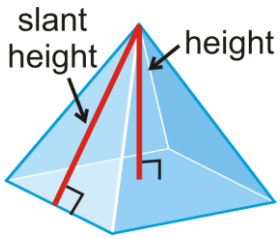
On https://www.ck12.org/geometry/pyramids/lesson/Pyramids-BSC-GEOM/ we find:



A **pyramid** is a solid with one **base** and **lateral faces** that meet at a common **vertex.** The edges between the lateral faces are **lateral edges.** The edges between the base and the lateral faces are **base edges.** A **regular pyramid** is a pyramid where the base is a regular polygon. All regular pyramids also have a **slant height**, which is the height of a lateral face. A non-regular pyramid does not have a slant height.

We define yet some more terms.

A **symmetrical pyramid** is a regular one having only congruent lateral faces, implying its vertex resides perpendicularly above the centre of its base. This is also called a **right pyramid**. If the base is a square it is a **square** or **quadratic pyramid**.

Below, we will consider only quadratic symmetrical pyramids, for which I coined the term ***quasymmid***.

Definitions:

top	≔ vertex or apex	h	≔ *height* of pyramid
side	≔ *base edge*	b	≔ *side length*
ridge	≔ *lateral edge*	l	≔ *ridge length*
face	≔ *lateral face*	s	≔ *slant height*
perimeter	≔ *perimeter* of *base*	p	$= 4b$
small radius	≔ perpendicular *distance* from center of *base* to centre of *side*		
	= half of the *side*	r	$= \frac{b}{2}$
large radius	≔ *distance* from center of *base* to each of its corners		
	= half the *diagonal* of the *base*	R	$= \frac{b}{\sqrt{2}}$
slope	≔ *angle* between *face* and *base*	α_s	≔ *slope*
ridge slope	:	α_r	≔ *angle* between *ridge* and *base*
ridge-side angle	:	α_{rs}	≔ *angle* between *ridge* and *side*

perpendicular midplane: the triangle formed by the top and midpoints of two opposite sides

diagonal midplane: the triangle formed by the top and two opposite base corners

From now on, the term *base* means the *side* and not the floor of the pyramid.

Special pyramids:

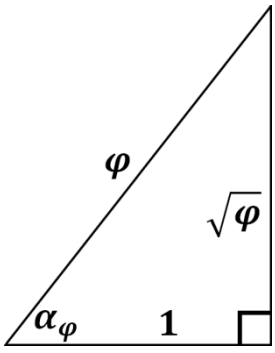
The *perimeter* of a *quasymmid* can equal $p = 2\pi h$, as if a hemisphere has been squared. We will call such a quadratic hemispheroidal pyramid a ***quamispheramid***.

A Kepler triangle is a rectangular trangle that contains the *golden ratio* $\varphi = \frac{1+\sqrt{5}}{2}$.

It has an angle that we will call the ***golden angle***:

$$\alpha_\varphi = \arctan\sqrt{\varphi} = 51°.827\,292\,373$$

If we flip it along its $\sqrt{\varphi}$ side, the two of them yield an isosceles triangle, which we will call a ***golden triangle***.



Two types of *quasymmids* can be constructed by use of such a *golden triangle*, since each of its midplanes can be a one. We will call the perpendicular one a ***Kepler pyramid*** and the diagonal one a ***diagonal golden pyramid***.

All 4 faces can be equilateral triangles having $l = b$, which we will call an ***equilateral pyramid***, and the diagonal triangle can also be equilateral, which we'll call a ***diagonal equilateral pyramid***. It has $l = 2R = b\sqrt{2}$.

Now take 7 identical circular coins without serrated edges and find out that 6 of them can EXACTLY surround the 7th. If the *perimeter* of a *quasymmid* equals $p = 6h$ we will call it a ***circlamid***.

We also have: $\frac{s}{r} = \frac{2s}{b} = \frac{2\cdot\sqrt{h^2+\frac{1}{4}b^2}}{b} = \sqrt{1+4\left(\frac{h}{b}\right)^2}$ which is used below.

Pythagoras:

$$s^2 = h^2 + r^2 = h^2 + \left(\frac{b}{2}\right)^2 = h^2 + \frac{1}{4}b^2$$

$$l^2 = s^2 + r^2 = s^2 + \frac{1}{4}b^2 = h^2 + \frac{1}{2}b^2$$

also: $$l^2 = h^2 + R^2 = h^2 + \left(\frac{b}{\sqrt{2}}\right)^2 = h^2 + \frac{1}{2}b^2$$

Goniometry:

$$\tan\alpha_s = \frac{h}{r} = \frac{2h}{b} \qquad \alpha_s = \arctan\frac{2h}{b}$$

$$\tan\alpha_r = \frac{h}{R} = \frac{h\sqrt{2}}{b} \qquad \alpha_r = \arctan\frac{h\sqrt{2}}{b}$$

$$\tan\alpha_{rs} = \frac{s}{r} = \sqrt{1+4\left(\frac{h}{b}\right)^2} \qquad \alpha_{rs} = \arctan\sqrt{1+4\left(\frac{h}{b}\right)^2}$$

Approximations:

$$\tilde{\pi} := \frac{22}{7} \approx \pi$$

$$\tilde{\varphi} := \frac{8}{5} \approx \varphi$$

Definitions:

- $\blacktriangle_{\triangleright}$:= diagonal *equilateral pyramid*: $l = b\sqrt{2}$ $\therefore \mathrm{b}_{\triangleright} = h\cdot\sqrt{\frac{2}{3}} \approx h \times 0.816\,496\,580\,927\,726$
- $\blacktriangle_{\boxslash}$:= *diagonal golden pyramid*: $h = R\sqrt{\varphi}$ $\therefore \mathrm{b}_{\boxslash} = h\cdot\sqrt{\frac{2}{\varphi}} \approx h \times 1.111\,785\,940\,502\,84$
- $\blacktriangle_{\Delta}$:= *equilateral pyramid*: $l = b$ $\therefore \mathrm{b}_{\Delta} = h\cdot\sqrt{2} \approx h \times 1.414\,213\,562\,3731$
- $\blacktriangle_{\circ}$:= *circlamid*: $p = 6h$ $\therefore \mathrm{b}_{\circ} = h\cdot\frac{3}{2} \approx h \times 1.5$
- $\blacktriangle_{\pi}$:= *quamispheramid*: $p = 2\pi h$ $\therefore \mathrm{b}_{\pi} = h\cdot\frac{\pi}{2} \approx h \times 1.570\,796\,326\,7949$
- $\blacktriangle_{\tilde{\pi}}$:= *near quamispheramid*: $p = 2\tilde{\pi}h$ $\therefore \mathrm{b}_{\tilde{\pi}} = h\cdot\frac{11}{7} \approx h \times 1.57[142857]$
- $\blacktriangle_{\varphi}$:= *Kepler pyramid*: $h = r\sqrt{\varphi}$ $\therefore \mathrm{b}_{\varphi} = h\cdot\frac{2}{\sqrt{\varphi}} \approx h \times 1.572\,302\,755\,514\,85$
- $\blacktriangle_{\tilde{\varphi}}$:= *near Kepler pyramid*: $h = r\sqrt{\tilde{\varphi}}$ $\therefore \mathrm{b}_{\tilde{\varphi}} = h\cdot\sqrt{\frac{5}{2}} \approx h \times 1.581\,138\,830\,084\,19$

Both diagonal pyramids will appear to have very steep slants, and as far as I know they do not exist in Egypt.

