

Pyramids



What is a pyramid?

A pyramid is a geometrical solid with a square base and four equilateral triangular sides, the most structurally stable shape for projects involving large amounts of stone or masonry. Pyramids of various types, sizes and complexities were built in many parts of the ancient world (like Central America, Greece, China and Egypt). In the history of Egypt and China, they were primarily tombs and monuments to kings and leaders. The pyramids of the Mayans and Aztecs of Central America were mainly religious temples, though some of them housed burial chambers.

The Central American pyramids were smaller and sometimes wider than their Egyptian counterparts. These pyramids also took longer to finish -- they were often built and modified over hundreds of years, while Egyptian pyramids took a couple of decades to construct. Pyramids in Central America were integrated into Aztec and Mayan cities, whereas Egyptian pyramids were located away from the major cities.

The ancestors of these great structures are the burial tombs found throughout North America and Europe -- simple mounds of earth that covered burial chambers. The first tombs of the Egyptian pharaohs were flat, box-shaped buildings called **mastabas** (Arabic for "bench"). Pharaohs later built grander tombs by adding levels on top of the box to form **stepped pyramids**. Stepped pyramids are prevalent in Central America. In Mesopotamia, they were called **ziggurats**.

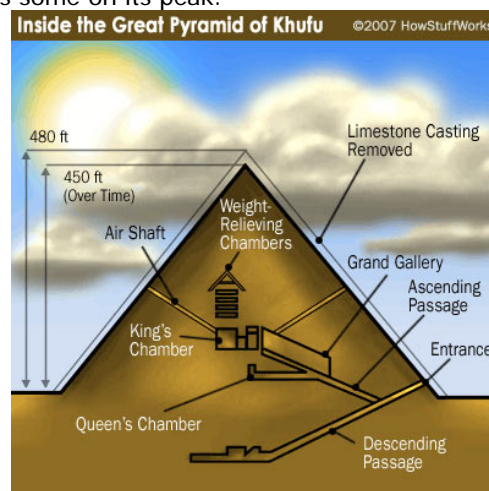
The Egyptians took pyramid design to new heights, culminating in the construction of the pyramids of Giza in the 26th century B.C. Laborers used 2.3 million blocks of limestone and granite to build the **Great Pyramid of Khufu**, which stands 146 meters high, has a 230-meter-square base and weighs about 6.5 million tons. A number of pyramids, including the Great Pyramid of Khufu, have survived thousands of years of exposure to the elements, a tribute to the ancient architects, engineers and workers who built them.

The Great Pyramid of Khufu

The Giza pyramid complex, on the west bank of the Nile, is the most famous group of pyramids in the world. As we discussed earlier, the grandest pyramid was built for Sneferu's son, Khufu, in 2540 B.C. The two smaller pyramids nearby were for Khufu's son, Khafre, and his grandson, Menkaure. After this dynasty, great pyramid building stopped, probably because of the time and expense of these massive state projects.

The **Great Pyramid of Khufu** on the Giza plateau in Egypt is the largest and most elaborately constructed pyramid in existence, representing the most advanced aspects of pyramid construction. Khufu's pyramid has the following features:

- The **primary burial chamber**, or king's chamber, contains the **sarcophagus** (tomb) that held Khufu's body, and the walls are adorned with **hieroglyphs** (writing) depicting various aspects of ancient Egyptian history and religion.
- The smaller **queen's chamber** (actually a misnomer -- it was not intended for the queen) lies within the pyramid, while another unfinished **secondary burial chamber** lies underneath the pyramid.
- **Weight-relieving chambers** above the king's chamber distribute the weight of the overlying rock and prevent the king's chamber from collapsing.
- The **gallery** is a large passageway with a vaulted, corbelled ceiling (the walls are layered upward, and each vertical layer sticks out further than the one below to form a primitive arch).
- Descending and ascending **passageways** connect various chambers to each other and to the outside.
- **Air shafts** connect the king's chamber to the outside. They may have been designed as a way for Khufu's spirit to exit the pyramid and rise to the heavens.
- The **entrance** was sealed after the pharaoh's body was placed inside.
- **White limestone rocks** line the pyramid's exterior, giving it a smooth face. These rocks have eroded away over time, but we know they existed because the Pyramid of Khafre still has some on its peak.



Egyptian Pyramids

The first stepped pyramid in Egypt, in Saqqara, was completed in 2620 B.C. for the Third Dynasty Egyptian pharaoh Djoser. It had four levels and an underground burial chamber. Builders later attempted, but never finished, another six-level stepped pyramid.

The Egyptians continued to construct taller and taller pyramids and started smoothing out the jagged edges of stepped pyramids. One of the earliest attempts was the Meidum pyramid, in 2570 B.C. It had seven steps progressing to eight, but it collapsed and was abandoned.

Pyramid designers learned that if pyramids were going to be higher and have steeper slopes, their bases needed to be wider. At Dahshur, further upstream along the Nile from Saqqara, laborers started the construction of a pyramid for the Fourth Dynasty pharaoh Sneferu. Unfortunately, the designers chose a poor foundation, and the pyramid began to lean inward upon itself when it was about two-thirds complete. The builders reduced the angle of the upper portion to complete it and make it more stable, and it is now known as the **Bent Pyramid** (2565 B.C.).

Unsatisfied with the Bent Pyramid, Sneferu ordered another pyramid at Dahshur. The designers chose a better foundation and made this pyramid the same height as the Bent Pyramid, but with a wider base and a shallower angle. The **Red Pyramid** was completed in 2560 B.C.