

# PARAMETERS OF TRIANGLES FORMED BY THE PEAKS OF THE GIZA PLATEAU PYRAMIDS AND THE HIGHEST POINT OF THE "GREAT SPHINX" MONUMENT

Andrey V. Voron ([anvoron1@yandex.ru](mailto:anvoron1@yandex.ru))

October 13, 2026

## Abstract

Based on calculated and recorded data, this paper demonstrates the use of two length systems – the metric system and the ancient Egyptian system (royal cubit) – by the builders of the Giza plateau. The study analyzes the numerical linear dimensions of each pyramid in the Giza pyramid complex, as well as the base area and visible surface area of the complex pyramids. Spatial 3D segments were obtained, which formed the basis for calculating the areas of two triangles formed by the peaks of the Menkaure, Khafre, and Khufu pyramids and the highest point of the "Great Sphinx" monument.

## 1 Introduction

Prior studies conducted by the author [1, 2, 3] indicated that mathematical regularities, specifically the Fibonacci numbers, are encoded within the parameters of the Giza plateau pyramids. The present study aims to harmonize individual data into a unified, logically coherent system, allowing for the formulation of a scientific hypothesis.

The objective of this work is to calculate the spatial (3D) parameters of the triangles formed by the physical peaks of the three Giza plateau pyramids and the highest point of the "Great Sphinx" monument to search for numerical patterns.

## 2 The main part

Research Methodology. This paper utilizes a method of comparative analysis matching recorded geometric parameters of the objects against their theoretical calculated models, adjusted for the thickness of the lost casing stones and structural degradation. Using artificial intelligence tools, true spatial 3D segments between key objects were reconstructed based on our previous research. The calculation of the areas of the formed triangles was performed using the ancient Egyptian unit of length, the "Royal Cubit" (0.5236 m).

The dimensions recorded today differ slightly from the calculated ones, which can be explained by the loss of casing and structural degradation (Table 1).

Table 1 – Recorded and calculated linear dimensions of the Giza pyramid complex [2]

| Pyramids | Recorded dimensions, m |                |        | Calculated dimensions, m |        |
|----------|------------------------|----------------|--------|--------------------------|--------|
|          | Base side length       |                | Height | Base side length         | Height |
|          | Side 1, 2              | Side 3, 4      |        | Side 1, 2, 3, 4          |        |
| Khufu    | 230,45; 230,25         | 230,36; 230,39 | 138,75 | 232,057                  | 147,59 |
| Khafre   | 210,5                  | 210,5          | 136,4  | 215,3                    | 137,5  |
| Menkaure | 102,2                  | 104,6          | 62     | 104,6                    | 66,5   |

Table 2 – Recorded and calculated base area dimensions of the Giza complex pyramids

| Area, S                            | Pyramids |        |          |
|------------------------------------|----------|--------|----------|
|                                    | Khufu    | Khafre | Menkaure |
| Recorded, m <sup>2</sup>           | 53 052   | 46 294 | 10 691   |
| Calculated, m <sup>2</sup>         | 53 850   | 46 368 | 10 946   |
| Variance from smaller to larger, % | 1,504    | 0,16   | 2,385    |
| Variance from larger to smaller, % | 1,482    | 0,16   | 2,33     |

Table 3 – Recorded and calculated visible surface area dimensions of the Giza complex pyramids

| Area, S                            | Pyramids   |            |            |
|------------------------------------|------------|------------|------------|
|                                    | Khufu      | Khafre     | Menkaure   |
| Recorded, m <sup>2</sup>           | 83 096,621 | 70 548,725 | 16 694,957 |
| Calculated, m <sup>2</sup>         | 87 132,117 | 75 025,000 | 17 711,000 |
| Variance from smaller to larger, % | 4,86       | 6,35       | 6,09       |
| Variance from larger to smaller, % | 4,63       | 5,97       | 5,74       |

Table 4 – Recorded and calculated total surface area dimensions of the Giza complex pyramids

| Area, S                            | Pyramids    |             |            |
|------------------------------------|-------------|-------------|------------|
|                                    | Khufu       | Khafre      | Menkaure   |
| Recorded, m <sup>2</sup>           | 136 148,621 | 116 842,725 | 27 385,957 |
| Calculated, m <sup>2</sup>         | 140 982,117 | 121 393     | 28 657     |
| Variance from smaller to larger, % | 3,55        | 3,89        | 4,64       |
| Variance from larger to smaller, % | 3,43        | 3,75        | 4,44       |

Using artificial intelligence, spatial 3D segments were obtained, which formed the basis for calculating the areas of two triangles. These triangles are formed by the peaks of the Menkaure, Khafre, and Khufu pyramids and the highest point of the "Great Sphinx" monument, accounting for elevations and utilizing the "Royal Cubit" unit of length (0.5236 m) (Table 5, Figure).

