



The Engineering Behind the Pyramids of Giza

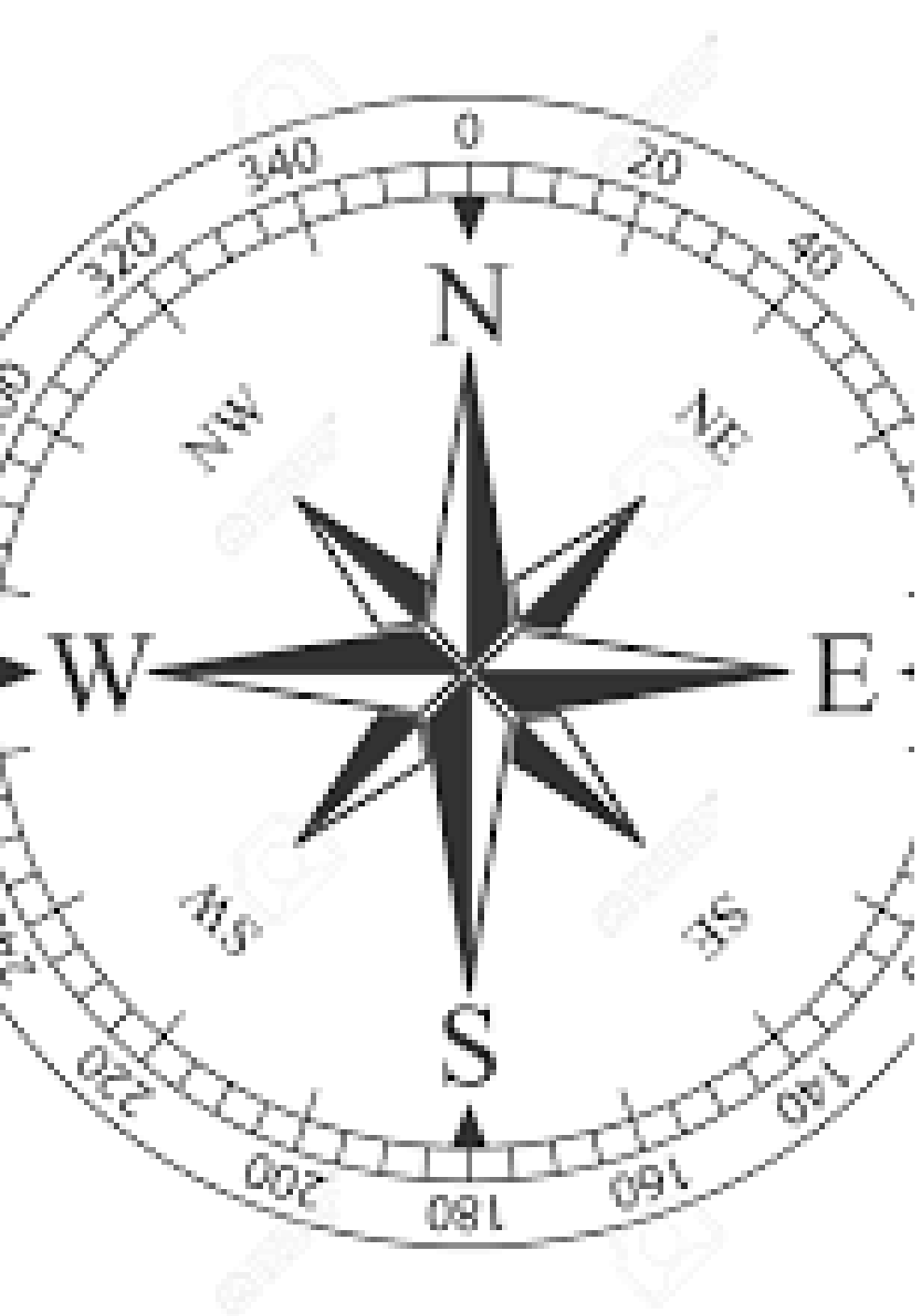
Jayna Briscoe

History of the Pyramids

- Built between 2560-2540 B.C.
- Was the tallest structure on Earth (45 stories tall) until the 14th Century when the Lincoln Cathedral in England was built
- The Great Pyramids of Giza are the oldest of the Seven Wonders of the World
- They are made up of about 2.3 million stones, each weighing about 3 tons!
- The bricks are made up of limestone and the dimensions were decided by the natural depth of the layer of limestone in the earth. It was just unearthed and sectioned
- Many conspiracy stories are associated with the pyramids as they are an engineering feat for the time period
- The pyramids hold a lot of religious significance to the people who built them



Building the Foundation



- The edges are perfectly aligned with the directions on a compass, which is even more impressive once you consider they did not have compasses at that time
- This was accomplished by tracking the stars and reading the directions based on how they move throughout the nights
- In order to keep the base level the Egyptians created a right angle and would stand at a distance looking at the levels to make sure they lined up with the top board
- The foundation is massive and the builders at the time managed to get it level within 2 cm and perfectly square within 11 cm which is quite the feat with the available resources



Contrary to popular belief the people who worked on the pyramids were said to be highly respected engineers within their community, not slaves.



