

**DO NOW**

A company is creating an object from a wooden cube with an edge length of 8.5 cm. A right circular cone with a diameter of 8 cm and an altitude of 8 cm will be cut out of the cube. Which expression represents the volume of the remaining wood?

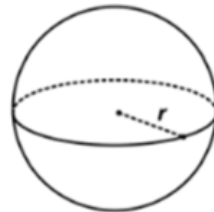
- 1)  $(8.5)^3 - \pi(8)^2(8)$       3)  $(8.5)^3 - \frac{1}{3}\pi(8)^2(8)$   
 2)  $(8.5)^3 - \pi(4)^2(8)$       4)  $(8.5)^3 - \frac{1}{3}\pi(4)^2(8)$

$$(8.5)(8.5)(8.5)$$

$$(8.5)^3 - \frac{1}{3}\pi(4)^2(8)$$

**Volume of a Sphere**

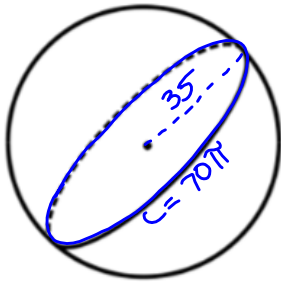
$$V = \frac{4}{3}\pi r^3$$



- All cross sections of a sphere are circles. (All circles are **similar** to one another.)
- A **great circle** is the largest circle that can be drawn on a sphere. It is a cross-section that goes through the center of the sphere (the diameter)
- A **hemisphere** is the half sphere

A sphere has a great circle whose circumference is  $70\pi$  cm. Find the volume of the sphere ~~in terms of  $\pi$~~

to the nearest cubic cm



$$C = 70\pi = \pi d$$

$$70 = d$$

$$35 = r$$

$$V = \frac{4}{3} \pi r^3$$

$$V = \frac{4}{3} \pi (35)^3$$

$$V = 179,594.38$$

$$\boxed{179,594}$$

A grain silo that stores corn is shaped like a cylinder along with a hemisphere of the same radius on top of the cylinder as shown.

(a) Determine the volume of the silo to the nearest cubic foot.

Cylinder

$$V = \pi r^2 h$$

$$V = \pi (5)^2 (15) = 1,178.097\dots$$

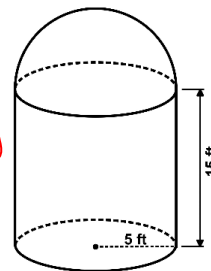
Hemisphere

$$V = \frac{1}{2} \left( \frac{4}{3} \pi r^3 \right)$$

$$V = \frac{1}{2} \left( \frac{4}{3} \pi (5)^3 \right) = 261.799\dots$$

$$\text{Silo Volume} = 1,439.89\dots$$

$$\boxed{1,440 \text{ ft}^3}$$



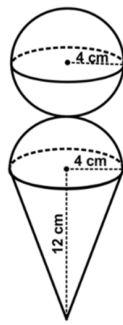
(b) Corn can pack at a density of 16 pounds per cubic foot. How many tons of corn can the silo hold if there are 2,000 pounds per ton? Round to the nearest tenth of a ton.

$$\frac{1,440 \text{ ft}^3}{1} \cdot \frac{16 \text{ pound}}{1 \text{ ft}^3} = 23,040 \text{ pounds}$$

$$\frac{23,040 \text{ pounds}}{1} \cdot \frac{1 \text{ tons}}{2000 \text{ pounds}} = 11.52 \text{ tons}$$

$$\boxed{11.5 \text{ tons}}$$

Niko got the jumbo ice cream cone at the Dutchess County Fair. The amount of ice cream can be modeled using a cone whose height is 12 centimeters and radius of 4 centimeters. Ice cream in the shape of a hemisphere and a full sphere of the same radius were loaded on top of the cone as shown. If there are 237 cubic centimeters in a cup and 320 calories per cup of ice cream, how many calories is this treat if the cookie cone itself has 85 calories?



Sphere  
 $V = \frac{4}{3}\pi r^3$   
 $V = \frac{4}{3}\pi(4)^3$

Hemisphere  
 $V = \frac{1}{2}(\frac{4}{3}\pi r^3)$   
 $V = \frac{1}{2}(\frac{4}{3}\pi(4)^3)$

Cone  
 $V = \frac{1}{3}\pi r^2 h$   
 $V = \frac{1}{3}\pi(4)^2(12)$

$V = 603.1857... \text{ cm}^3$

$\frac{603.18... \text{ cm}^3}{1} \cdot \frac{1 \text{ cup}}{237 \text{ cm}^3} = 2.545$   
 cups

$\frac{2.545 \text{ cups}}{1} \cdot \frac{320 \text{ cal}}{1 \text{ cup}} = 814.42$   
 calories

899 calories