

Cones can be Greater than Pyramids

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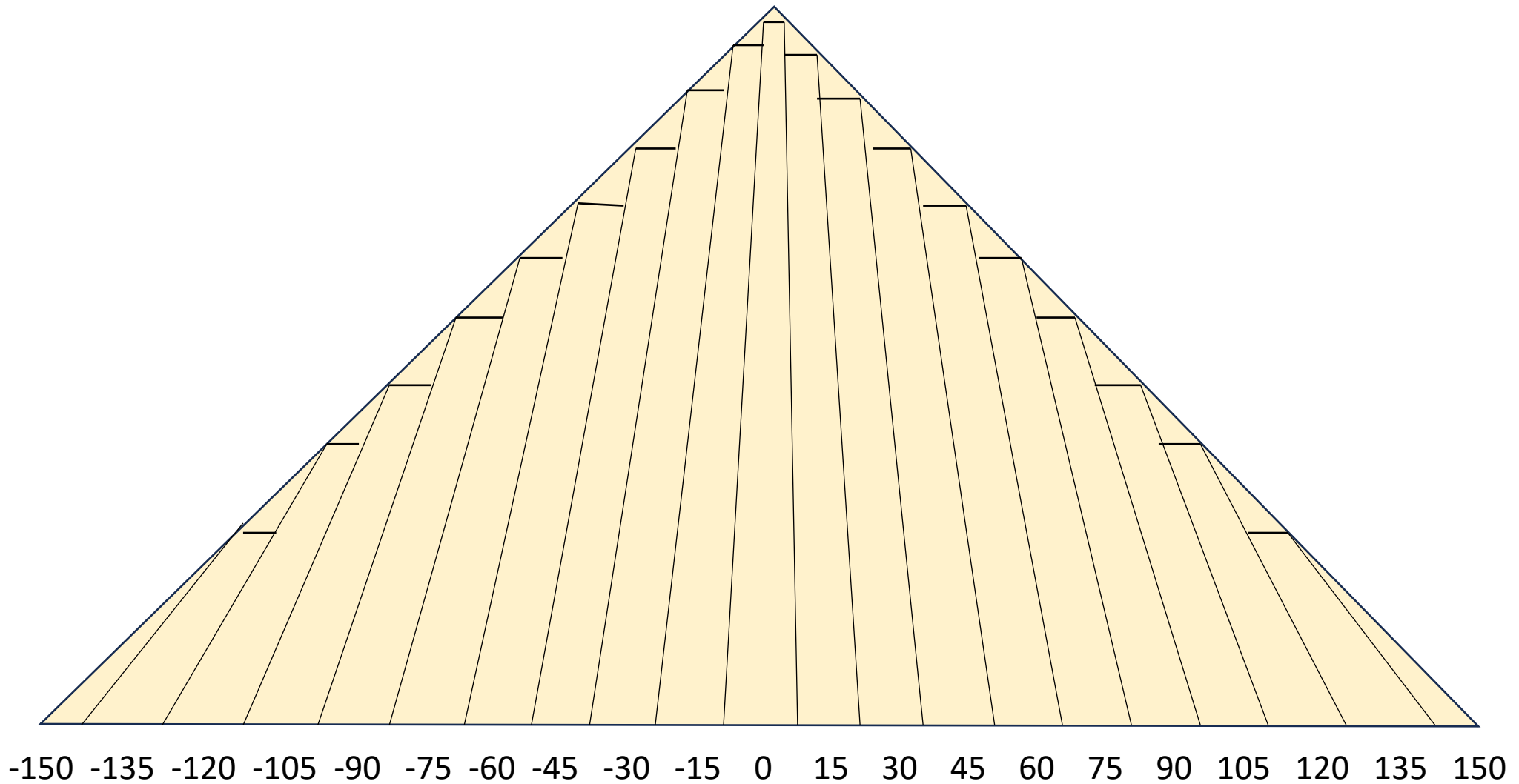
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The Great Cone

- A Great Cone built out of sand could be much cheaper than a Great Pyramid built out of rock.
- Sand is cheap to process if nearby but stable and can be good filler within thin, circular, concrete walls.
- Walls lean toward middle to balance inner and outer pressure.
- Little material is needed to resist small differences in pressure, like in a balloon, but the surfaces should be round, not square.
- Concentric tapered cylinders could support gradual differences in downward pressure from middle to edges of a Great Cone.

