# 12-6 Surface Area & Volume of Spheres

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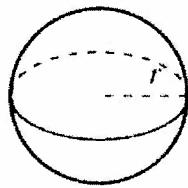
$$V = \frac{4}{3}\pi r^3$$

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

Find the Surface Area & Volume of each sphere.

1.

6.5 cm
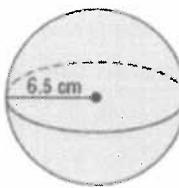
S.A. = $4\pi(6.5)^2$ 530.9 cm²

V = $\frac{4}{3}\pi(6.5)^3$ 1150.3 cm³

2.

89 ft
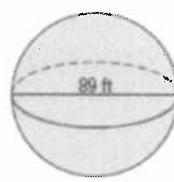
S.A. = $4\pi(44.5)^2$ 24,884.6 ft²

V = $\frac{4}{3}\pi(44.5)^3$ 369,120.9 ft³

3. Find the Surface Area & Volume of the hemisphere.

6 in.

$SA = \frac{4\pi(6)^2}{2}$ = 226.2 in²
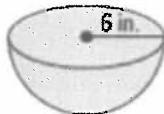
$V = \frac{4}{3}\pi(6)^3 \over 2$ = 452.4 in³

4. Find the radius of a sphere if the surface area of a hemisphere is 92π cm².

$$\frac{4\pi r^2}{2} = 92\pi$$

$$\frac{2\pi r^2}{2\pi} = \frac{92\pi}{2\pi}$$

$$r^2 = 46$$

$$r = \sqrt{46}$$

$$r \approx 6.8 \text{ cm}$$

5. The sphere is tangent to the sides of the cube. Find the empty space not taken up by the sphere.

8 in
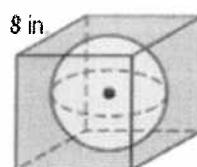
BOX — SPHERE

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

$512 - 268.1$

243.9 in³

6. Find the volume of the shape below.

5 in.   13 in.
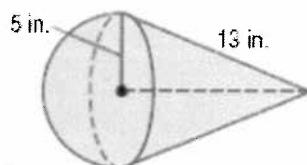
HEMI○ + CONE

$\frac{\frac{4}{3}\pi(5)^3}{2} + \frac{1}{3}\pi(5)^2(12)$

$261.8 + 314.2$

576.0 in³

12-8 Congruent & Similar Solids

If two similar solids have a scale factor of a : b or $\frac{a}{b}$, then the following will always be true:

- The ratio of their perimeters or any part(s) of the solid will be = a : b or $\frac{a}{b}$

- The ratio of their surface areas will be: a^2 : b^2 or $\frac{a^2}{b^2}$

- The ratio of their volumes will be: a^3 : b^3 or $\frac{a^3}{b^3}$

1-4: For each pair of similar figures below, do the following:

A. Find the scale factor   **B. Find the ratio of their surface areas**   **C. Find the ratio of their volumes**

1.
A. $1:2$
B. $1:4$ $(1^2:2^2)$
C. $1:8$ $(1^3:2^3)$

SF: $\frac{2}{4} = \frac{3}{6} = \frac{5}{10} = \frac{1}{2}$

3 cm, 2 cm, 5 cm (smaller box); 4 cm, 6 cm, 10 cm (larger box)
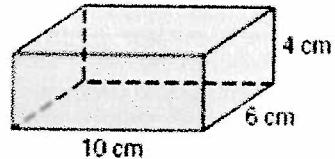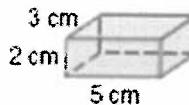
2.
A. $3:4$
B. $9:16$ $(3^2:4^2)$
C. $27:64$ $(3^3:4^3)$

3 ft, 4 ft
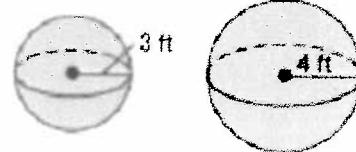
3.
A. $2:1$
B. $4:1$ $(2^2:1^2)$
C. $8:1$ $(2^3:1^3)$

SF: $8:4 = 2:1$

16 yd, 4 yd
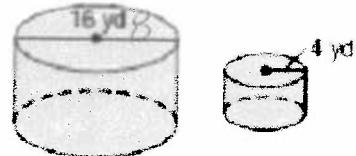
4. SOL Question: The radius of Sphere A is 2 inches and the radius of Sphere B is 4 inches. How many times larger is the volume of Sphere B compared to the volume of Sphere A?

A. 2
B. 3
C. 4
(D.) 8   8x bigger!
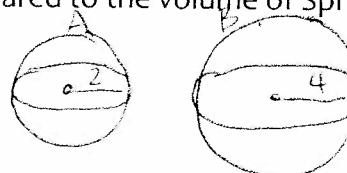
SF = $2:4 = 1:2$
Vol = $1^3 : 2^3$
= $1:8$

5. If the 2 right cylinders shown are similar and the volume of the larger cylinder is 4608 π ft³, find the height of the larger cylinder

$\left(\frac{24}{H}\right)^3 = \frac{1944\pi}{4608\pi}$

$\frac{13824}{H^3} = \frac{1944}{4608} \Rightarrow 1944H^3 = 63700992$

$H^3 = 32768$

$H = \sqrt[3]{32768}$

$V = \pi(9^2)(24)$
$1944\pi \rightarrow$

$V = 4608\pi$

$H = 32$ ft.