Mathematical facts:

- A *Kepler pyramid* is slightly greater than a *quamispheramid* of the same *height*.ratio:
- ratio: $\sigma := \frac{\mathrm{b}_\varphi}{\mathrm{b}_\pi} = \frac{4}{\pi\sqrt{\varphi}} \approx 1.000\,959\,022\,308\,78$

  so a *quamispheramid* ("π-ramid") is nearly identical to a *Kepler pyramid* ("φ-ramid").
  Their bases differ less than $1‰$. This is called a *mathematical coincidence*.
- ratio of approximations: $\tilde{\sigma} \equiv \frac{\mathrm{b}_{\tilde{\varphi}}}{\mathrm{b}_{\tilde{\pi}}} = \frac{2/\sqrt{8/5}}{11/7} = \frac{14}{11}\sqrt{\frac{5}{8}} \approx 1.006\,179\,255\,508\,12$
- for a *circlamid* we find: $r : h : s = 3 : 4 : 5$ which is the first Pythagorean triple.

Note: Mathematical facts are NOT a great achievement of any pyramid builders,
but a free gift of mathematics.

Below, all values are calculated, not measured (b & h of the Giza pyramids are from WikipediA).

type	example	h[cb]	b[cb]	b/h	l/h	s/h	α_s	α_r	α_{rs}
$\blacktriangle_{\triangleright}$				$\sqrt{2/3} \approx 0.8165$	1.1547	1.0801	67.7923	60.0000	69.2952
$\blacktriangle_{\varnothing}$				$\sqrt{2/\varphi} \approx 1.1118$	1.2720	1.1441	60.9306	51.8273	64.0864
$\blacktriangle_{\Delta}$				$\sqrt{2} \approx 1.4142$	1.4142	1.2247	54.7356	45.0000	60.0000
$\blacktriangle_{\circ}$	Khafre	274	411	$3/2 = 1.5000$	1.4577	1.2500	53.1301	43.3139	59.0362
$\blacktriangle_{\pi}$				$\pi/2 \approx 1.5708$	1.4946	1.2716	51.8540	41.9972	58.2977
$\blacktriangle_{\tilde{\pi}}$	Khufu	280	440	$11/7 \approx 1.5714$	1.4949	1.2717	51.8428	41.9858	58.2913
$\blacktriangle_{\varphi}$				$2/\sqrt{\varphi} \approx 1.5723$	1.4953	1.2720	51.8273	41.9699	58.2825
$\blacktriangle_{\tilde{\varphi}}$				$\sqrt{5/2} \approx 1.5811$	1.5000	1.2748	51.6712	41.8103	58.1939
	Menkaure	125	200	$8/5 = 1.6000$	1.5100	1.2806	51.3402	41.4729	58.0072

Egyptian Royal cubit: 1 cb $\approx 523 - 525$ millimetres (we'll use 525).

Sizes and slopes below are from WikipediA (from pages in various languages):

Egyptian pyramids:	h[cb]	b[cb]	slope	notes
Great Pyramid of Giza, Khufu, Cheops	280	440	51°50′40" 51.8[4]	It is a ***near quamispheramid*** ("$\tilde{\pi}$-ramid"), hence it also approximates a **(*near*) *Kepler pyramid*** ("$\tilde{\varphi}$-ramid"). With this *base* & *height*: ▪ the sides of a π-ramid and a φ-ramid would be $(\sigma - 1) \times 440$ cb $/2 \approx$ **11 centimetres** apart; ▪ for a *near quamispheramid* ($\tilde{\pi} = 22/7$) and a *near Kepler pyramid* ($\tilde{\varphi} = 8/5$) this is $(\tilde{\sigma} - 1) \times 440$ cb $/2 \approx$ **71 centimetres**; ▪ actually the sides are not straight, their midpoints are indented by $\sim$ **50 − 100 centimetres**; ▪ other approximations than $\tilde{\pi} = 22/7$ and $\tilde{\varphi} = 8/5$ yield far worse approximations of this indentation.
2nd pyramid, Khafre, Chefren	274	411	53°10′ 53.1[6]	$\frac{p=4\times411}{h=274} = 6$ (exactly), so it is a ***circlamid***. It is a bit smaller than Khufu, at the same *height* it would have been 280×420 (420 cb is also the *base* of the Red Pyramid).
3rd pyramid, Menkaure	125	200	51°20′25" 51.3402[7]	$\frac{b}{h} = \frac{200}{125} = \frac{8}{5} = \tilde{\varphi} =$ approximated ***Golden Ratio***. We'll call it a ***near golden pyramid***.

Please check http://henk-reints.nl/pyramidsAnalysis.html for a LOT of number crunching about the Giza pyramids.

Misalignment of cardinalities (see http://henk-reints.nl/pyramidsAnalysis.html):

Khufu:	*mean*:	+000°31'23" = +000°.5230	(of absolute values)
	max.:	+000°57'11" = +000°.9530	
Khafre:	*mean*:	+000°27'06" = +000°.4517	
	max.:	+001°06'27" = +001°.1075	
Menkaure:	*mean*:	+000°57'59" = +000°.9665	
	max.:	+001°25'19" = +001°.4220	

Great Pyramid:

- geographical *latitude* of apex $= 29°58'45"\text{N} =$ very near $30°$ (it is 2.3 km south of the true $30°$ latitude, but the Giza plateau just is not larger), so at this location, the celestial pole has an altitude of $60°$, corresponding to exactly one sixth of a circle.
- A circle fits exactly 6 times around itself, making 6 a sort of "circle number" and $60°$ can be seen as some special angle (cf. equilateral triangles as well);
- Khafre's pyramid's "official" circumference ($4 \times 411 = 1644$ cb) exactly equals **six** times its "official" height ($6 \times 274 = 1644$ cb);
- Earth's polar circumference $= 40\,008$ km;
- (Khufu's *perimeter* $= 4 \times 440$ cb) $\times 12 \times 60 \times 60 \times 0.525$ m/cb $\approx 39\,917$ km;
- difference $= -91$ km $\approx -0.2275\%$.

