Notes: Spheres

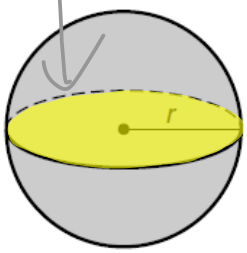
Sphere: is a set of all points equidistant from a fixed point called the center.

Radius of a sphere is the length of the line segment from the center of the sphere to any point on the sphere.

A circle is a set of all points in a plane **equidistant** from a fixed point in the plane called the **center**.

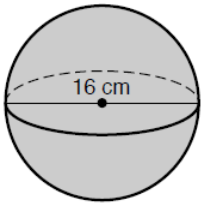
A **hemisphere** is half of a sphere.

Great Circle of a sphere: the intersection of a sphere and a plane through the center of the sphere, divides a sphere into two hemispheres.

Volume and Surface Area of a Sphere		
Volume	The volume of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.	
Surface Area	The surface area of a sphere with radius r is $S = 4\pi r^2$.	

Find each measurement. Give your answer in terms of π.

1. **Surface Area:** 256π cm²



$d = 16$

$r = 8$

$S = 4\pi r^2$

$= 4\pi 8^2$

$= 256\pi$ cm²

Volume: _____

$V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi 8^3$

calculator: $4 \div 3 * 8 \wedge 3 = 682.\overline{6}$ math Enter Enter $\frac{2048}{3}$

$= \frac{2048}{3}\pi \approx 682.\overline{6}\pi$

2. **the radius of a sphere with volume 7776π in³**

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

$7776\pi = \frac{4}{3}\pi r^3$

$\left(\frac{3}{4}\right)7776\pi = \frac{4}{3}\pi r^3\left(\frac{3}{4}\right)$

$5832 = r^3$

$r = \sqrt[3]{5832} = 18$

3. **Find the volume of a sphere with surface area 324π in².**

$S = 4\pi r^2$

$324\pi = 4\pi r^2$

$\frac{324\pi}{4\pi} = \frac{4\pi r^2}{4\pi}$

$r^2 = 81$

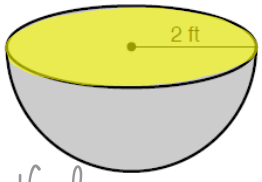
$r = \sqrt{81} = 9$

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

$V = \frac{4}{3}\pi 9^3$

$= 972\pi$ in³

4. **Volume:** _____



☆ half of a sphere

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

$V_{hemisphere} = \frac{\frac{4}{3}\pi r^3}{2}$

$= \frac{\frac{4}{3}\pi 2^3}{2}$

$= \frac{16}{3}\pi$ ft³ $\approx 5.3\pi$ ft³

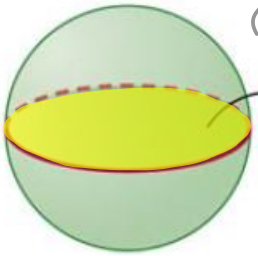
Surface Area: _____

$S_{\text{hemisphere without base}} = \frac{4\pi r^2}{2} = \frac{4\pi 2^2}{2} = 8\pi$

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

$S_{\text{total with base}} = 8\pi + 4\pi = 12\pi$ ft²

5. **Find the surface area of a sphere with a great circle that has an area of 49π mi².**



$A = \pi r^2$

$49\pi = \pi r^2$

$49 = r^2$

$r = \sqrt{49}$

$r = 7$

$S = 4\pi r^2$

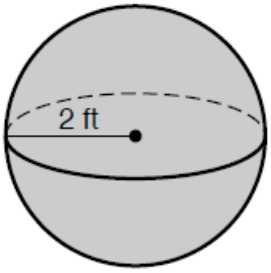
$= 4\pi 7^2$

$= 196\pi \text{ mi}^2$

Describe the effect of each change on the given measurement of the figure.

If: The radius is multiplied by 4.

6. **Surface Area:** _____ **Volume:** _____

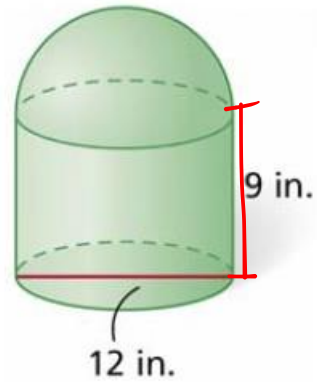


7. **Find the surface area and volume of the composite figure.**

$d = 12$

$r = 6$

$h = 9$



Surface Area

$S_{\text{hemisphere}} = \frac{4\pi r^2}{2}$

$= \frac{4\pi 6^2}{2} = 72\pi$

$LA_{\text{cylinder}} = 2\pi rh$

$= 2\pi(6)(9) = 108\pi$

$B = \pi r^2$

$= \pi 6^2 = 36\pi$

$S_{\text{Total}} = 72\pi + 108\pi + 36\pi$

$= 216\pi \text{ in}^2$

Volume

$V_{\text{hemisphere}} = \frac{\frac{4}{3}\pi r^3}{2}$

$= \frac{\frac{4}{3}\pi 6^3}{2} = \frac{288\pi}{2} = 144\pi$

$V_{\text{cylinder}} = Bh = \pi r^2 h$

$= \pi 6^2(9) = 324\pi$

$V_{\text{Total}} = 144\pi + 324\pi$

$= 468\pi \text{ in}^3$