

Volume of Spheres

Definition

Sphere – the set of all points in space that are the same distances from a center point.

FORMULA:

$$V_{\text{sphere}} = \frac{4}{3} \pi r^3$$

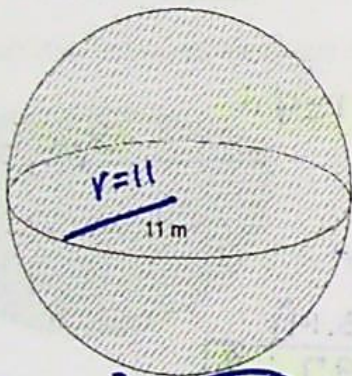
$$\frac{4\pi r^3}{3}$$

Part A)

For Examples 1 and 2, find the volume of each sphere.

Use 3.14 for π

Example 1:



$$\frac{4\pi(11)^3}{3} = \frac{4\pi(1331)}{3} = \frac{5324\pi}{3}$$

In terms of π
Volume = $1774.\bar{6}\pi\text{ m}^3$

$$1774.\bar{6}(3.14)$$

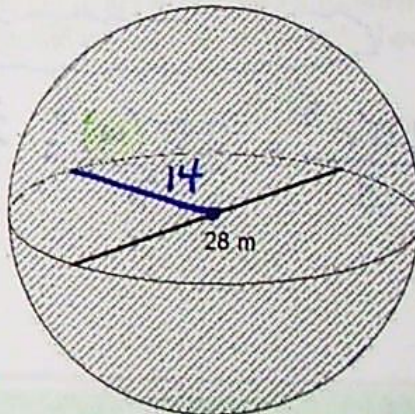
Find the volume to the nearest tenth.

Volume $\approx 5572.5\text{ m}^3$

Example 2: (Hint: What's the radius?)

$$r = 14$$

$$\frac{4\pi(14)^3}{3} = \frac{4\pi(2744)}{3} = \frac{10976\pi}{3}$$



In terms of π
Volume = $3658.\bar{6}\pi\text{ m}^3$

$$3658.\bar{6}(3.14)$$

Find the volume to the nearest tenth.

Volume $\approx 11,488.2\text{ m}^3$

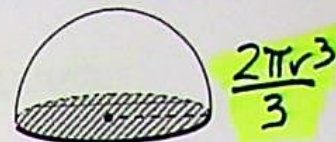
Part B) HEMISPHERES

Definition
HEMISPHERE - a circular cross section that separates a sphere into two congruent halves.

$$\frac{1}{2} \cdot \frac{4\pi r^3}{3} = \frac{2\pi r^3}{3}$$

half of sphere

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



Example 1:
 Find the volume of the hemisphere with a diameter of 15 km. (Round to the nearest tenth.)

$$V = \frac{2\pi r^3}{3} = \frac{2\pi (7.5)^3}{3}$$

$$r = 7.5$$

$$\frac{2\pi (421.875)}{3}$$

$$\frac{2\pi (140.625)}{3}$$

$$281.25\pi$$

$$281.25(3.14)$$

$$883.1 \text{ km}^3$$

Example 2:

The inside of a cereal bowl is in the shape of a hemisphere. Find the maximum amount of milk that can fit in the bowl. (Round to the nearest hundredth.)

$$V = \frac{2\pi r^3}{3} = \frac{2\pi (4)^3}{3} = \frac{2\pi (64)}{3} = \frac{128\pi}{3}$$

$$r = 4 \text{ in}$$

$$42.6\pi$$

$$42.6(3.14)$$

$$133.97 \text{ in}^3$$

Part C) DETERMINING MISSING LENGTHS

Example 1:

The volume of a golf ball is about $13.2\pi \text{ cm}^3$. What is the radius of the golf ball to the nearest tenth?



$$\frac{4\pi r^3}{3} = 13.2\pi$$

$$4\pi r^3 = 39.6\pi$$

$$r^3 = \frac{39.6}{4}$$

$$r^3 = 9.9$$

$$r \approx 2.1 \text{ cm}$$

Example 2:

The volume of a baseball is about 13.39 cubic inches. What is the diameter of the baseball to the nearest tenth?



$$\frac{4\pi r^3}{3} = 13.39$$

$$4\pi r^3 = 40.17$$

$$4(3.14)r^3 = 40.17$$

$$12.56r^3 = 40.17$$

$$\frac{12.56r^3}{12.56} = \frac{40.17}{12.56}$$

$$r^3 = 3.2$$

$$r \approx 1.5$$

$D = 3 \text{ in}$