The next larger or smaller size of integer cubits in the $11/7$ ratio would increment or decrement the base by 11 cb, which would increase or decrease the above by 11 cb $\times 12 \times 60 \times 60 \times 0.525$ m/cb ≈ 249.5 kilometres. Therefore we cay say the actually existing size of 440 & 280 cb is the best possible approximation of Earth's northern hemisphere, measured in integer Egyption Royal cubits of 525 mm. This also suggests (but not more than that) 525 mm would be the best approximation of a cubit. And it seems Ερατοσθενης (*Eratosthenes*) was not the first one to accurately determine Earth's circumference...

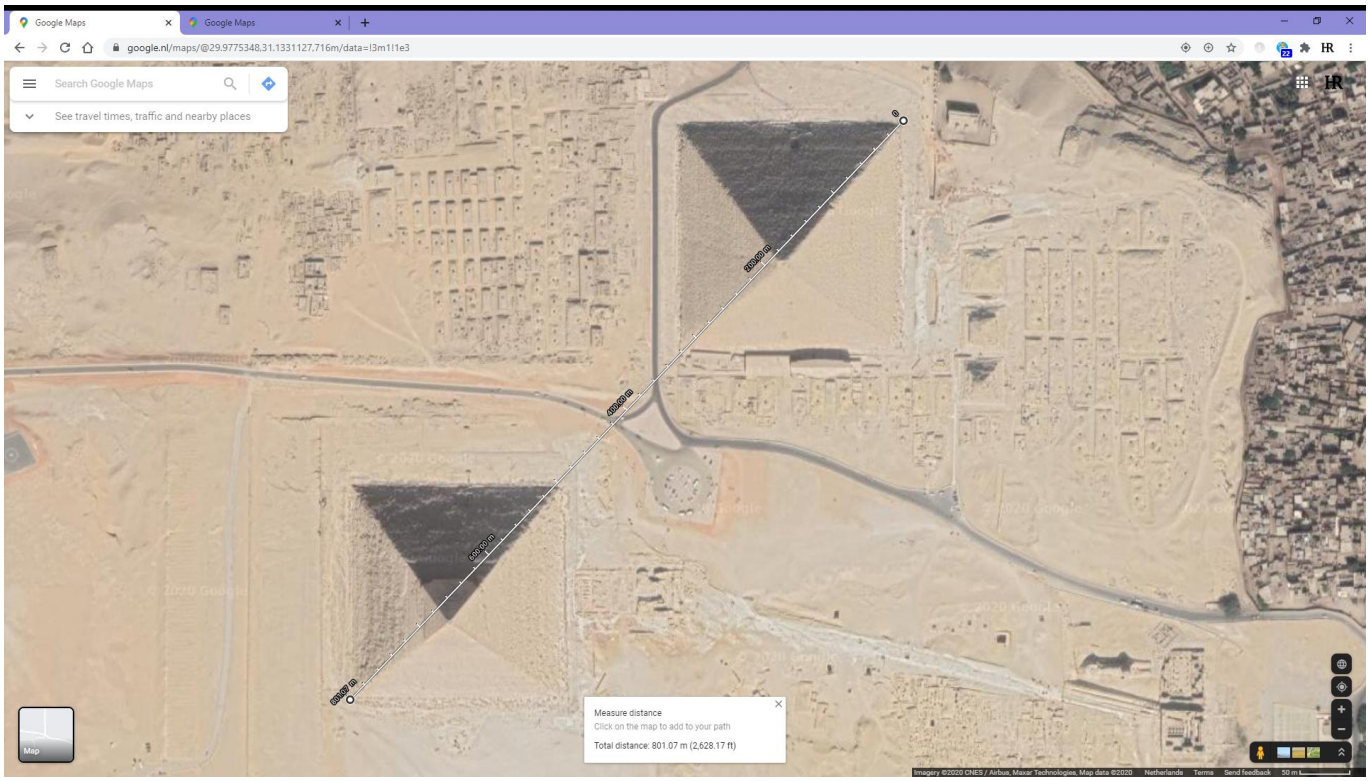
What is definitely not to be considered an achievement of the the pyramid builder is that Khufu's *height* scales to Earth's polar *radius* by the same factor. Of course they do. It would have been a great achievement had they been able to violate mathematics. Circumference: earth: $2\pi r$, Khufu: $2\pi h$ & $\frac{2\pi r}{2\pi h} = \frac{r}{h}$, so their *circumferences* ***must*** have the same ratio as the *radius* and *height* and this ratio equals $12 \times 60 \times 60 = 43\,200$.

One should NOT say: they made the *circumference* of Khufu equal to $1/43200$ of Earth's *circumference* ***and also*** its *height* equal to $1/43200$ of Earth's *radius*. One should say: they made the *circumference* of Khufu equal to $1/43200$ of that of the earth ***and then of course*** the same factor applies to the *radius* & *height*. Nothing special. Please read this once again, Mr. Hancock... (https://www.youtube.com/watch?v=kdWVVROD-UY&t=224s).

Earth's polar *radius* rounds to $r_{\text{E}} = 6\,356\,752$ m and Khufu's *height* equals $h = 280$ cb. We find that $\frac{h \times 0.525 \times 12 \times 60 \times 60 - 6\,356\,752}{6\,356\,752} \approx -0.000\,999\,26 \approx 0.0999\% \approx 0.1\%$, twice as accurate as for the *circumference*. This difference in accuracy is also nothing special. The $\frac{2b}{h}$ ratio of the pyramid equals

$\frac{22}{7} \approx \pi$ and "≈" means: "nearly equals", so it is not exactly equal. It means the accuracies in *circumference* and *height* MUST differ and of course one of them will then be the best. Moreover, the earth is flattened by roughly $1/300$, so its polar *circumference* does not equal 2π times its polar *radius* (and, unless you find $C = 4aE(e) = 4a\int_0^{\pi/2}\sqrt{1-e^2\sin^2\theta}\,d\theta$ with $e = \sqrt{1-b^2/a^2}$ easy, there exists no easy exact formula for the *circumference* of an ellipse).

