as symbolic cosmology, the analysis proposes that ancient Egyptian architecture embodied a unified harmonic order connecting spatial form, temporal cycles, and cosmic structure. By integrating Egyptological, metrological, and philosophical insights, this study encourages interdisciplinary exploration and empirical testing of these proportional correspondences.

Key words: Golden Ratio (ϕ); π (π); Sacred Geometry; Harmonic Proportion; Great Pyramid; Pyramid of Baka; Metrology; Symbolic Cosmology.

1. Introduction

The Great Pyramid of Giza remains the most precise architectural expression of geometric order in the ancient world. Its slope, orientation, and dimensional ratios encode mathematical constants π and ϕ with accuracies exceeding those of most pre-classical structures (Petrie, 1883; Verner, 2001). Modern analyses, informed by both Egyptology and the history of mathematics (Neugebauer, 1957; Rossi, 2004), interpret this precision not solely as a technical achievement but as a potential deliberate manifestation of *Maat*, the Egyptian principle of cosmic balance (Lawlor, 1982). Within this conceptual framework, proportion may have served as a bridge between heaven and earth: a harmonic grammar through which architecture mirrored the cosmos (Eliade, 1959).

This study proposes a 5.5 harmonic ratio as a unifying analytical lens for examining these monuments. Derived from dividing a symbolic Earth diameter (7,920 miles) by the 24-hour day expressed as 1,440 temporal units, the ratio ($7,920 \div 1,440 = 5.5$) functions here as a comparative scale linking planetary geometry and architectural proportion (Michell, 2008).

While ancient Egyptians did not employ miles or minutes, the relationship reveals a harmonic parallel between spatial and temporal cycles, one that may have been intuitively recognized through the measurement systems of the Old Kingdom (Heath, 1991). (Shown in Figures 1 and

2) The 5.5 ratio is conceptually related to the Egyptian *seked*, the slope system defining the Great Pyramid's angle of 51.84° . In that method, one cubit of vertical rise equalled 7 palms and $5\frac{1}{2}$ palms of horizontal run (28 : 22 digits), yielding the same angular value (Lehner, 1997; Edwards, 1981). This study interprets that canonical proportion as evidence that the builders encoded harmonic relationships equivalent to modern mathematical constants through practical design rules rather than through abstract theory. By treating 5.5 as a harmonic index rather than a literal measure, the paper situates Egyptian metrology within a broader symbolic philosophy of geometry, where number and form articulate universal order (Jung, 1964; Guénon, 2001).



Figure 1. Wikimedia Commons. “Measuring Ruler N 1538, Ancient Egyptian Measuring Rod.” Wikipedia, 2025, by author Dawn E Higgins

https://en.wikipedia.org/wiki/Measuring_rod#/media/File:Measuring_ruler-N_1538-IMG_4492-gradient.jpg. Accessed 1 April 2025.



Figure 2. The folding cubit rod, found in the Tomb of Kha (TT8, Deir el-Medina, 18th Dynasty, c. 1425–1353 BC), is now in the Museo Egizio in Turin. It folds in half for portability, supporting the concept of a foldable 5.5 rod. (Image source Wikipedia) by author Dawn E Higgins

2: Mathematical Constants and Harmonic Proportion

The Great Pyramid of Giza embodies a precise geometric relationship between height, base, and slope that encodes the constants π (3.1416) and ϕ (1.618) with remarkable accuracy. The perimeter of the base divided by twice the height ($1760 \div 560 = 3.1428$) approximates π within 0.04%, while the ratio of the slant height to half the base ($356 \div 220 = 1.618$) mirrors ϕ (Petrie,

1883; Stecchini, 1971; Michell, 2008). Modern architectural analysis confirms that these relationships emerge naturally from the chosen seked, demonstrating that the builders achieved mathematical coherence through practical design rules rather than abstract calculation, an intuitive geometry rooted in measure and proportion (Rossi, 2004; Lehner, 1997).

The principle underlying these relationships corresponds to what may be described as a harmonic ratio of 5.5, reflecting a unity between spatial form and temporal rhythm. Though ancient Egyptians did not quantify the day in minutes, the ratio $7,920 \div 1,440 = 5.5$ expresses a symbolic harmony between Earth's dimensions and its rotational cycle, a concept that aligns with the Egyptian principle of *Maat*, or cosmic balance (Lawlor, 1982). The appearance of 5.5 in the Great Pyramid's seked, a run of $5\frac{1}{2}$ palms for each cubit of rise, is a tangible architectural fact (Edwards, 1981; Clarke & Engelbach, 1990), further indicating that this proportion was not coincidental but integral to the design canon of the Old Kingdom.

