

- GOALS:
1. Find volumes of pyramids.
 2. Find volumes of cones.
 3. Identify and state the properties of similar solids.

Theorem 11-8 Volume of a Pyramid

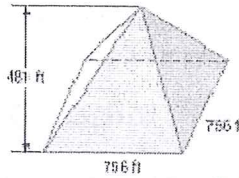
The volume of a pyramid is one third the product of the area of the base and the height of the pyramid.

$$V = \frac{1}{3} \cdot B \cdot h$$

↑
area of the Base



1. Still standing in Egypt after more than four thousand years is the Khufu or Cheop's Great Pyramid. Each side of the base of this square pyramid measures 756 feet and the height is 481 feet. Find the volume of the pyramid.



$$B = 756 \cdot 756$$

$$B = 571,536 \text{ ft}^2$$

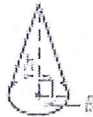
$$V = \frac{1}{3} \cdot (571,536 \text{ ft}^2) (481) \text{ ft}$$

$$= 91,636,272 \text{ ft}^3$$

Theorem 11-9 Volume of a Cone

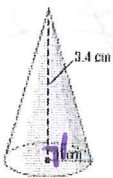
The volume of a cone is one third the product of the area of the base and the height of the cone.

$$V = \frac{1}{3} \pi r^2 \cdot h$$



Find the volume of each cone.

a.



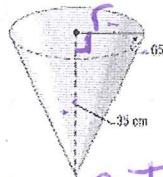
$$V = \frac{1}{3} \pi r^2 \cdot h$$

$$\frac{1}{3} \cdot \pi \cdot (1)^2 \cdot 3.4$$

$$\frac{1}{3} \cdot \pi \cdot 1 \cdot 3.4$$

$$V = 3.6 \text{ cm}^3$$

b.



Solve CAH TOA

$$a \tan(65^\circ) = \frac{35}{a}$$

$$h = 35$$

$$\frac{a \cdot \tan(65^\circ)}{\tan(65^\circ)} = \frac{35}{\tan(65^\circ)}$$

$$a \approx 16.3$$

$$r = 16.3 \quad h = 35$$

$$V = \frac{1}{3} \pi (16.3)^2 (35)$$

$$\approx 9738 \text{ cm}^3$$

c.



$$V = \frac{1}{3} \pi r^2 \cdot h$$

$$h = 2.6$$

$$r = 1.2$$

$$\approx 3.9 \text{ m}^3$$

Congruent Solids

Two solids are congruent if:

- the corresponding angles are Congruent,
- the corresponding edges are congruent,
- the corresponding faces are Congruent, and
- the volumes are equal

Take note

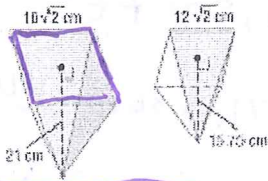
Theorem 11-12 Areas and Volumes of Similar Solids

If the scale factor of two similar solids is $a : b$, then

- the ratio of their corresponding areas is $a^2 : b^2$
- the ratio of their volumes is $a^3 : b^3$

Determine whether each pair of solids are *similar*, *congruent*, or *neither*.

a. Find the ratios between the corresponding parts of the square pyramids.

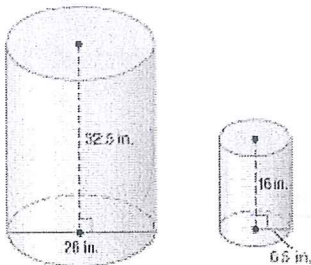


$$\frac{\text{base edge of larger pyramid}}{\text{base edge of smaller pyramid}} = \frac{10\sqrt{2}}{12\sqrt{2}} = \frac{5}{6}$$

$$\frac{\text{height of larger pyramid}}{\text{height of smaller pyramid}} = \frac{21}{15.75} = \frac{4}{3} \quad \checkmark$$

Similar
Not congruent

b. Compare the ratios between the corresponding parts of the cylinders.



$$\frac{\text{radius of larger cylinder}}{\text{radius of smaller cylinder}} = \frac{13}{6.5} = 2$$

$$\frac{\text{height of larger cylinder}}{\text{height of smaller cylinder}} = \frac{32.5}{16} = \frac{65}{32} \neq 2$$

Not congruent
Not similar

SPORTS The balls used in golf and tennis are spheres that are required to have standard measurements. A golf ball is not to be less than 1.6 inches in diameter. A tennis ball is not to exceed 2.4 inches in diameter. Consider a golf ball with a diameter of 1.6 inches and a tennis ball with a diameter of 2.4 inches.

a. Find the scale factor of the two spheres.

$$\frac{1.6 \times 10}{2.4 \times 10} = \frac{16}{24} = \frac{2}{3} \quad 2:3$$

b. Find the ratio of the surface areas of the two balls.

$$2^2 : 3^2$$

$$4 : 9$$

c. Find the ratio of the volumes of the two spheres.

$$2^3 : 3^3$$

$$8 : 27$$