Why limestone is significant

- It was easily accessible and relatively close in proximity
- Limestone is not extremely hard and can be manipulated with minimal force
- The only available metal to make tools out of was copper which is a soft metal, so they needed a soft material to sculpt
- The largest of the pyramids is made up of about 2.3 million bricks

Extraction of the Stones



Immediately upon removal from the earth the roughly shaped bricks would be placed in water to prevent the limestone from reacting with the CO₂ in the atmosphere which would cause it to harden making it much more difficult to work with.



Workers would then chip away at the sides until the desired shape and size was acquired



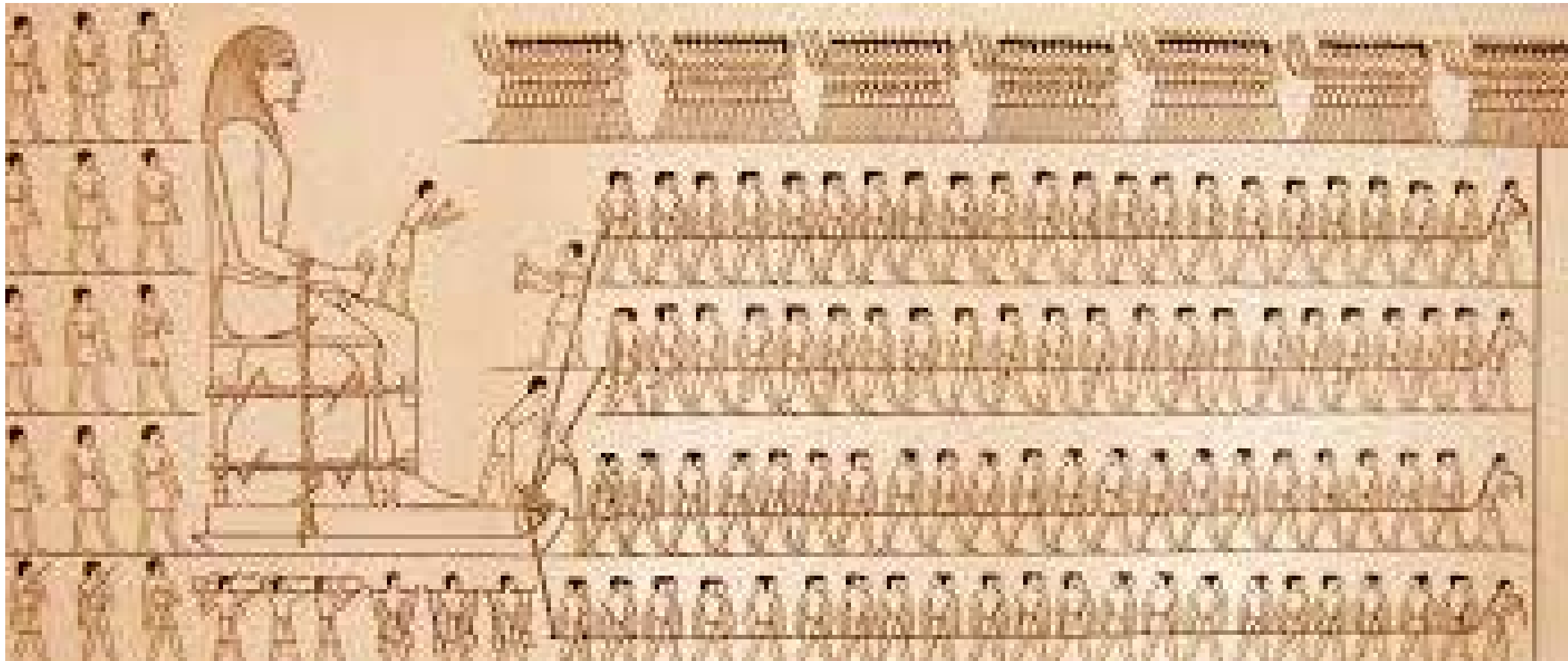
The surface of the water the brick was sculpted in was also a good level to ensure an even surface



Limestone also has a low density and needs only a small amount of buoyant material, such as small trees, attached to make it float down the quarry closer to the build site.

Tools Used

- Made of wood, copper and animal bones/hide
- Some were larger and just used to make general less accurate cuts while others are smaller used for intricate details/designs