The repetition of 144 and its multiples in both cosmic and architectural scales reinforces this harmonic structure. For instance:

- $144 \times 15 = 2,160$ (lunar diameter);
- $144 \times 55 = 7,920$ (Earth's diameter).

These values relate proportionally as Moon : Earth = 1.5 : 1 and Earth : Time = 5.5 : 1 (Michell, 2008; Stecchini, 1971), suggesting a consistent pattern through which natural cycles were mirrored in architecture. The builders appear to have used whole-number analogues, palms, cubits, and sekeds, to express the same proportional truths that modern mathematics describes through constants, a practice that aligns with ancient Near Eastern traditions of encoding cosmological numbers into sacred structures (George, 1992).

In this sense, the Great Pyramid is not a numerical anomaly but a harmonic instrument, translating cosmic relationships into measurable form (Heath, 1991). The consistent presence of π and ϕ across its geometry demonstrates that ancient architects understood proportion as a language of resonance: a means of embodying order, rhythm, and divine symmetry within the material world, a concept explored in broader philosophical terms by scholars of symbolism (Jung, 1964; Chevalier & Gheerbrant, 1996).

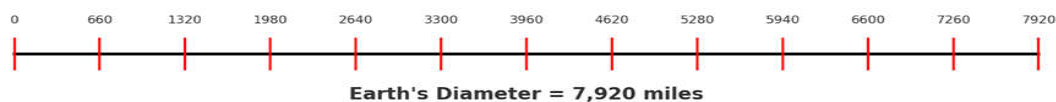


Figure 3. Division of Earth's diameter, 7,920, into 12 parts of 660. Author 2025 by author Dawn E Higgins

3: The Pyramid of Baka: Geometric Continuity and Symbolic Context

Situated between Giza and Abusir, the unfinished monument at Zawyet el-Aryan, commonly referred to as the Pyramid of Baka, shows a striking geometric kinship with the Great Pyramid. Although construction ceased before completion, its preserved foundation allows a credible

reconstruction of its intended proportions based on archaeological analysis (Lehner, 1997; Verner, 2001). The base, measuring approximately 660 feet per side (Arnold, 2003), suggests design intent within the same canonical system that governed Giza's 51.84° slope.

While the original height of the monument is uncertain due to its unfinished state, geometric extrapolation using the Giza ratio of base-to-height (1.574) yields an estimated height near 420 feet. This value is not presented as a physical measurement but as a harmonic projection, an analytical reconstruction consistent with Old Kingdom proportion. When expressed through the same seked system (rise of 7 palms to a run of $5\frac{1}{2}$ palms), the resulting slope reproduces the 51.84° inclination of Khufu's pyramid (Edwards, 1981; Petrie, 1883; Rossi, 2004).

Expressed in royal cubits (20.61 inches; Clarke & Engelbach, 1990), Baka's reconstructed base of 660 feet equals 384.3 cubits, aligning proportionally with Giza's base of 440 cubits. When scaled by the 5.5 harmonic ratio, both monuments yield internal consistency:

- Giza: Base 80 units, height 50.9 units, slant 64.7 units.
- Baka (projected): Base 69.8 units, height 44.4 units, slant 56.5 units.

In both, the perimeter-to-height ratio approximates π (3.141), and the slant-to-half-base ratio equals ϕ (1.618). The repetition of these constants across two distinct structures supports the view that a unified canon of measure and proportion informed pyramid design (Taylor, 1859; Michell, 2008). (Pyramid of Baka seen in Figure 4).

