

A pyramid is a structure whose outer surfaces are triangular and converge to a vertex at the top. Its base is usually triangular or rectangular. It is often found in Egypt. Meanwhile, a lot of mathematical theories are behind the construction of pyramids.

First, the cross-sections of pyramids on each side of them are triangles. These triangles are isosceles triangles so we can actually cut them into two right-angled triangles. Many mathematical theories work on right-angled triangles, such as Pythagoras' Theorem. It means that the square of the length of the two sides of triangle is equal to the square of the length of hypotenuse, known as $a^2+b^2=c^2$.

Also, some trigonometry can be applied to find out the interior angles of the triangle. $\sin \theta = \text{opposite side/hypotenuse}$, $\cos \theta = \text{adjacent side/hypotenuse}$ and $\tan \theta = \text{opposite side/adjacent side}$. Using these methods, we can easily find out the inclination of a certain pyramid, and hence find the height, width, length of a pyramid without accurate measuring.

Secondly, the construction of pyramid may involve the use of golden ratio. It is said that paintings or architectures that have made use of the golden ratio are aesthetically pleasing. The golden ratio is denoted as phi φ , which is equal to $(1+\sqrt{5})/2$, around 1.618. Why this ratio is so special? It is because it is found in many natural things. For example, the pattern of a sunflower, snail, etc. A triangle of golden ratio is called the Kepler triangle. Ratio between its base, side and hypotenuse is $1: \sqrt{\varphi} : \varphi$, in which the Pythagoras' theorem is applicable in this triangle. Knowing these facts, we can know understand how pyramids are built and why they can be so magnificent.