12.6 Volume of a

Surface Area of a Sphere: $4\pi r^2$ **Volume of a Sphere** $\frac{4\pi r^3}{3}$

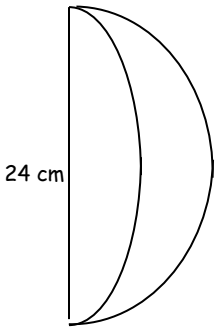
1. Find the volume of a sphere whose radius is 5 cm. $V = \frac{4\pi(5)^3}{3} = \frac{500\pi}{3}\ cm^3$

2. Find the volume of the quarter sphere.

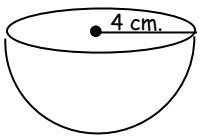
$V = \frac{4\pi(12)^3}{3}$

$= 2304\pi/4$

$= 576\pi$



3. Find the volume and surface area of the hemisphere below.



$\frac{1}{2} \cdot \frac{4\pi(4)^3}{3}$

$V = \frac{128\pi}{3}\ cm^3$

$S.A. = \frac{4\pi(4)^2}{2} + 16\pi = 32\pi + 16\pi$

$= 48\pi\ cm^2$

4. If the surface area of a sphere is 256π in^2, find the radius and the volume of the sphere.

$SA = 4\pi r^2$

$256\pi = 4\pi r^2$

$64 = r^2$

$8 = r$

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

$= \frac{2048\pi\ in^3}{3}$

5. If the volume of a sphere is 972π cm^3, find the radius and the surface area of the sphere.

$972\pi = \frac{4\pi r^3}{3}$

$2916\pi = 4\pi r^3$

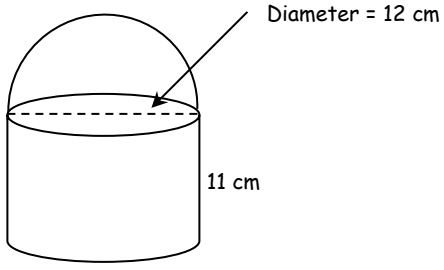
$r^3 = 729$

$r = 9$

$S.A. = 4\pi(9)^2$

$= 324\pi$

6. Find the surface area and volume of the solid at the right.

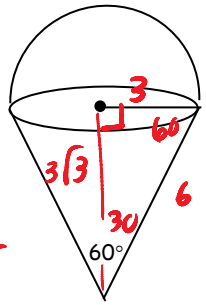


$V_{cyl} = 36\pi \cdot 11 = 396\pi$

$V_{hem} = \frac{1}{2}\left(\frac{4\pi(6)^3}{3}\right) = 144\pi$

$V_{total} = 540\pi\ cm^3$

7. If the great circle of the hemisphere has a circumference of 6π in, find the surface area and volume of the solid at the right.



$V_{cone} = \frac{9\pi \cdot 3\sqrt{3}}{3} = 9\sqrt{3}$

$V_{hem} = \frac{1}{2}\left(\frac{4\pi(3)^3}{3}\right) = 18\pi$

$V_{total} = 18\pi + 9\sqrt{3}$

$SA_{cone} = \pi(3)(6) = 18\pi$

$S.A_{hem} = \frac{1}{2}(4\pi(3)^2) = 18\pi$

$T.S.A. = 36\pi \text{ in}^2$

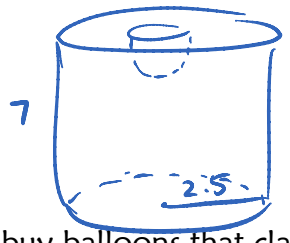
8. In your chemistry lab, you use test tubes that are in the shape of a cylinder with a hemisphere bottom. The radius of the hemisphere is 2 and the height of the entire test tube is 15. What volume would this test tube hold?

$V_{cyl} = 4\pi \cdot 13 = 52\pi$

$V_{hem} = \frac{1}{2}\left(\frac{4\pi(2)^3}{3}\right) = \frac{16\pi}{3}$

$V_{total} = 52\pi + \frac{16\pi}{3}$

9. A container of ice cream is in the shape of a cylinder with a diameter of 5 inches and a height of 7inches. You take out a hemisphere scoop of ice cream 1.2 inches deep. What volume of ice cream is left?



$A_{Base} = (2.5)^2\pi = 6.25\pi$

$V_{cont} = 6.25\pi \cdot 7 = 43.75\pi$

$V_{scoop} = \frac{1}{2}\left(\frac{4\pi(1.2)^3}{3}\right) = 1.152\pi$

What's left?

$43.75\pi - 1.152\pi$

$= 42.598\pi$

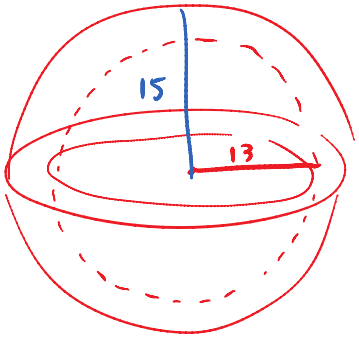
10. You buy balloons that claim to hold 250 cubic liters of air. What would the radius of these spherical shaped balloons be? (Round to the nearest hundredth).

$250 = \frac{4\pi r^3}{3}$

$\frac{750}{4\pi} = \frac{4\pi r^3}{4\pi}$

$r \approx 8.4$

11. A large child's ball is made with a sphere of rubber. The outer diameter of the ball is 30 in and the inner diameter is 26in. How much material is needed to make this?



$V_{Big} = \frac{4\pi(15)^3}{3} = 4500\pi$

$V_{sm} = \frac{4\pi(13)^3}{3} = \frac{8788\pi}{3}$

$Vol = 4500\pi - \frac{8788\pi}{3}$

≈ 4934.39