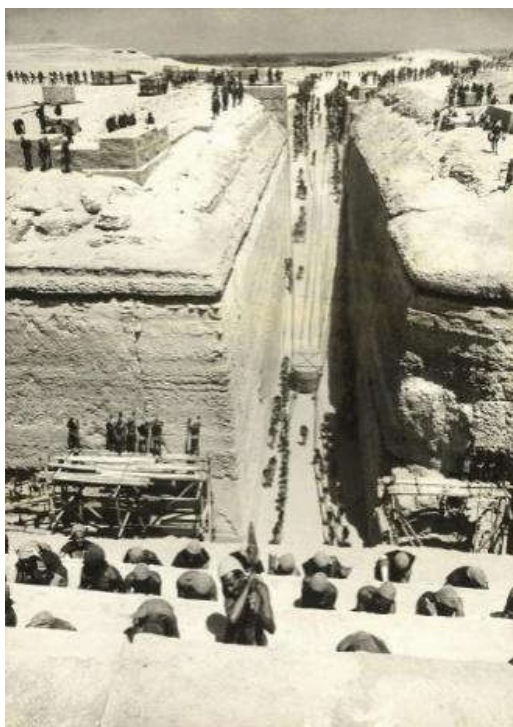
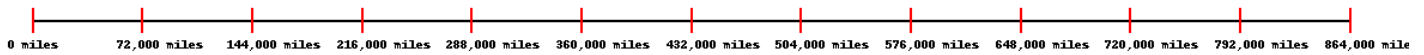


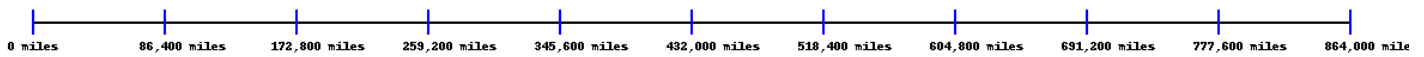
Figure 4. Pyramid of Baka. Barsanti, Alessandro. “Excavations at Zawyet el-Aryan.” *Annales du Service des Antiquités de l’Égypte*, vol. 6, 1905, pp. 192-200. View of the Giza Pyramids in the background by author Dawn E Higgins

The base number 660 also bears cosmological resonance. When the Earth's symbolic diameter (7,920 miles) is divided by twelve, the result is 660, a value mirrored in the foundation of Baka. The base perimeter, 31,680 inches, corresponds to four times 7,920, a number long associated with "the square of the Earth" (Michell, 1988). Such proportional echoes reinforce the interpretation that Egyptian architects conceived of architecture as a geometric expression of cosmic balance, transforming astronomical insight into structural form, a concept that finds parallels in other ancient cosmologies (Cirlot, 2002).

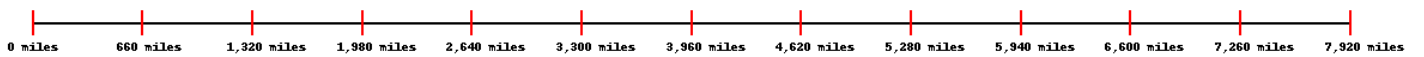
Sun's Diameter (12 Parts) = 864,000 Miles



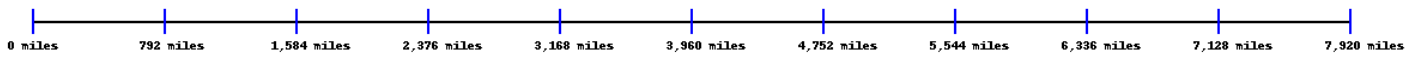
Sun's Diameter (10 Parts) = 864,000 Miles



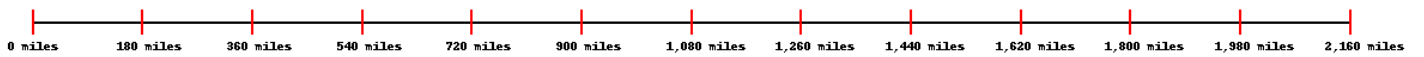
Earth's Diameter (12 Parts) = 7,920 Miles



Earth's Diameter (10 Parts) = 7,920 Miles



Moon's Diameter (12 Parts) = 2,160 Miles



Moon's Diameter (10 Parts) = 2,160 Miles

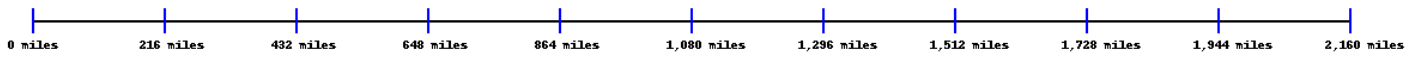


Figure 5. Sun, Earth, and Moon measures in their 10th and 12th parts by author Dawn E Higgins

Thus, the Pyramid of Baka, though incomplete, functions as a harmonic mirror of Giza, sustaining a shared language of number, proportion, and cosmological symbolism (Heath, 1991). Its foundations preserve the architectural trace of a system that united heaven and Earth through measure, embodying a principle where the microcosm of the temple reflects the macrocosm of the universe (Eliade, 1959). (Figure 6)

