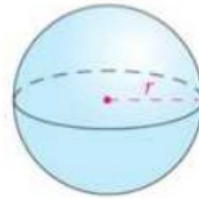


## 12.6 Surface Area and Volume of Spheres

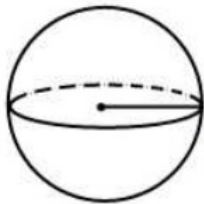
$$SA = 4\pi r^2$$

$r$ : radius



**Examples:** Find the surface area of the following spheres. Leave answers in terms of  $\pi$ .

1)



$r = 3 \text{ cm}$

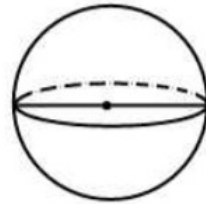
$$SA = 4\pi r^2$$

$$SA = 4\pi(3)^2$$

$$SA = 36\pi \text{ cm}^2$$

SA = \_\_\_\_\_

2)



$d = 10 \text{ ft}$

$$r = 5$$

$$SA = 4\pi(5)^2$$

SA =  $100\pi \text{ ft}^2$

**Examples:** Find the surface area of the following hemispheres. Leave answers in terms of  $\pi$ .

3)



$r = 8 \text{ in}$

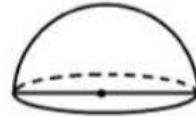
$$SA = \frac{4\pi r^2}{2}$$

$$SA = \frac{4\pi(8)^2}{2}$$

$$SA = 128\pi \text{ in}^2$$

SA = \_\_\_\_\_

4)



$d = 20 \text{ mm}$

$$r = 10$$

$$SA = \frac{4\pi(r)^2}{2}$$

$$SA = \frac{4\pi(10)^2}{2}$$

SA =  $200\pi \text{ mm}^2$

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

$r$ : radius

**Examples:** Find the volume of the following spheres. Leave answers in terms of  $\pi$ .

1)



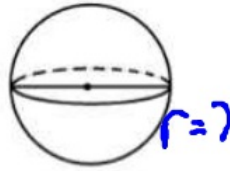
$r = 4$  cm

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

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

$$V = \frac{256\pi}{3} \text{ cm}^3$$

2)



$d = 14$  ft

$$V = \frac{4}{3}\pi(7)^3$$

$$V = \frac{1372\pi}{3} \text{ ft}^3$$

3)



$r = 5$  in

$$V = \frac{4}{3}\pi(5)^3 = \frac{500\pi}{3}$$

$$V = \frac{250\pi}{3} \text{ in}^3$$

**Example:** The circumference of a sphere is 14 cm. Calculate its **surface area** to the nearest whole number.

$$\frac{2\pi r}{2\pi} = \frac{14}{2\pi}$$

$$r = 2.23$$

$$S.A = 4\pi r^2$$

$$S.A = 4\pi(2.23)^2$$

$$S.A = 62 \text{ cm}^2$$

**Example:** The volume of a sphere is 5000 m<sup>3</sup>. What is the **surface area** of the sphere to the nearest whole number?

$$3 \cdot 5000 = \frac{4}{3}\pi r^3$$

$$\frac{15,000}{\frac{4\pi}{3}} = \frac{4\pi}{3} r^3$$

$$\sqrt[3]{1193.66} = r^3 \quad r \approx 10.6$$

$$S.A = 4\pi r^2$$

$$S.A = 4\pi(10.6)^2$$

$$S.A = 1412 \text{ m}^2$$

**Example:** The surface area of a sphere is 144 $\pi$  cm<sup>2</sup>. What is the **volume** of the sphere in terms of  $\pi$ ?

$$S.A = 4\pi r^2$$

$$\frac{144\pi}{4\pi} = \frac{4\pi r^2}{4\pi}$$

$$\sqrt{36} = \sqrt{r^2} \quad 6 = r$$

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

$$V = \frac{4}{3}\pi(6)^3$$

$$V = 288\pi \text{ cm}^3$$