Cone support: Tapered cylinders

Cross-section shown

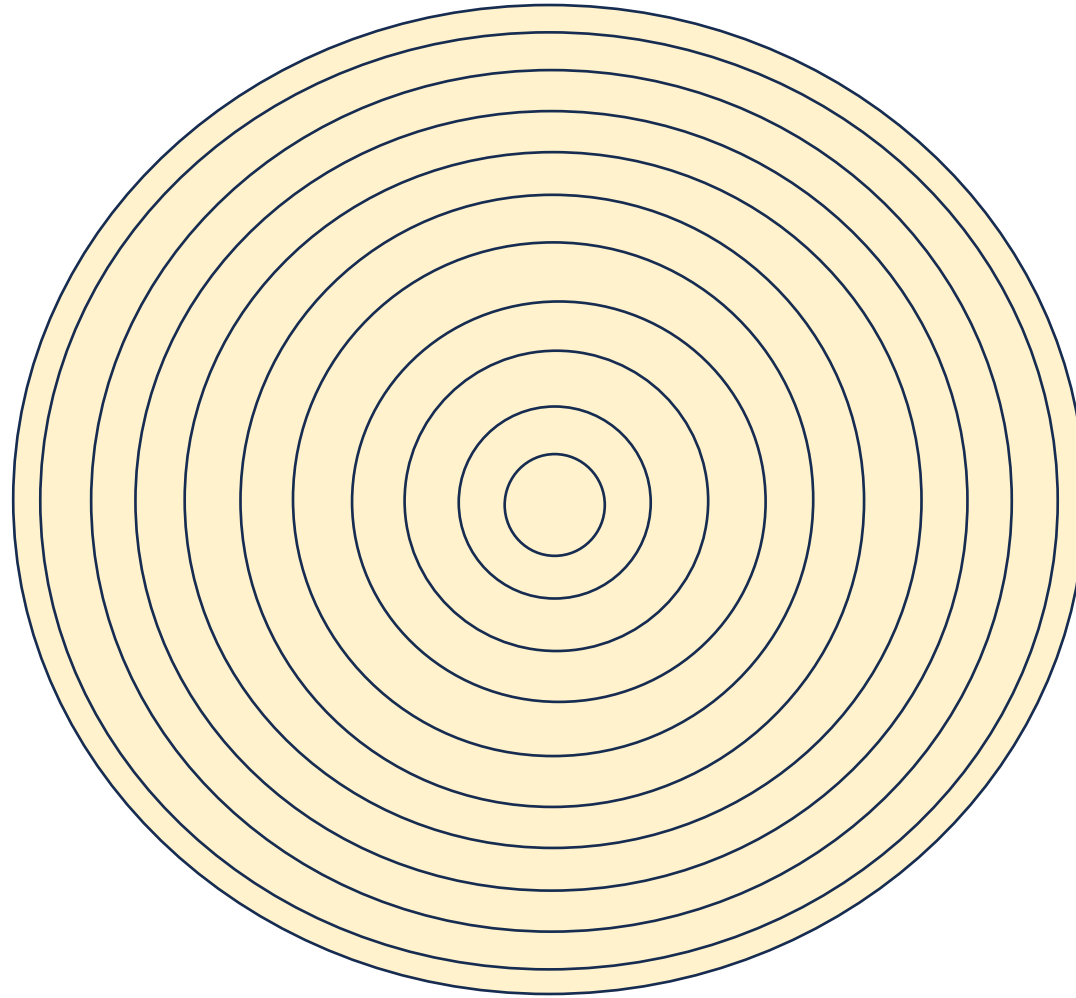


Pyramids vs. Cones

- The Great Pyramid in Egypt could cost > \$5 billion if built today.
 - **Ingredients:** 2.3 million blocks (6 million tons) of precisely cut rock.
 - Pyramid built ~ 2,500 BC was tallest structure on earth (147 meters) for 4,400 years until Eiffel built a 330-meter tower in Paris in 1889.
- A Great Cone of 150 meters could cost only \$20 million.
 - **Ingredients:** 3.5 million cubic meters (5 million tons) of nearly free sand,
 - 40,000 cubic meters of concrete costing \$8 million,
 - 5 million meters of 1-inch steel rebar costing about \$5 million,
 - Construction labor costing \$7 million.