Great Pyramid of Giza Using 5.5-Cubit Rod			
Measurement	Feet	Rods	Mathematical Ratios
Base Length	756	80	3.143 (π)
Height	480.1	50.909	1.571 ($\pi/2$)
Half-Base Length	378	40	1.618 (ϕ)
Slant Height	611	64.735	1.272 ($\sqrt{\phi}$)

Pyramid of Baka (Using 5.5-Cubit Rod)			
Measurement	Feet	Rods	Mathematical Ratios
Base Length	660	69.818	3.141 (π)
Height	420	44.465	1.570 ($\pi/2$)
Half-Base Length	330	34.936	1.618 (ϕ)
Slant Height	534	56.545	1.271 ($\sqrt{\phi}$)

Figure 6. Measures of the Pyramids by author Dawn E Higgins

4: Harmonic Constants and Universal Geometry

The Great Pyramid of Giza and the Pyramid of Baka together reveal a coherent harmonic framework grounded in three mathematical constants, π (3.1416), ϕ (1.618), and $\sqrt{5}$ (2.236). These values appear not as isolated coincidences but as interdependent expressions of a unified proportional canon, linking geometry, cosmology, and symbolic design (Taylor, 1859; Petrie, 1883; Michell, 2008).

In Giza, the perimeter of the base divided by twice the height ($1760 \div 560 = 3.1428$) approximates π to within 0.04 %, while the slant height to half-base ratio ($356 \div 220 = 1.618$) reproduces ϕ with equal precision. Within the King's Chamber, the diagonal-to-width ratio ($4.066 \div 1.818 = 2.236$) corresponds to $\sqrt{5}$, completing a triadic system of constants that define the relationship between circle, square, and diagonal (Lawlor, 1982). The recurrence of these constants in both internal and external geometry implies that Egyptian architects conceived of structure as a harmonic translation of mathematical law.

Expressed through the seked system, these constants emerge naturally from the canonical slope of 51.84° , defined by a rise of one cubit (7 palms) to a run of $5\frac{1}{2}$ palms. This ratio of 28 : 22 digits yields the same angular value, showing that the Egyptians achieved transcendental precision through practical proportion rather than numerical abstraction (Edwards, 1981; Rossi, 2004). The seked thus represents a geometric key, an early formulation of the harmonic relationship between vertical and horizontal, heaven and Earth (Guénon, 2001).

When scaled by the 5.5 ratio, the Great Pyramid's base-height relationship mirrors the same harmonic sequence expressed in planetary measures: the Earth's symbolic diameter (7,920

miles), the lunar diameter (2,160 miles), and the solar diameter (864,000 miles). These numbers form a consistent pattern of sixfold, threefold, and one-and-a-half relationships, echoing musical intervals and time cycles (Michell, 2008; Heath, 1991). Through such proportional analogues, architecture becomes a resonant model of cosmic order: the physical embodiment of harmonic balance linking structure, time, and motion.

Rather than implying theoretical knowledge of transcendental numbers, these correlations demonstrate an empirical harmony between form and function. The builders' design system, rooted in a symbolic worldview (Jung, 1964), produced constants that modern mathematics would later define explicitly. By aligning architecture with natural proportion, they created enduring monuments that reflect not only technical mastery but an intuitive grasp of universal geometry.

5. Harmonic Framework and Temporal Ratio

The 5.5 ratio functions as a symbolic bridge between spatial and temporal order. Derived from dividing a symbolic Earth diameter of 7,920 miles by the 1,440 minutes in a day ($7,920 \div 1,440 = 5.5$), it represents one minute of Earth's rotation expressed as linear measure (Michell, 2008). While the unit of minutes was not part of the ancient Egyptian system, the principle of correlating celestial motion with architectural proportion reflects a deep awareness of cyclic harmony, a concept explored in studies of ancient cosmologies (Eliade, 1959). The same principle is physically embodied in the seked slope ratio, where a rise of seven palms corresponds to a run of five and a half palms, generating the 51.84° inclination of the Great Pyramid (Edwards, 1981; Petrie, 1883; Rossi, 2004).

The half-ratio, 2.75, extends this framework further. Dividing Earth's radius (3,960 miles) by 1,440 produces 2.75, uniting the temporal cycle of a day with the spatial measure of the planet. When the Sun's symbolic measure of 864 is divided by 2.75, the result (314.18) reproduces π to four significant figures. This reciprocal relationship demonstrates how harmonic scaling translates motion into form, a geometrical signature of resonance between Earth, Sun, and time (Stecchini, 1971; Heath, 1991).