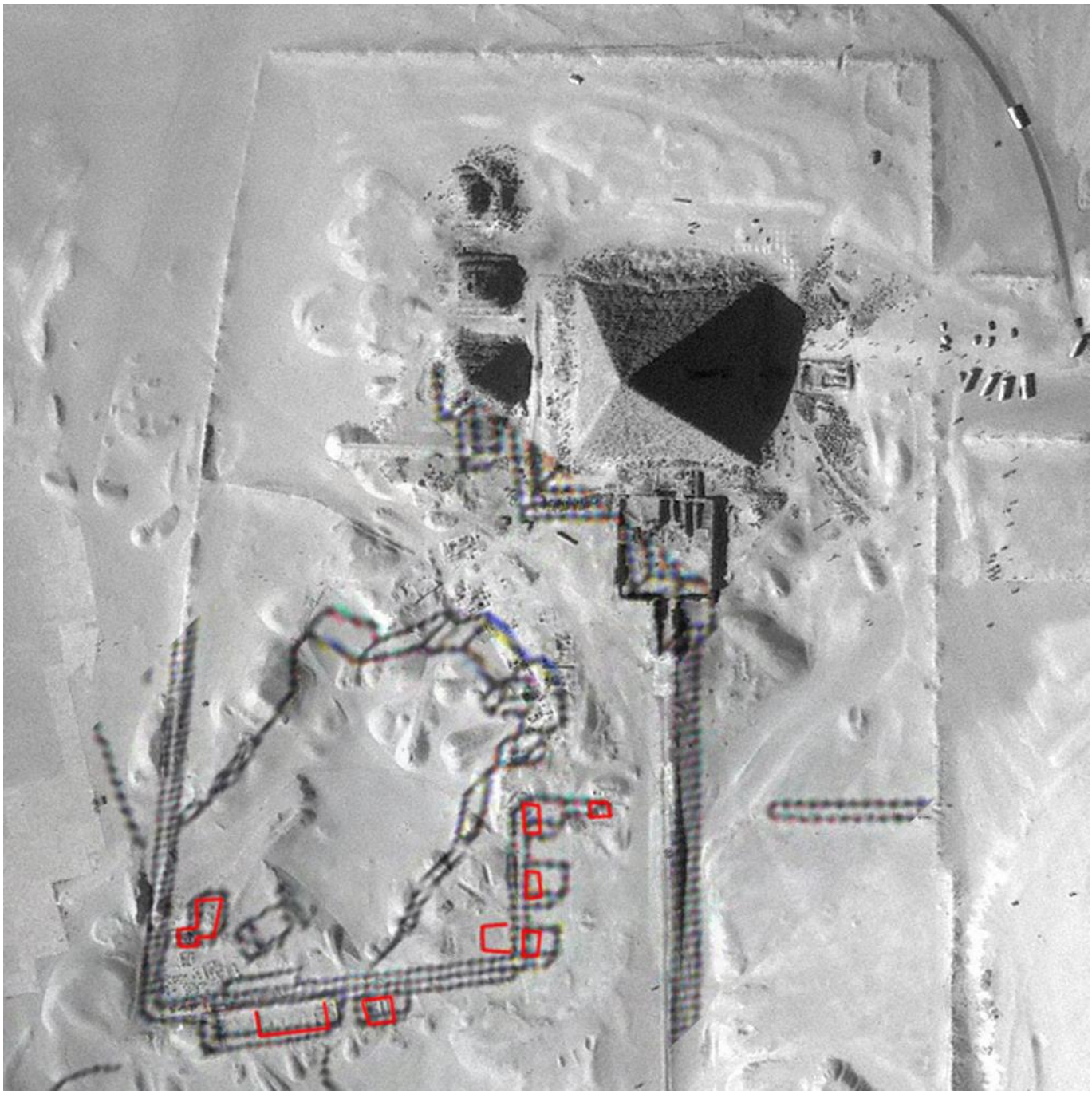
And $0.1\% = \frac{1}{1000}$, wow! But one may doubt if they considered 1000 a special number like we seem to do and it is neither plausible that they would intendedly have made an error in order to achieve this number. Probably , they hardly used the decimal system, but based their calculations on numbers with a lot of divisors, which makes many calculations a lot easier. That is why the Sumerians used the sexagesimal system. 60 is the smallest number having 12 divisors.
Please see http://henk-reints.nl/Why12-why60.pdf.



Pyramids of Khafre (LL) & Khufu (UR) seem nicely lined up at $45°$,
but their (extended) diagonals are $\sim 11 - 15.5$ m $\approx 21 - 29.5$ cb apart,
the Khafre apex to Khufu apex bearing is $43°19'10"$,
and Khafre is rotated eastward by $1°30'09"$ w.r.t. Khufu.

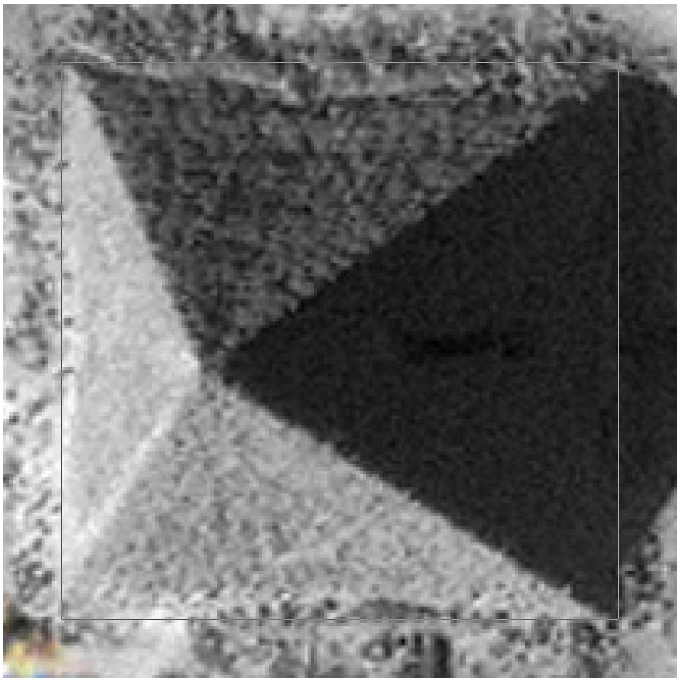
Menkaure's pyramid

To me it seems Menkaure's pyramid's perimeter is an indented octagon like Khufu's. Menkaure also reflects the *Golden Ratio*. See also https://curiosmos.com/were-all-3-ancient-giza-pyramids-built-with-8-and-not-4-sides/ as well as next image from http://giza.fas.harvard.edu/3dmodels/71017/allphotos/:



http://gizamedia.rc.fas.harvard.edu/images/GPH/3D%20Model%20References/Giza%20Plateau/sat_ikonos_saleh_plan_composite.jpg

Ikonos satellite image of Menkaure Quarry, overlaid with plan of Abdel-Aziz Saleh's settlement area.



This image of course is an enlarged section of the prior, with a square around the pyramid of 172×172 pixels in the original. Indentation seems to be:

top	= west	$7 : 172$	$\approx 4.07\%$	≈ 8.14 cb ≈ 427 cm
left	= south	$3 : 172$	$\approx 1.74\%$	≈ 3.49 cb ≈ 183 cm
bottom	= east	$4 : 172$	$\approx 2.33\%$	≈ 4.65 cb ≈ 244 cm
right	= north	$? : 172$		
average		$\frac{7+3+4}{3} : 172$	$\approx 2.71\%$	≈ 5.43 cb ≈ 285 cm

Please note this is merely a very rough estimate since the pyramid most probably lost its original skin. The absolute distances of course use Menkaure's base of 200 cb.