Table 5 – Comparison of the calculated area of the Khufu pyramid (514,229 sq. cubits) with the areas of the Giza plateau triangles (from the peaks)

| Comparison Parameter                      | Triangles                                    |                                           |
|-------------------------------------------|----------------------------------------------|-------------------------------------------|
|                                           | 1st – Menkaure (B) – Khafre (C) – Sphinx (A) | 2nd – Khafre (C) – Khufu (D) – Sphinx (A) |
| Recorded triangle area, sq. cubits        | 544 538,17                                   | 503 705,39                                |
| Calculated Khufu pyramid area, sq. cubits | 514 229,00                                   | 514 229,00                                |
| Variance from smaller to larger, %        | 5,89                                         | 2,09                                      |
| Variance from larger to smaller, %        | 5,57                                         | 2,05                                      |

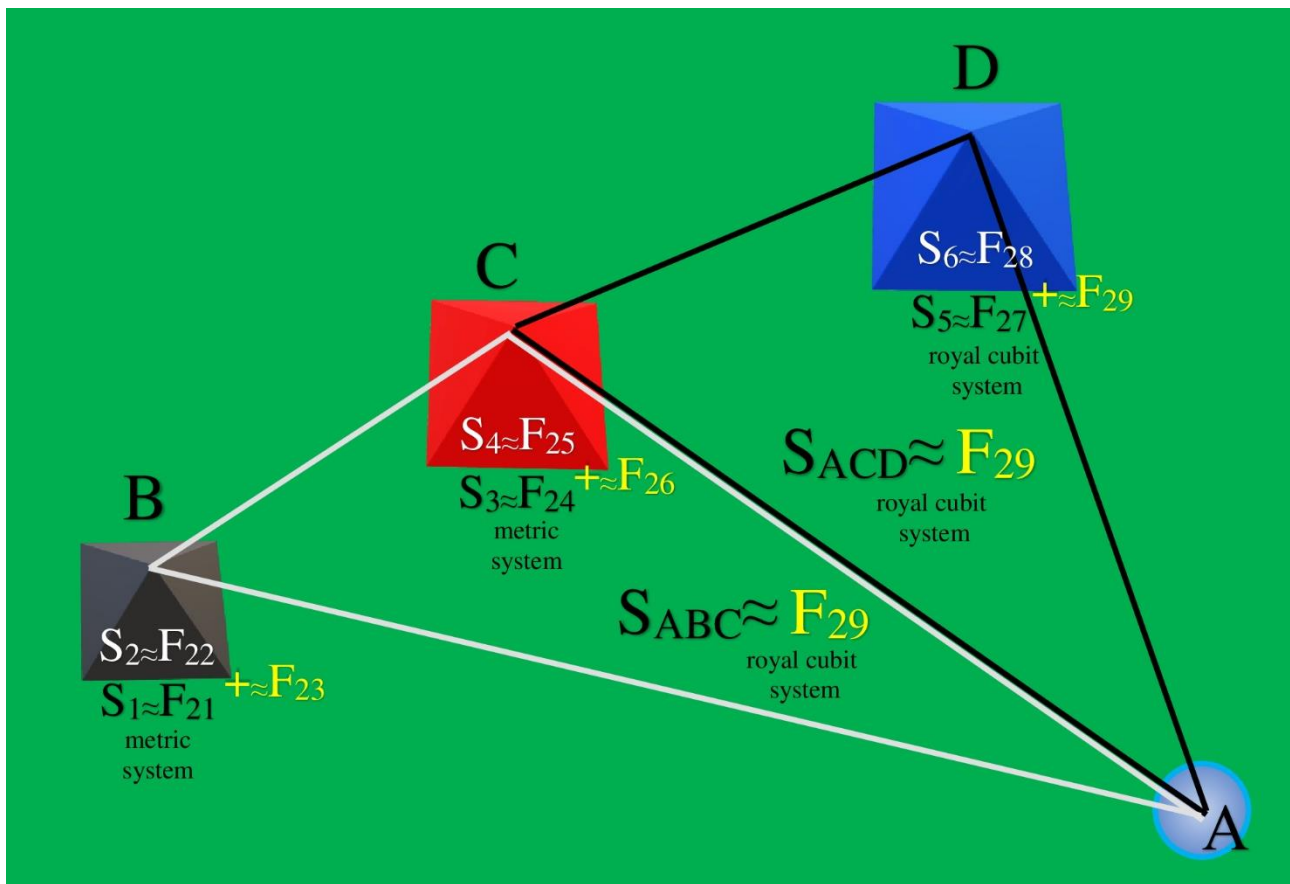


Figure – Base areas (S1, S3, S5) and visible surface areas (S2, S4, S6) of the Giza plateau pyramids (B, C, D) and the triangles formed by their peaks and the highest point of the "Great Sphinx" monument (A)

Calculated segments for the 1st triangle – Menkaure (B) – Khafre (C) – Sphinx (A) (Figure).