When doubled, 2.75 yields 5.5, which mirrors the golden angle of 137.5° , the fundamental interval of growth observed in phyllotaxis, galactic spirals, and electromagnetic symmetry (Livio, 2002). Expressed numerically, $5.5 \times 24 = 132$; when added to its generating ratio ($132 + 5.5 = 137.5$), the result aligns precisely with the golden angle. This relationship encodes a transformation from temporal rhythm (daily rotation) to spatial harmony (natural growth geometry), suggesting the 5.5 ratio encapsulates a principle universal to both cosmic and biological forms (Lawlor, 1982).

These proportional symmetries reveal a conceptual understanding that geometry and time were interdependent expressions of one harmonic principle. Through architecture, the Egyptians inscribed this principle in stone: the 5.5 ratio unites the measures of the Earth with the dynamics of the heavens, translating motion into form and mathematics into meaning (Guénon, 2001). The result is a living geometry, an architectural expression of cosmic resonance that continues to bridge science and symbolism (Jung, 1964; Chevalier & Gheerbrant, 1996).

6. Discussion: The Harmonic Architecture of Earth, Time, and Number

Across the Great Pyramid of Giza and the unfinished monument at Zawyet el-Aryan, a consistent mathematical grammar emerges, one that unites geometry, astronomy, and proportion into a single harmonic system (Michell, 2008; Heath, 1991). Numbers such as 144, 432, 1,728, 5,040, and 31,680 recur throughout these structures, forming a network of ratios that mirror planetary cycles and what we might now understand as musical intervals, reflecting a worldview where cosmology was expressed through number and measure (Lawlor, 1982).

The value 144 is the square of 12, multiplying it by ten gives 1,440, the total minutes in a solar day, while extending the same harmonic progression to its cubic power yields 1,728 (12^3). This number appears both in musical resonance and in the architecture of the Great Pyramid, where the King's Chamber floor is positioned roughly 1,728 inches above the base platform.

Similarly, the Sun's symbolic diameter of 864,000 miles divided by 100 equals 8,640, one-tenth of the 86,400 seconds in a day, an echo of solar rhythm encoded in time itself (Heath, 1991). These correlations suggest a conceptual, if not numerical, link between the scales of time and space.

At Zawyet el-Aryan, the reconstructed 660-foot base expresses one-twelfth of Earth's symbolic diameter ($7,920 \text{ mi} \div 12 = 660$). Its projected 420-foot height equates to 5,040 inches, numerically identical to the sum of Earth's and Moon's radii ($3,960 + 1,080 = 5,040$), a value cited by Plato as the ideal number for the citizens of a state and a measure of cosmic harmony (Plato, 1961). Together these dimensions link the terrestrial and lunar spheres, embedding astronomical relationships within architectural form and suggesting a deliberate encoding of cosmological order (Eliade, 1959).

When scaled upward, the same ratios extend to the perimeter of 31,680 inches, four times 7,920, representing "the square of the Earth" (Michell, 1988). The constant 432 appears as $1/2$ of 864, relating the Sun's symbolic measure to musical tuning ($A = 432 \text{ Hz}$). In this view, number functions not as mere arithmetic but as vibration, the mathematical counterpart of sound and proportion, a concept explored in both ancient and modern symbolic thought (Chevalier & Gheerbrant, 1996; Cirlot, 2002).

The persistence of these constants across architecture, music, and planetary geometry suggests an ancient synthesis of disciplines, rooted in a perception of universal order (Guénon, 2001). Through the 5.5 ratio and its derivative 2.75, space and time converge into a unified harmonic field. Whether or not these correlations were defined through explicit numerical systems, their recurrence indicates that Egyptian architects conceived of form as resonance: a dialogue between stone and cosmos (Jung, 1964).

Ultimately, the Great Pyramid and the monument of Baka represent more than engineering achievements; they are metrological hymns, structures in which the measures of the Earth and the motions of the heavens were harmonized through geometry. Their proportional coherence affirms a worldview where number, sound, and structure were facets of one universal law: the architecture of harmony itself.