Above, I called Menkaure a *near golden pyramid* with $b/h = 8/5$. It would yield an indentation with respect to another pyramid, scaled to the same height, as follows:

compared to	indent	cm
near Kepler pyramid	0.596%	63
Kepler pyramid	0.881%	92
near quamispheramid (Khufu)	0.909%	95
quamispheramid	0.930%	98
circlamid (Khafre)	3.333%	350

Khafre (a *circlamid*) seems closest to what can be measured on the image. Were it scaled to Menkaure's *height*, it would fit inside it with an indentation of 350 cm, close the the above measured value. Were Menkaure scaled up to Khafre's *height*, its *base* would become 438.4 cb and this exceeds Khafre's *base* by 27.4 cb $= 14.385$ m. Precisely $\frac{1}{10}$ of Khafre's *height*. These two things together make me ponder it might not be a fluke. Of course I do not know what was in the mind of the pyramid builders, but might Menkaure be linked to Khafre in this way?

If Khufu (a *near quamispheramid*) were scaled to Menkaure's *height*, it would fit inside it with an indentation of 95 cm. Would Menkaure be scaled to Khufu's *height*, its *base* would be 448 cubits, 8 more than Khufu's, which is 4 on each side (so it would be 2.10 m outside the line connecting the corners). To me, this seems not relevant.

Khufu's and Menkaure's *heights* have a ratio of: $\frac{280}{125} = 2.24 \approx \sqrt{5} + 0.003\,932 \approx \sqrt{5} + 0.176\%$ and $\sqrt{5}$ is the core of the Golden Ratio: $\varphi = \frac{1+\sqrt{5}}{2}$. I think this may not be a fluke, it might link Menkaure to Khufu.

Menkaure is a *near golden pyramid* with $\frac{b}{h} = \frac{8}{5} = 1.60$, whilst $\frac{1+\frac{280}{125}}{2} = 1.62$, a 9 times better approximation of $\varphi \approx 1.6180$. This better approximation is however not to be considered a masterpiece of the pyramid builders. Mathematics gives it for free, thanks to the fairly good approximation of $\sqrt{5}$ by the ratio of $\frac{280}{125}$ and those are not some mystical numbers or so.

Heights: Khufu: 280 cb, Khafre: 274 cb, Menkaure: 125 cb; $\frac{280}{125} = \frac{56}{25} = 2.24 \approx \sqrt{5} \approx 2.236$, $\frac{274}{125} = 2.192 \approx \frac{57}{26}$. One might consider the $\frac{56}{25}$ vs. $\frac{57}{26}$ remarkable.

And although Khufu is the largest pyramid if the things are considered stand-alone buildings, its original apex has an elevation (above sea level) of ~ 5 metres ≈ 10 cb less than Khafre.

The Sphinx:

Please read:

http://henk-reints.nl/Thoughts-Younger-Dryas.pdf
http://henk-reints.nl/HR-the-flood.pdf
http://henk-reints.nl/HR-the-flood-02.pdf
http://henk-reints.nl/pyramidsAnalysis.html

and take a look at https://mariobuildreps.com/ .

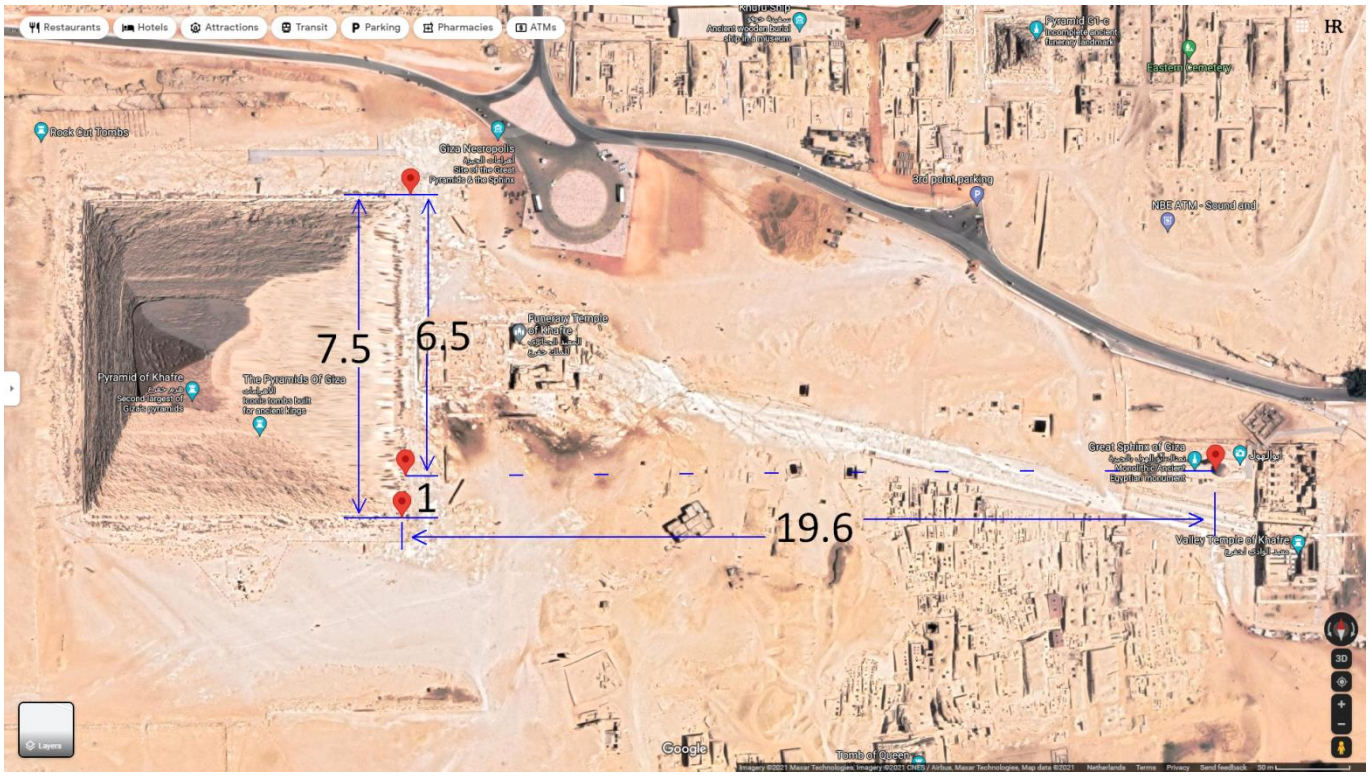
The last pole shift as mentioned on the latter was by $14°$. I am not a geologist, but the Giza plateau at least looks like it might very well be some huge flood deposit. It could result from an earth crust shift at the end of the Younger Dryas, roughly 9500 years BCE. This date agrees with Plato's mentioning of Atlantis. The last earth crust shift as mentioned on https://mariobuildreps.com/ rotated the part of the earth where Egypt lies by $16.2°$ counterclockwise, thus causing the north as seen from there to turn clockwise by the same amount. This matches the cardinalities of Gobekli Tepi and Baalbek, both are pointing some $15°$ west of north, so they must date from before such a pole shift. A huge flood deposit resulted and it became the current Giza plateau. In order to mark the new orientation of the world and sky, the pyramids were built on top of it, with a nearly perfect alignment to the new north.