Concentric tapered cylinders

Shown at base of cone



Building a perfect cone

- Height = radius
- Exterior with 45-degree angle of incline
- Supported by 10 concentric cylinders
 - Tapered at angle $(12 - n) / n$, where n is number of cylinder from center
 - For example, rising 11:1 at center ($n = 1$) and 2:1 near edge ($n = 10$)
 - Filled with sand to give equal pressure on inner and outer sides of walls
- Construction
 - Start on level, solid, rock base near a sandy desert
 - Assemble forms, rebar, and pour concrete for bases of all 10 cylinders
 - Raise all forms up a few meters, fill last level with sand, and pour next rings
 - Repeat until central cylinder is at required height, then finish exterior

Construction math

- General math for a perfect cone
 - Base = πr^2 , Radius at height $h = r - h$, Volume = $\pi r^3/3$, Center of gravity = $r/3$.
- Prices and weights assumed
 - Cost to lift sand = 1.8 trillion foot-pounds * \$0.04 per million foot-pounds = \$75,000.
 - Concrete walls with total area $\Sigma \pi r_i(h - r_i) = 250,000$ meters² averaging 0.2 meter thick, requiring 50,000 meters³ of concrete * \$200 costing = \$10 million
 - Steel rebar (2-cm)² each 0.5 horizontal and vertical meter weighing 8,000 kg / meter³ and costing \$1 / kg has total cost = $2 * 0.02^2 * 2 * 250,000$ meters² * 8,000 * \$1 = \$3.2 million

Remaining questions

- What to do with the exterior?
 - High quality stone, like the pyramids had
 - Recreation such as hiking up and water-sliding down the cone
 - Residence or office space, but then need to build stronger
- How long will it last?
 - Needs smooth concrete walls allowing sand to settle over the millennia
 - Likely to collapse if earthquake hits unless further reinforced
- How to pay for it and why build it?
 - Require each visitor to carry a bucket of sand to the top
 - Show how sand can be a building material



Or give Egypt a Great Cone as gift

- Like France giving Statue of Liberty to the United States
- Money saved on construction can be invested to pay for long-term maintenance, to keep the Cone looking new for thousands of years.
- Easy to rebuild a Great Cone if an earthquake knocks it down. Sand is recyclable.
- Or build cone 75 years from now by investing \$1 million in bonds with 4% interest: $1.04^{75} =$ \$20 million

A wide-angle photograph of the San Francisco City Hall at dusk. The building's iconic blue-tiled dome is illuminated from below, and the entire structure is lit up, with warm light emanating from the windows and the arched entrances at the base. The sky is a clear, pale blue. In the foreground, a street with a crosswalk is visible, with a few cars parked or moving. Trees and streetlights are also present, adding to the urban scene.

World's largest museum grand
opening

New museum next to the pyramids

- [The New Grand Egyptian Museum Is the Largest Archeological Museum in the World — What's Inside](#)
- Just opened today November 1, 2025.
- Cost \$1 billion and took 30 years to complete the museum.
- To build it they removed 80 million tons of sand in first 7 months.
- That much sand could have filled 16 cones the size of Great Pyramid, or one Huge Cone 2.5 times taller and wider than the Great Pyramid with a cost of < 0.5 billion because volumes and costs are cubic.
- Maybe the Huge Cone will come next.

Other properties of cones

- In astronomy or physics, the speed of light limits:
 - The places where a particle could be in the future to within a positive cone, where X and Y are Cartesian coordinates and Z is time.
 - The places where a particle could have been in the past to within a negative cone, with negative Z representing the past.
- In statistics:
 - Covariances must be $\leq \sqrt{\text{var}(X) * \text{var}(Y)}$, which form a positive cone
 - Positive definite matrices are within the cone
 - Positive semi-definite matrices are on the edge of the cone
 - Negative definite and negative semi-definite are the mirror images

Reviewer comments

- Building great cone cheaper than great pyramid sounds a good idea and worth posting.
- The pyramids in Egypt are amazing structures that took huge teams of engineers, builders, and workers many years to complete. They used complex math, geometry, and put in massive mental and physical effort, to the best of our knowledge, the purpose was to build a tomb for one or a few people. It feels like a lot of resources were spent to serve a single person's need.
- Today Egypt makes a lot of money from pyramid tourism, but that was not their original purpose. It might sound strange coming from an Egyptian. I am, like many others, really impressed by the pyramid methodology but not the purpose. Recently, there were some attempts to investigate whether the pyramids were built to produce energy, but nothing really scientific other than being tombs.

Further reading on cones and pyramids

- Estimated \$5 billion cost to rebuild pyramid in 2012:
 - [How Much Would It Cost to Build the Great Pyramid Today? | Live Science](#)
- [Fill Sand in construction: A complete Guide](#)
- [A Complete Guide to Cylindricity \(GD&T\)](#)
- Walking up cones is easy:
 - [Vesuvius mount - the Great Cone · See Pompeii](#)
- Large ancient cone now is underwater:
 - [Enormous Underwater Structure in the Sea of Galilee is a Mystery to Archaeologists | Ancient Origins \(ancient-origins.net\)](#)