Body	Diameter (mi)	1/12	1/10	1/100
Sun	864,000	72,000	86,400	8,640
Moon	2,160	180	216	21.6
Earth	7,920	660	792	79.2

7. Conclusion: The Harmonic Legacy of the 5.5 Ratio

The geometric and metrological precision observed in the Great Pyramid of Giza and the unfinished monument at Zawyet el-Aryan reveals an integrated harmonic framework. When the 5.5 ratio, derived from the relationship between Earth's symbolic diameter (7,920 miles) and the 1,440 temporal divisions of a day, is applied to canonical pyramid dimensions, it consistently reproduces mathematical constants such as π (3.1416) and ϕ (1.618) within minimal variance (Petrie, 1883; Michell, 2008). This proportional coherence suggests that the architects expressed a cosmological understanding of measure, one that united spatial form and temporal rhythm through geometry (Eliade, 1959; Lawlor, 1982).

Rather than a relic of numerology, this system reflects an early form of harmonic science: a worldview in which architecture materialized the balance between heaven and Earth through precise ratios aligned with celestial cycles (Heath, 1991). The correspondence between Giza's 51.84° slope and the seked ratio of 5½ palms to one cubit exemplifies this harmony (Edwards, 1981; Rossi, 2004). When interpreted as a harmonic principle rather than an isolated engineering convenience, the 5.5 ratio becomes a key to decoding how ancient builders embedded mathematical constants into architectural form. The same symbolic grammar reappears in the proportional scaling between the Great Pyramid and the hypothetical reconstruction of the Pyramid of Baka, whose ≈ 660 ft base mirrors the 1 : 12 division of Earth's diameter, reinforcing the unity of terrestrial and cosmic geometry (Arnold, 2003; Lehner, 1997). (Figure 7)

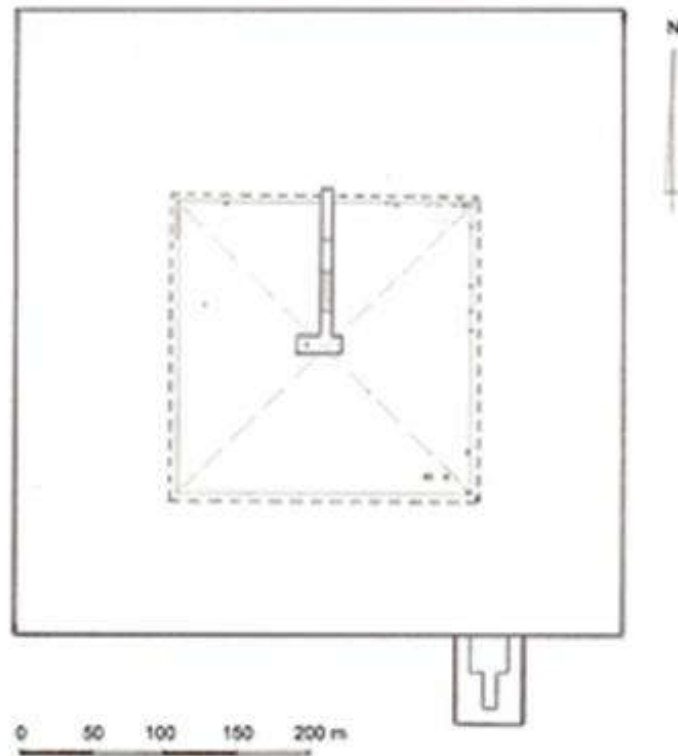


Figure 7. Baka-Pyramid Plan The Free Encyclopaedia. Retrieved (12-6-2024) by author Dawn E Higgins

7.1 Universal Encoding of π through the 5.5 Ratio

The 5.5 ratio reveals a universal harmonic principle linking celestial, architectural, and symbolic systems through π . When halved (2.75), it reproduces the same proportional constant (~ 314.18) across different scales: the Sun's symbolic measure ($864 \div 2.75$) and the Great Pyramid's perimeter in long cubits ($1,728 \div 5.5$).