The "road" from Khafre to the Sphinx has a bearing of $\sim 12°$ southward when going from west to east, so I think it has nothing to do with this pole shift.

It is plausible that the pyramids were built to mark the new orientation of the earth and the sky. Probably a few thousand years later the dynasties of what we now call the Egyptian pyramid builders arose and they tried to also build pyramids, but miserably failed.

The Sphinx is definitely not on top of the Giza Plateau and to me it seems it was not constructed in its entirety. It may very well be an already long existing rock or hill or maybe you want to call it a mountain, which would easily explain its clear state of erosion. After a pole shift it all of a sudden pointed straight east, which (litterally) turned it into something special and then it got some sort of finishing touch giving it a head by removing superflous stone. It may as well be a offshoot of the flood deposit. It lies on a floor that is some 40 metres below the top of the Giza Plateau, where the pyramids were built.

Next image shows relative distances of Khafre and the Sphinx head. The 7.5 actually is 7.4909 and the 19.6 is $19.5869 \approx 20$.



Next is with a distance measure line from the southwest of Khafre's pyramid to the entrance of the Valley Temple of Khafre. This distance is 4.001 times the base of the pyramid. The entrance is nearly exactly on the same line as the southern base of the pyramid.

Detail of last image, showing the end of the distance measure line:

Left point of this line moved to the latitude of the Sphinx head on the eastern pyramid base:

It nearly perfectly is along the central gallery of the temple of Khafre:

Meidum pyramid:

side: $b = 472$ ft ≈ 275 cb ≈ 144 m

would-be *height*: $h \approx 301$ ft ≈ 175 cb ≈ 91.65 m $\quad \frac{b}{h} = \frac{11}{7}$

theor. *slope*: $\alpha_s = \arctan\frac{301}{472/2} \approx 51.9017° \approx 51°54'06"$

WikipediA: *slope*: $\alpha_s = 51°50'35"$ nearly same as Khufu = *quamispheramid*
(How did they measure this slope?)

cardinality: NESW.

http://www.ancient-egypt.org/_Media/pyramid-view-1_med-2.png

Could it hold clues on how the pyramids were built?

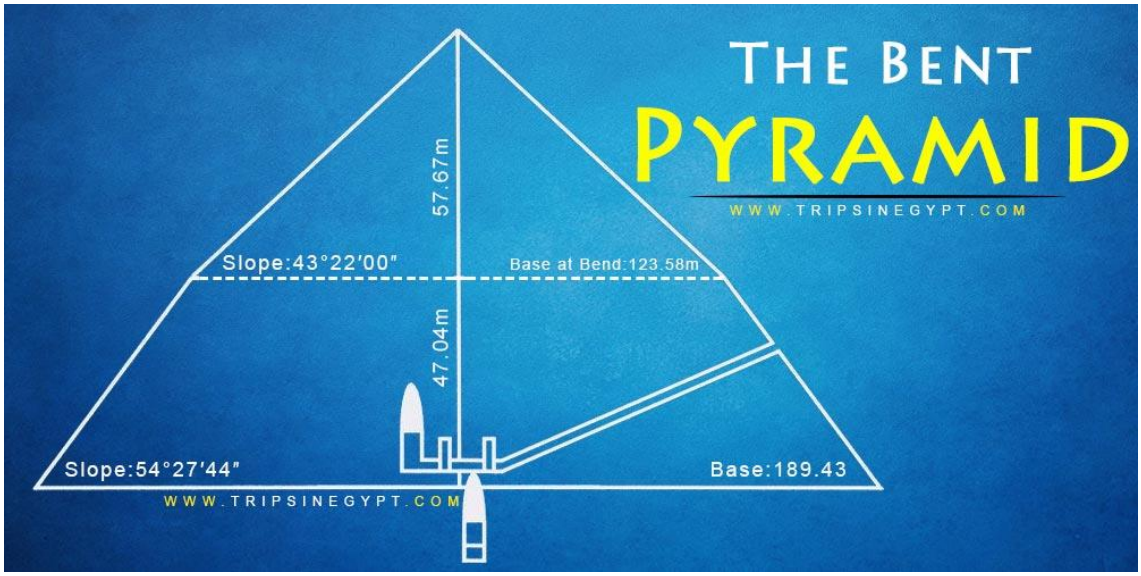
Doesn't the still standing core indicate it did NOT collapse because of steepness?

I do not know the slope of this central structure, but the thing seems smooth, as if it originally was the outside of some building. To me, it has great similarity to:

https://commons.wikimedia.org/wiki/File:Sudan_Meroe_Pyramids_30sep2005_10.jpg

i.e. the Meroë pyramids in Sudan.

Sneferu's bent pyramid:



Ahum:

$$\arctan \frac{57.67}{123.58/2} = \mathbf{43°01'19"} = 43°22'00" - \mathbf{20'41"}$$

$$\arctan \frac{47.04}{(189.43-123.58)/2} = \mathbf{55°01'39"} = 54°27'44" + \mathbf{33'55"}$$

actual total *height*: $h = 104.71$ m ≈ 199.45 cb

below bend (measures from WikipediA):

side: $b_0 = 189.43$ m ≈ 360.82 cb

slope: $\alpha_{s,0} = 54°27'44"$ $\tan\alpha_{s,0} \approx 1.399\,995$ nearly $\sqrt{2}$ (*equilateral pyramid*)

ridge-side angle $\alpha_{rs} = \arctan\sqrt{1+4\left(\frac{h_0}{b_0}\right)^2} = 59.8331°$ ~ *equilateral pyramid*

would-be *height*: $h_0 = \frac{1}{2}b_0\tan\alpha_{s,0} \approx 132.60$ m ≈ 252.57 cb

theoretical *height*: $h_{0\Delta} = \frac{1}{2}b_0\sqrt{2}$ ≈ 133.95 m ≈ 255.14 cb if *equilateral pyramid*

theoretical *slope*: $\alpha_{s\Delta} = \arctan\sqrt{2} \approx 54.73561$ m $\approx 54°44'08"$ if *equilateral pyramid*

virtual *slope* from base to actual top: $\arctan\frac{104.71}{189.43/2} \approx 47.8692° \approx 47°52'09"$

height of bend: $h_b = 47.04$ m ≈ 89.60 cb

side of bend: $b_1 = 123.58$ m ≈ 235.39 cb

base outside bend: $b_b = (b_0 - b_1)/2 = 32.925$ m ≈ 62.71 cb on each side

yielding: $\tan\alpha_{sb} \approx \frac{h_b}{b_b} \approx 1.4287016$

slope would be: $55.0104° \approx 55°00'38"$

when rounding slopes to integer degrees, this equals the equilateral slope, whilst the "official" slope of $54°27'44"$ would be 1 less.