1. Segment Sphinx (A) – Menkaure Pyramid (B).  
 In meters: 967.68 m.  
 In royal cubits: 1,848.10 r.c.
2. Segment Menkaure Pyramid (B) – Khafre Pyramid (C).  
 In meters: 460.13 m.  
 In royal cubits: 878.77 r.c.
3. Segment Khafre Pyramid (C) – Sphinx (A).  
 In meters: 698.22 m.  
 In royal cubits: 1,333.48 r.c.

Calculated segments for the 2nd triangle – Khafre (C) – Khufu (D) – Sphinx (A) (Figure).

1. Segment Khafre Pyramid (C) – Khufu Pyramid (D).  
 In meters: 485.00 m.  
 In royal cubits: 926.27 r.c.
2. Segment Khufu Pyramid (D) – Sphinx (A).  
 In meters: 575.21 m.  
 In royal cubits: 1,098.55 r.c.
3. Segment Khafre Pyramid (C) – Sphinx (A).  
 In meters: 698.22 m.  
 In royal cubits: 1,333.48 r.c.

It is probable that the areas of the Giza pyramids and the triangles calculated in this study indicate that their builders possessed knowledge of the recursive Fibonacci sequence and, concurrently, knowledge of two length measurement systems:

1 – "meter";

2 – a derivative of the "meter" unit – the "Royal Cubit" measure.

Furthermore, the pyramid builders likely demonstrated knowledge that the base area and visible surface area of the Khufu pyramid correspond to the 27th and 28th Fibonacci numbers in "Royal Cubit" units, while the base area and visible surface area of the Khafre pyramid correspond to the 24th and 25th Fibonacci numbers, and the Menkaure pyramid to the 21st and 22nd Fibonacci numbers.

Given that the Fibonacci sequence is formed by the principle that "each subsequent number equals the sum of the two preceding ones," incorporating the total area values for each of the three pyramids into this sequence yields a continuous segment of the Fibonacci number sequence—from the 21st to the 29th number inclusive. In this unique manner, a sequential series of Fibonacci numbers with indices 21, 22, 23, 24, 25, 26, 27, 28, 29 is obtained (see Figure).

This entire mathematical configuration is bound together by two triangles formed by the three pyramids of the Giza complex and the highest point of the "Great Sphinx" monument. The areas of these triangles are (within a certain approximation) equal to each other on one hand, and comparable to the total area of the Khufu pyramid on the other.

### 3 Conclusion

1. It is established that the numerical values of the base areas and visible surface areas of the Menkaure and Khafre pyramids are remarkably close to the numerical values of the 21st, 22nd and 24th, 25th Fibonacci numbers in the metric system, while the Khufu pyramid follows this logic by utilizing the 27th and 28th Fibonacci numbers, but within the derivative unit of length – the "Royal Cubit".

2. It is shown that the calculated total area of the Khufu pyramid (514,229.00 sq. cubits) is approximately equal to:

– the area of the 1st triangle formed by the peaks of the Menkaure and Khafre pyramids and the highest point of the "Great Sphinx" monument, with an error margin of 5.57%;

– the area of the 2nd triangle formed by the peaks of the Khafre and Khufu pyramids and the highest point of the "Great Sphinx" monument, with an error margin of 2.05%.

### References

[1] Voron, A.V. (2025) 'The Giza Pyramid Complex and the Mathematical Equality of Areas', Akademiya Trinitarizma [Academy of Trinitarism], El No. 77-6567, publ. 29583, 10 July.

[2] Voron, A.V. (2025) 'The Metric System as a Key to Understanding the Symbolic Information of the Giza Pyramid Complex', Akademiya Trinitarizma [Academy of Trinitarism], El No. 77-6567, publ. 29624, 15 August.

[3] Voron, A.V. (2025) 'Pyramids of the Giza Complex and Area Values Equal to Fibonacci Numbers in Two Systems of Length Measurement', Akademiya Trinitarizma [Academy of Trinitarism], El No. 77-6567, publ. 29607, 29 July.