

Name: _____

Date: _____

SPHERES

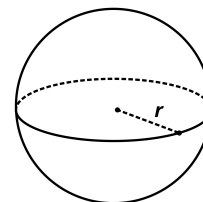
COMMON CORE GEOMETRY



The last solid we will examine will be the sphere. Recall that a sphere is defined as all points equidistant from a fixed point in three-dimensional space. The volume contained within a sphere is dependent only on that fixed distance and is a formula that needs calculus to truly appreciate. In this lesson we will only use the formula.

VOLUME OF A SPHERE

A sphere with a radius of r has a volume given by: $V = \frac{4}{3}\pi r^3$



Exercise #1: Find the volume of a sphere whose radius is 6 inches in:

(a) terms of pi

(b) rounded to the nearest cubic inch

Recall that all cross sections of spheres are circular. The largest of these is known as a **great circle** and is caused by the intersection of a plane that passes through the sphere's center.

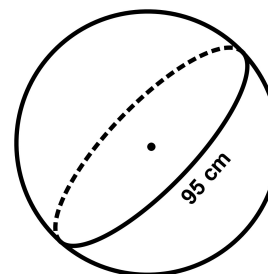
Exercise #2: A sphere has a great circle whose circumference is 95 centimeters. Which of the following is closest to the volume of the sphere, in cubic centimeters?

(1) 4,600

(3) 12,700

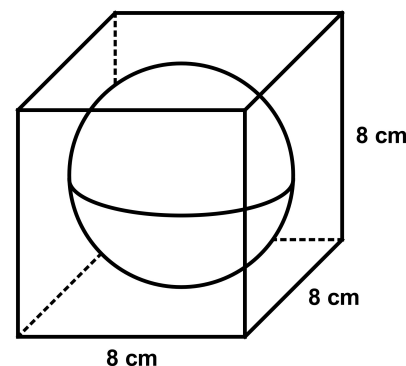
(2) 7,500

(4) 14,500



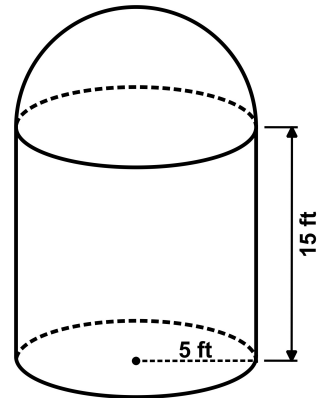
We can use the volume formula of a sphere in combination with a variety of other volume formulas to solve problems similar to the ones in the last two lessons.

Exercise #3: The largest sphere possible is placed in a cube that has side lengths that measure 8 centimeters each. What percent of the cube's volume does the sphere occupy? Round to the nearest percent.



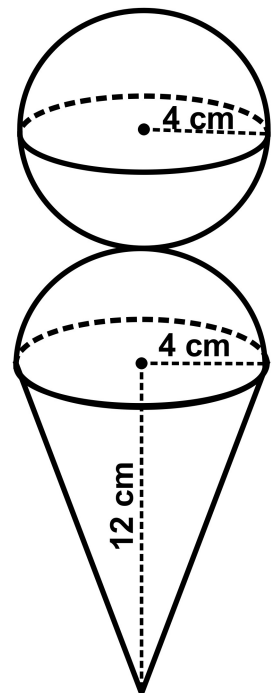
Exercise #4: A grain silo that stores corn can pack at a density of 16 pounds per cubic foot. The silo is shaped like a cylinder along with a hemisphere of the same radius on top of the cylinder as shown.

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



(b) 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.

Exercise #5: 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?



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COMMON CORE GEOMETRY HOMEWORK

PROBLEM SOLVING

1. A basketball has a diameter of 9.4 inches. Which of the following would be closest to the volume of the basketball?

(1) 298 in^3

(3) $1,107 \text{ in}^3$

(2) 435 in^3

(4) $3,479 \text{ in}^3$

2. Which of the following is the volume of the largest sphere that can fit inside of a cube whose volume is 1000 cubic inches?

(1) $\frac{500\pi}{3} \text{ in}^3$

(3) $\frac{4000\pi}{3} \text{ in}^3$

(2) $325\pi \text{ in}^3$

(4) $1000\pi \text{ in}^3$

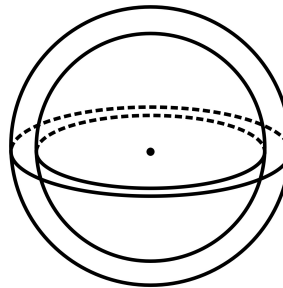
3. An hollow metallic ball is created that has an outer diameter of 10 centimeters and a thickness of 1 centimeter in all directions. Which of the following expressions could be used to calculate the volume of metal used in units of cubic centimeters?

(1) $4\pi(10^3 - 8^3)$

(2) $\frac{4}{3}\pi(10^3 - 8^3)$

(3) $4\pi(5^3 - 4^3)$

(4) $\frac{4}{3}\pi(5^3 - 4^3)$



4. A spherical baseball has a radius of 1.47 inches and weighs 11 grams per cubic inch. Which of the following is closest to the weight of the entire baseball?

(1) 128 grams

(3) 146 grams

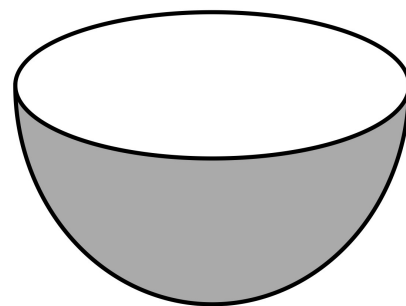
(2) 135 grams

(4) 158 grams



5. A punch bowl is in the shape of a hemisphere. The top rim has a circumference of 116 cm.

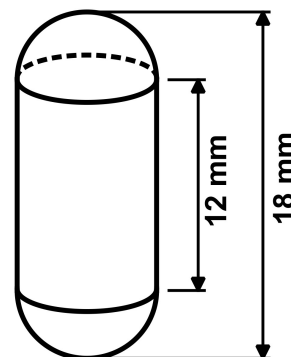
(a) Determine the volume of the punch bowl to the nearest cubic centimeter.



(b) If there are 1000 cubic centimeters in a liter and 3.785 liters in a gallon, determine, to the nearest tenth of a gallon, how much punch can fit in the bowl.

6. A pill has the shape of a cylinder with a hemisphere at each end. The height of the cylindrical portion is 12 mm and the overall height is 18 mm.

(a) Find the volume of the pill in cubic millimeters. Round to the nearest cubic millimeter.



(b) If the pill is to contain 1,000 milligrams of vitamin C, then how much vitamin C does the pill contain per cubic millimeter? Round to the nearest tenth of a cubic millimeter.

(c) Another pill that is entirely spherical has a diameter of 10 millimeters and contains 1.5 milligrams of vitamin C per cubic millimeter. How much less vitamin C does this second pill contain, rounded to the nearest milligram, than the one pictured?