Egyptian sleds

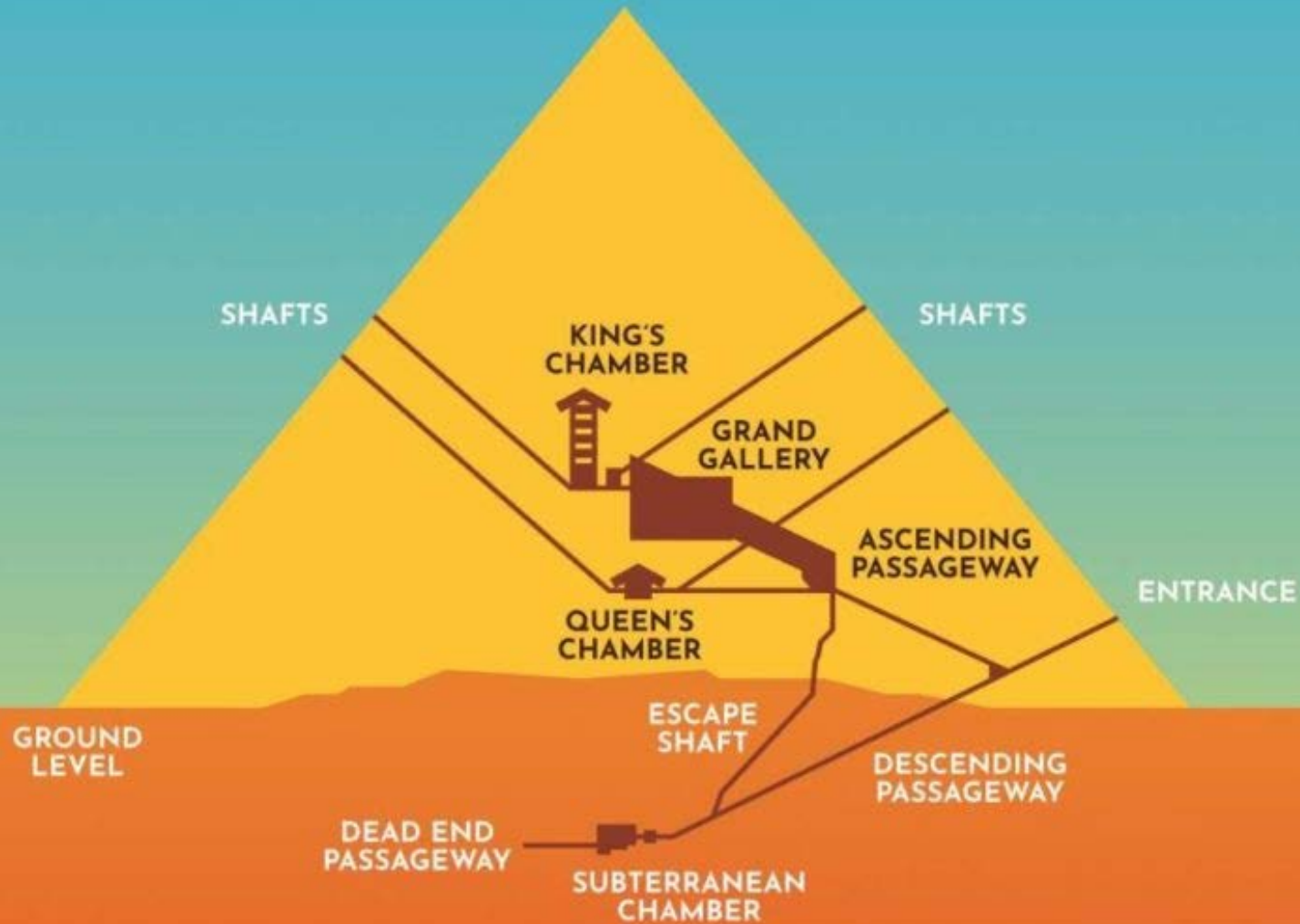
Sleds were frequently used to move heavy things in Egyptian culture. It is believed this is how they moved the bricks used to build pyramids. As pictured in the hieroglyphics it was frequent practice to pour water on the sand in front of the sled to cut down on friction making the object easier to transport.



Religious Significance

- Egyptians were among the first to believe in an afterlife
- They believe that everyone housed a second self within that would live eternally after our physical bodies die
- The second life was called a “Ka” usually meaning “double” but in this case it references a person’s soul
- Most people had provisions for their afterlife experiences and the pyramids were the extravagant provisions of wealthy and powerful pharaohs

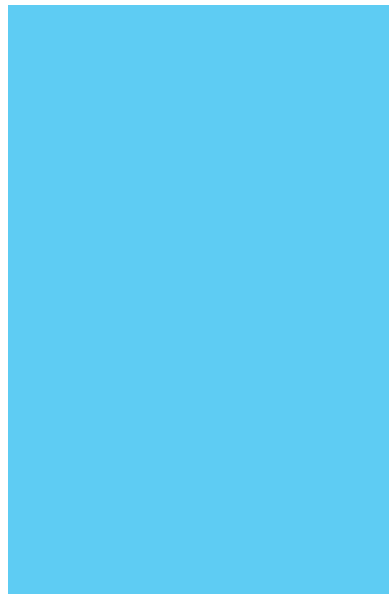
THE GREAT PYRAMID OF GIZA



(this cross section is west facing)

Inside the Pyramids

Despite their massive size inside of the pyramids is actually a pretty tight squeeze. It has been said that the Pharaohs were buried with their riches and treasures but those have since been stolen, leaving only the sarcophagus and the mummified body of the king.



Just For Fun: Conspiracies

Due to the sophistication of the design and execution of the pyramids many believe that humans had some extraterrestrial help in building the pyramids. It has even been rumored that alien remains have been found in the shafts of the pyramids which seem to have no real use. Which, now that the government has confirmed the existence of UFOs, may have some credibility to them...?



SOURCES

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