



Geometry – Set in Stone

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The Great Pyramid at Giza





History of the Great Pyramid



- ★ Located near the city of Giza, Egypt.
- ★ The only remaining ancient wonder of the world. (1 of 7)
- ★ Built approximately 4,500 years ago. (2551-2528 BC)
- ★ Tomb for great Egyptian dead. The Great Pyramid was built for King Khufu, also known as Cheops.
- ★ Greek Traveler Herodotus of Halicanassus
 - 100,000 workers about 20 years



Dimensions

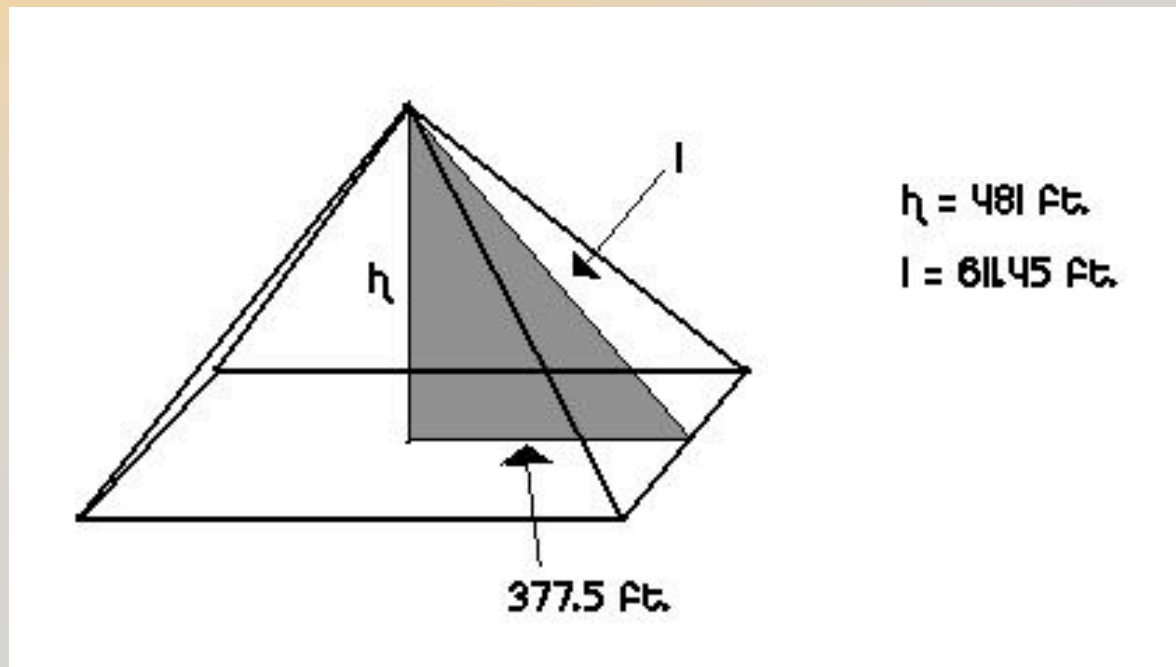


- ★ Originally stood 481 feet tall.
 - Now it stands only 455.31 feet tall
- ★ Each side of the square base has length of about 755 feet.
- ★ Amazing accuracy.
- ★ 2.3 million blocks of stones.
- ★ Each stone weighs on average 2.5 tons.
- ★ With a reign of 30-32 years, it would have taken a rate of 1 stone every 2-3 minutes during a 10-hour day.



Finding Pi

- ★ The vertical height of the pyramid is almost exactly equal to the radius of the circle with circumference equal in length to the sum of the sides of the base of the pyramid.





Finding Pi

$$\text{Sum of Sides} = 755 \times 4 = 3,020 \text{ ft.}$$

So, the radius of a circle with $C = 3,020$ ft. is:

$$C = 2 \times (\pi) \times (\text{radius})$$

$$3,020 = 2 \times 3.14 \times (\text{radius})$$

$$\text{Radius} = 480.65 \text{ ft.}$$

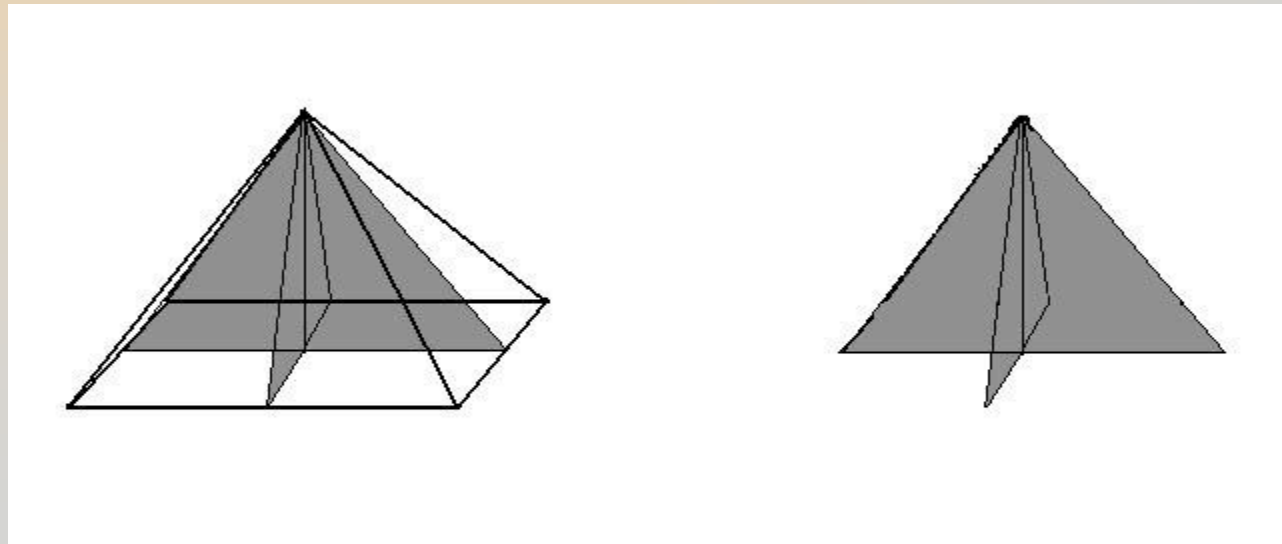




Finding Pi



- ★ The ratio of the surface area of the shaded figure below to the surface area of one of the sides of the pyramid is approximately equal to pi.





