

Geometry

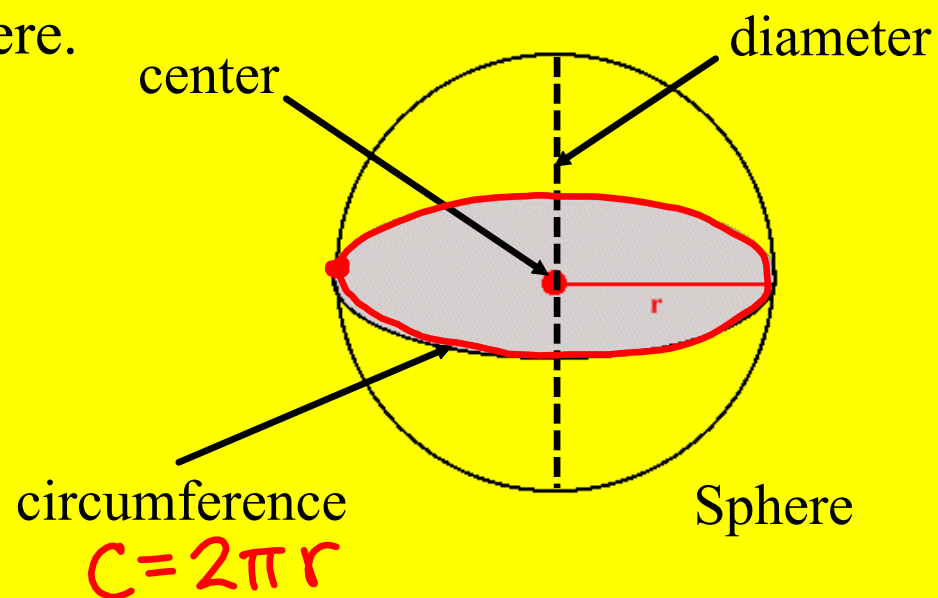
Ch. 11 Handout 11.6

Surface Area and Volumes of Spheres

A **sphere** is the set of all points in space equidistant from a given point called the **center**.

A **radius** is a segment that has one endpoint at the center and the other endpoint on the sphere.

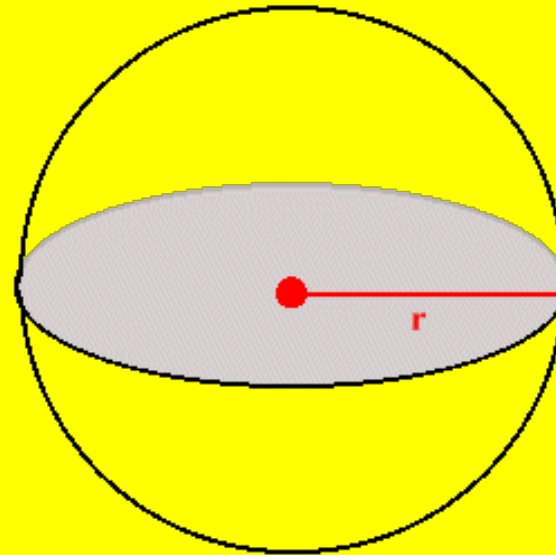
A **diameter** is a segment passing through the center with endpoints on the sphere.



Surface Area of a Sphere

The surface area of a sphere is four times the product of π and the square of the radius of the sphere.

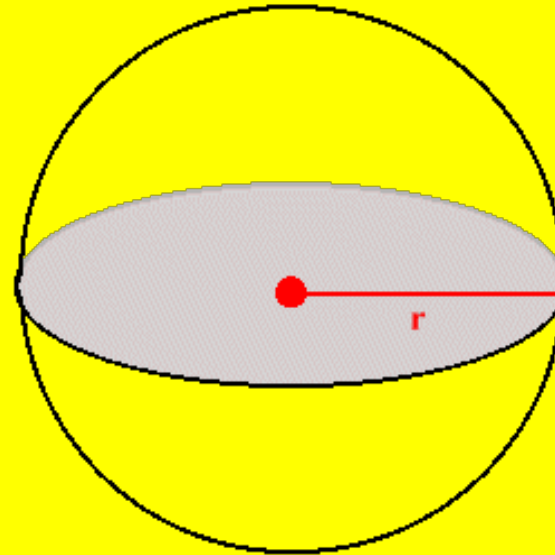
$$SA = 4 \pi r^2$$



Volume of a Sphere

The volume of a sphere is four thirds the product π and the cube of the radius of the sphere.