Fact: the "official" slope is inconsistent with the values of 189.43 m, 123.58 m & 47.04 m.

slant height: $s_0 = \sqrt{47.04^2 + 32.925^2} \approx 57.42$ m ≈ 109.37 cb

at/above bend:

side: $b_1 = 123.58$ m ≈ 235.39 cb

height: $h_1 = 57.67$ m ≈ 109.85 cb

side/*height* ratio: $\frac{b_1}{h_1} \approx 2.142882 \approx \frac{15}{7}$

yielding *slope*: $\alpha_{s,1} = \arctan\frac{2h_1}{b_1} = 43°01'29"$

WikipediA: $\alpha_{s,1} = 43°22'$

Once again, the "official" slope is inconsistent, now with 123.58 m & 57.67 m.

Note: $\alpha_r(\blacktriangle_\circ) = 43.3139 = 43°18'50"$

which is the *ridge slope* of a *circlamid*,

i.e. a $\mathbf{1:2.49}$ scaled-down version of Khafre would diagonally fit inside the upper part of the bent pyramid.

would-be *base*: $b_2 = b_1 \cdot \frac{h}{h_1} = 123.58 \cdot \frac{104.71}{57.67} \approx 224.38$ m ≈ 427.39 cb

in rounded cubits: $b_2 = b_1 \cdot \frac{h}{h_1} = 235 \cdot \frac{200}{110} \approx 427.2727$ cb $(236 \cdot \frac{200}{110} \approx 429.0909)$

slant height: $s_1 = \sqrt{57.67^2 + \left(\frac{123.58}{2}\right)^2} \approx 84.52$ m ≈ 160.99 cb

Entire pyramid: $\frac{b_0}{h} \approx 1.8091 \approx \frac{9}{5}$ (cf. Menkaure's $\frac{b}{h} = \frac{8}{5}$)

slant height: $s = s_0 + s_1 = 141.94$ m ≈ 218.41 cb

surrounding square: $\sim 290 \times 290$ m^2

cardinality: NESW.

I do not believe the bent pyramid's shape is a fluke. It was not an "early experiment in true pyramid building" as stated on WikipediA. They did not change their plan when they were halfway because it would have been too steep or so. It is a two-in-one pyramid that must have been intendedly built the way it is, although I do of course not know what the reason was.

Sneferu's red pyramid:

side: $b = 722$ ft ≈ 420 cb ≈ 220 m

https://fr.wikipedia.org/wiki/Pyramide_rouge:

$b = 218.50 \times 221.50$ m^2

height: $h \approx 344$ ft ≈ 200 cb ≈ 105 m

$\frac{b}{h} \approx 2.09884 \approx \frac{21}{10}$

yielding *slope*: $\alpha_s = \arctan\frac{2 \cdot 344}{722} = 43°37'07"$

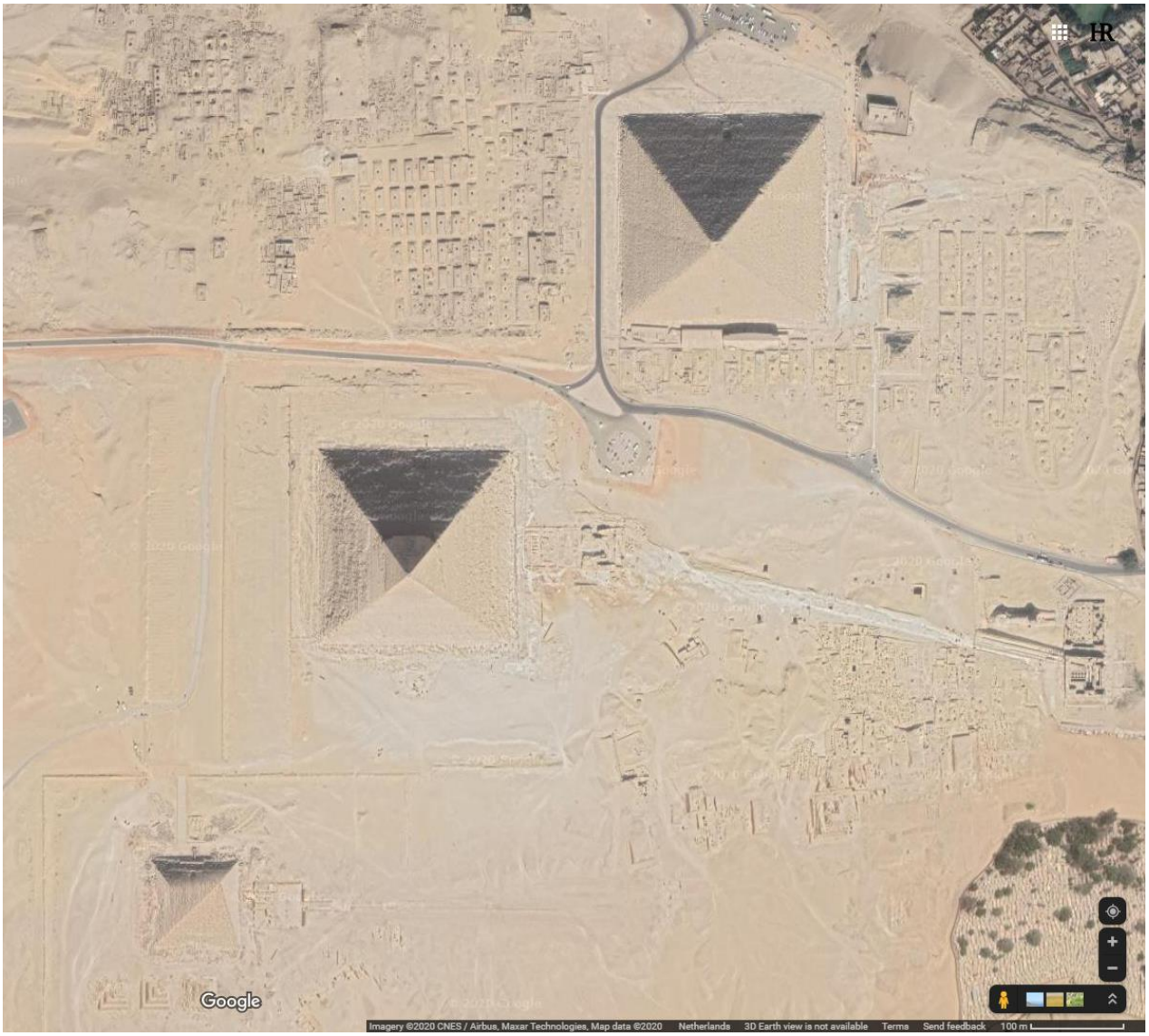
WikipediA: English: $= 43°40'$

Deutsch: $= 43°36'$

Français: $= 43°19'$

Note: $\alpha_r(\blacktriangle_\circ) = 43.3139 = 43°18'50"$ (*ridge slope* of *circlamid* like Khafre, which, if scaled down by a factor of 1.37, would diagonally fit inside it)

cardinality: NESW.



https://www.google.com/maps/@29.9762688,31.1286714,1043m/data=!3m1!1e3

Overview of the Giza plateau.

Please check http://henk-reints.nl/pyramidsAnalysis.html for a LOT of number crunching about the Giza pyramids.

https://www.wonders-of-the-world.net/Pyramids-of-Egypt/images/Vignettes/Description/Gizeh/Plateau-de-Gizeh-4-V.jpg

The Sphinx is clearly not on top of the plateau.

http://gizamedia.rc.fas.harvard.edu/images/MFA-images/Giza/GizaImage/full/photoreg/A4763_NS.jpg

An old image of the Giza plateau as seen from the Nile, which overflowed its banks.
Today this area is full of buildings (flooding is now regulated by the Aswan dam).

Detail of the above.

The Sphinx is clearly not on top of the plateau.

https://curiosmos.com/wp-content/uploads/2018/10/Ancient-Sphinx-9.jpeg
https://curiosmos.com/here-are-10-extremely-old-images-of-the-sphinx-youve-probably-never-seen/

On top of the Sphinx's head is a hole, this man stands inside it.

The Sphinx is clearly not on top of the plateau.

https://curiosmos.com/wp-content/uploads/2018/10/Ancient-Sphinx-3.jpeg

This picture would date from 1860. The Sphinx is clearly not on top of the plateau.

https://curiosmos.com/wp-content/uploads/2018/10/Ancient-Sphinx-2.jpeg

The Sphinx is clearly not on top of the plateau.

https://lh3.googleusercontent.com/proxy/ym1YHG5pbVXMbhNJ9dP7yjMOrjNZtec9jXzdCO0F9SBn3s8ffQL_lC2Qvy5xvd847sA51PgedylHw-ijNor_0PswU-LoX40HpRQkYareQg

The Sphinx is clearly not on top of the plateau.

https://www.wonders-of-the-world.net/Pyramids-of-Egypt/images/Description/Gizeh/Plateau-de-Gizeh.jpg

The Sphinx is clearly not on top of the plateau.

https://s27363.pcdn.co/wp-content/uploads/2020/05/Giza-Necropolis.jpg.optimal.jpg

The Sphinx is clearly not on top of the plateau.

https://images.snapwi.re/5750/5edb7f428955054e3b8f5f3b.w800.jpg

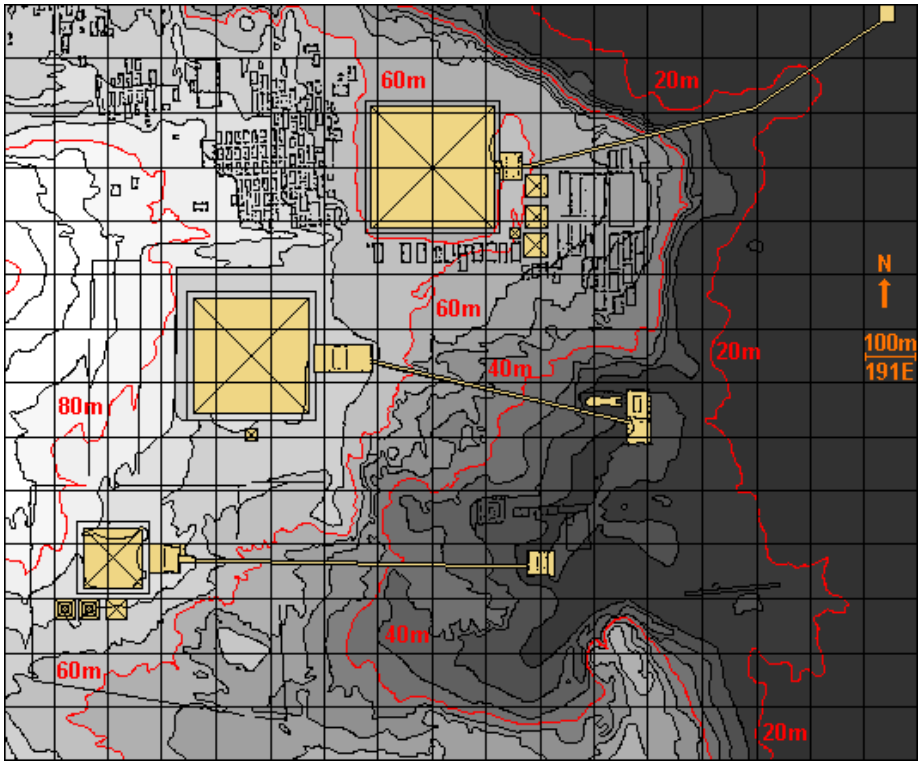
The Sphinx is clearly not on top of the plateau.

https://curiosmos.com/wp-content/uploads/2019/06/The-Pyramid-of-Cheops-and-the-Sphinx-photograph-by-Antoine-Beato-ca.-1880.jpg

On this URL itself this image appears left-right flipped. I do really not understand why people do that.

https://cdn.theatlantic.com/thumbor/b2aCssc-yJjI84a1-St3rHWIiWk=/900x600/media/img/photo/2020/02/sphinx/s20_1261365463/original.jpg

The Sphinx is clearly not on top of the plateau.



https://www.cheops-pyramide.ch/image/map-Karte/giza-ebene.gif

The Sphinx lies on ground that is some 40 metres below where the pyramids are standing.

Its own height approximates 20 metres (its back, not the top of its head).

I think the Sphinx is an offshoot of the plateau and I *think* the latter is a flood deposit.

It should be easily verifiable by geologists whether it indeed is a flood deposit.