Finding Pi



$$\text{S.A.}_{\text{figure}} = 8 \times (.5 \times 377.5 \times 481)$$

$$\text{S.A.}_{\text{figure}} = 726,310 \text{ ft}^2$$



So, the ratio is:

$$\text{Ratio} = (726,310)/(230,822.275)$$

$$\text{Ratio} = 3.14661869$$



Very close to pi!!



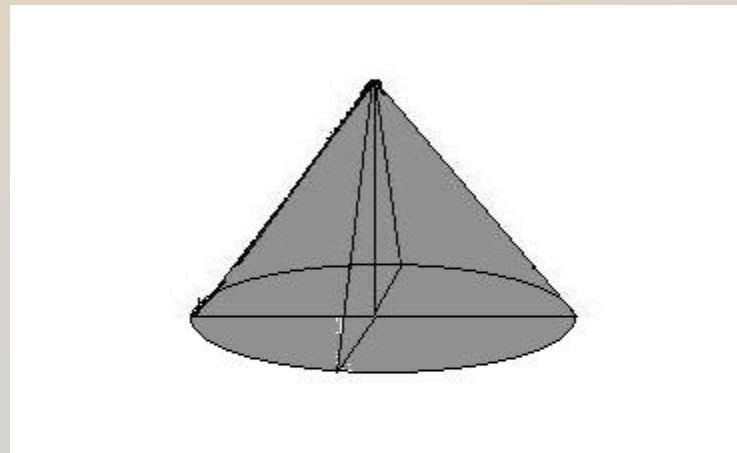
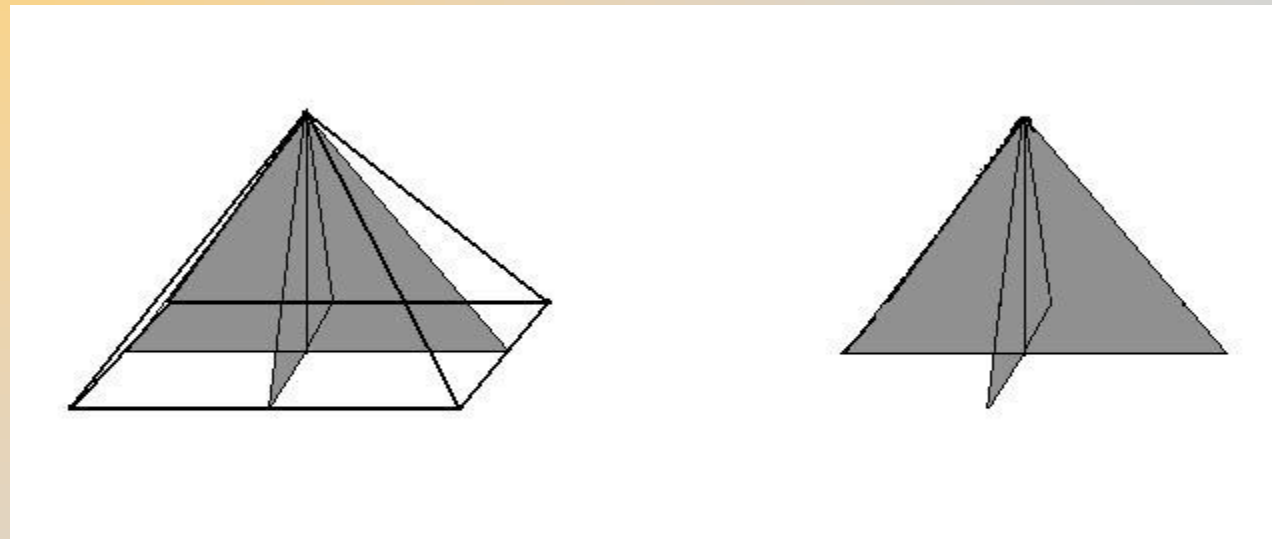
Finding Pi



- ★ Even weirder, let's compare the volumes of the cone formed by rotating the triangle about the height of the pyramid and the sphere formed by using the length of the base of the pyramid as a diameter.
- ★ In other words...



Finding Pi





Finding Pi

$$V_{\text{cone}} = (1/3)(\pi)r^2h$$

$$V_{\text{cone}} = (1/3)(3.14)(377.5)^2(481)$$

$$V_{\text{cone}} = 71,780,686.29 \text{ ft}^3$$

$$V_{\text{sphere}} = (4/3)(\pi)r^3$$

$$V_{\text{sphere}} = (4/3)(3.14)(377.5)^3$$

$$V_{\text{sphere}} = 225,340,616 \text{ ft}^3$$





Finding Pi

$$\text{Ratio} = (V_{\text{sphere}})/(V_{\text{cone}})$$

$$\text{Ratio} = (225,340,616)/(71,780,686.29)$$

$$\text{Ratio} = 3.1392931$$

Once again, very close to pi!!





The Earth, Moon and Great Pyramid