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



1. The circumference of a rubber ball is 13 cm.
Calculate its surface area and volume to the nearest whole number.

$$r = \frac{13}{2\pi}$$

$$C = 13 \text{ cm}$$

$$C = 2\pi r$$

$$\frac{13}{2\pi} = \frac{2\pi r}{2\pi}$$

$$\frac{13}{2\pi} = r$$

$$SA = 4\pi r^2$$

$$SA = 4\pi \left(\frac{13}{2\pi}\right)^2$$

$$= \cancel{4\pi} \left(\frac{169}{\cancel{4\pi^2}}\right)$$

$$SA = \frac{169}{\pi} \approx 54 \text{ cm}^2$$

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

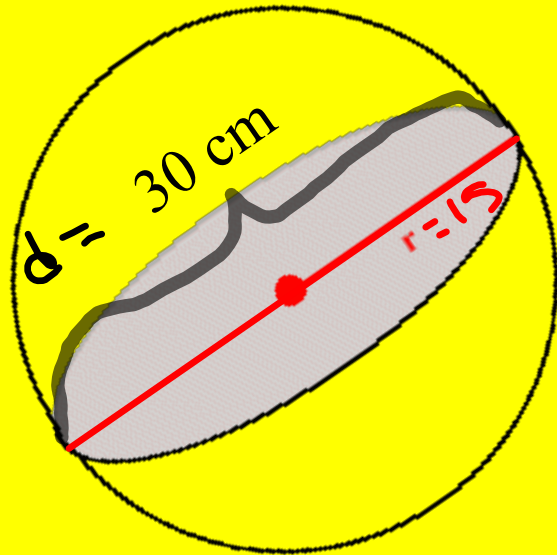
$$= \frac{4}{3}\pi \left(\frac{13}{2\pi}\right)^3$$

$$= \frac{4}{3}\pi \left(\frac{2197}{\cancel{8\pi^3}}\right)$$

$$V = \frac{2197}{6\pi^2} \text{ cm}^3$$

$$V \approx 37 \text{ cm}^3$$

2. Find the surface area and volume of the sphere.
Leave your answer in terms of π .



$$r = 15$$

$$\begin{aligned} SA &= 4\pi r^2 \\ &= 4\pi(15)^2 \\ &= 4\pi(225) \end{aligned}$$

$$SA = 900\pi \text{ cm}^2$$

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

$$V = \frac{4}{3}\pi(15)^3$$

$$V = \frac{4}{3}\pi(3375)$$

$$V = 4500\pi \text{ cm}^3$$

3. Find the surface area of a sphere with $d = 14$ in. Give your answer in two ways, in terms of π and rounded to the nearest square inch.

$$r = 7$$

$$\begin{aligned} SA &= 4\pi r^2 \\ &= 4\pi(7^2) \end{aligned}$$

$$SA = 196\pi \text{ in}^2$$

$$SA \approx 616 \text{ in}^2$$

$$\begin{aligned} V &= \frac{4}{3}\pi r^3 \\ &= \frac{4}{3}\pi(7)^3 \end{aligned}$$

$$= \frac{4}{3}\pi(343)$$

$$V = \frac{1372\pi}{3} \text{ in}^3 \approx 1437 \text{ in}^3$$

4. The volume of a sphere is 1 in^3 . Find its surface area to the nearest tenth.

$$\begin{aligned}
 V &= 1 \text{ in}^3 \\
 V &= \frac{4}{3} \pi r^3 \\
 3 \cdot 1 &= 3 \cdot \frac{4}{3} \pi r^3 \\
 \frac{3}{4\pi} &= \frac{\cancel{4\pi} r^3}{\cancel{4\pi}} \\
 \sqrt[3]{\frac{3}{4\pi}} &= \sqrt[3]{r^3}
 \end{aligned}$$

$$\begin{aligned}
 r &= \sqrt[3]{\frac{3}{4\pi}} \\
 SA &= 4\pi r^2 \\
 SA &= 4\pi \left(\sqrt[3]{\frac{3}{4\pi}} \right)^2 \\
 SA &\approx 4.8 \text{ in}^2
 \end{aligned}$$

5. Find the surface area of a spherical melon with circumference 18 in. round your answer to the nearest ten square inches.

$$\begin{aligned}C &= 18 \\ \frac{18}{\cancel{2\pi}} &= \frac{\cancel{2\pi}r}{\cancel{2\pi}} \\ r &= \frac{9}{\pi}\end{aligned}$$

$$\begin{aligned}SA &= 4\pi r^2 \\ &= 4\pi \left(\frac{9}{\pi}\right)^2 \\ &= \cancel{4\pi} \cdot \frac{81}{\cancel{\pi^2}} \pi \\ SA &= \frac{324}{\pi} \text{ in}^2\end{aligned}$$

6. The volume of a sphere is 4200 ft^3 . Find the surface area to the nearest tenth.

Assignment:

pgs 641-643 1-9,11-20,23,24,30,32,40,41