When applied to Earth's geocosmic proportion ($7,920 \div 2.88 = 2,750$), the result no longer expresses π directly but rather the scale of translation, the conversion between planetary dimension and architectural module. Here, 2.88 represents the physical measure of the harmonic rod, derived from dividing Earth's equatorial circumference by the solar constant 8,640, thereby bridging planetary geometry and metrological practice (Michell, 2008; Stecchini, 1971). (Figure 8)

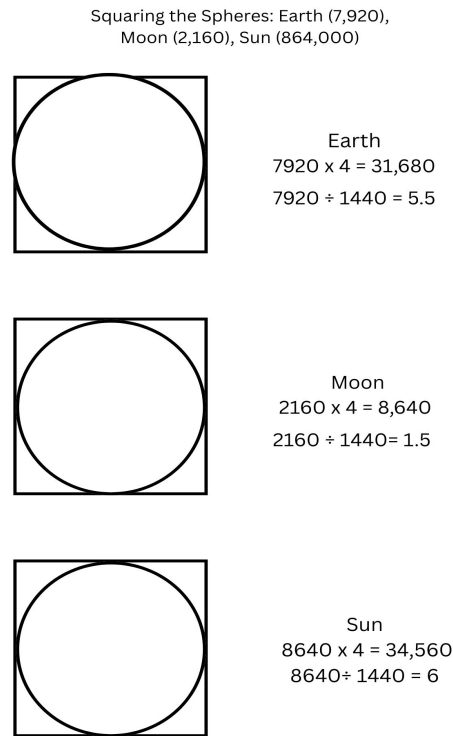


Figure 8. Squaring the spheres by author Dawn E Higgins

Rather than coincidence, this pattern demonstrates an ancient awareness of proportional order, translating time and motion into geometric form (Guénon, 2001). Through the 5.5 code, π operates as a mediating principle between circular motion and material structure.

The same harmonic reasoning appears in later sacred architecture, notably the Round Church of the Knights Templar in London (consecrated 1185 CE), whose 55-foot diameter and 172.8-foot circumference reproduce π with high precision, preserving a lineage of symbolic proportion (Cirlot, 2002).

7.2 Medieval 5.5-Yard Rod and the Golden Angle

The 5.5 code's persistence into the medieval era is evident in the British rod, 5.5 yards (16.5 ft or 198 in), used in architecture and land division. This measure encodes geometric relationships reflecting Earth's proportions: dividing 198 inches by 5 yields 39.6, symbolic of Earth's radius in hundreds of miles ($3,960 \text{ miles} \div 1,000 = 3.96$). It aligns with the 5.5 system in Earth's diameter-to-time ratio ($7,920 \div 1,440 = 5.5$). Dividing 198 inches by 3 gives 66 inches, or 5.5 ft, representing the 660-inch scale. Such proportional modules express a conceptual harmony between human and cosmic scales (Michell, 2008).

Finally, dividing 5.5 yards by 4 gives 1.375, which, when multiplied by 100, produces 137.5, the golden angle derived from the golden ratio ($\phi = 1.618$) (Livio, 2002). This connection bridges the 5.5 ratio with natural growth spirals, planetary motion, and the geometric constants governing life itself (Lawlor, 1982). Although the British rod is formally recorded in the

thirteenth century, its numerical structure aligns with much older cosmological systems, suggesting it preserved an inherited code of sacred proportion (Chevalier & Gheerbrant, 1996). More than a functional standard, it encoded a worldview where measure was a link between heaven and Earth.

7.3 Final Reflection

Together, these findings indicate that the 5.5 ratio operates as a harmonic constant rather than an artifact of speculation. The ratio provides a coherent analytical bridge connecting the Great Pyramid, Earth's planetary measures, and later Western metrology. The recurrence of proportional values such as 144, 432, and 1,728 across timekeeping, architecture, and music reinforces the idea that ancient geometry expressed a unified cosmological system (Jung, 1964; Heath, 1991).

By interpreting these monuments through a harmonic rather than purely mechanical framework, this study invites an interdisciplinary dialogue between Egyptology, metrology, and the history of symbolic thought. The 5.5 ratio may therefore represent not a forgotten standard of measure, but an enduring language of proportion, a code through which ancient builders translated cosmic order into form.

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Conflicts of Interest / Competing Interests:

The author declares no conflicts of interest or competing interests.

Ethics Approval/Declarations:

Not applicable. This study does not involve human participants, animals, or sensitive data.

Consent to Participate:

Not applicable.

Consent for Publication:

The author consents to the publication of this manuscript.

Availability of Data and Material/Data Availability: Data sharing is not applicable to this article, as no datasets were generated or analysed in this study. All numerical values

referenced are derived from published archaeological and mathematical sources cited in the text.

Code Availability:

Not applicable. No custom code or software was created for this research.

Authors' Contributions:

The author conceived the research, performed the harmonic and metrological analyses, interpreted the numerical and architectural correlations, and wrote the full manuscript. The author has read and approved the final version of the paper.

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