$$
\begin{aligned}
& S=4 \pi r^{2} \\
& V=\frac{4}{3} \pi r^{3}
\end{aligned}
$$

Find the surface area and volume of the spheres. Leave all answers in terms of $\pi$.
1.


Surface Area: $S=4 \cdot \pi \cdot$

$$
=4 \cdot \ldots \pi=
$$

$\qquad$ $i n^{2}$

Volume:

$$
\begin{aligned}
V & =\frac{4}{3} \cdot \pi \cdot \sim \mathrm{in}^{3} \\
& =\frac{4}{3} \cdot \square=\square
\end{aligned}
$$

2. 


radius: $r=\overline{2}=\ldots \mathrm{mm}$

Surface Area: $S=4 \cdot \pi \cdot \underbrace{2}$

$$
=4 \bullet
$$

$\qquad$ $\pi=$ $\qquad$ $\mathrm{mm}^{2}$

Volume: $\quad V=\frac{4}{3} \cdot \pi \cdot$ $\qquad$

$$
=\frac{4}{3} .
$$

$\qquad$ $\pi=$ $\qquad$ $\mathrm{mm}^{3}$
3. A sphere with radius of 9 cm . Surface Area: $\qquad$

Volume: $\qquad$
4. What is the volume of a sphere whose surface area is $196 \pi \mathrm{yd}^{2}$ ?

Surface Area and Volume of Hemispheres

$$
\begin{gathered}
S=3 \pi r^{2} \text { (closed) or } S=2 \pi r^{2} \text { (open) } \\
V=\frac{2}{3} \pi r^{3}
\end{gathered}
$$

1. 



Surface Area: $S=3 \cdot \pi \cdot \underbrace{2}$

$$
=3 \cdot \ldots \pi=
$$

$\qquad$ $\mathrm{m}^{2}$

Volume: $\quad V=\frac{2}{3} \cdot \pi \cdot \square^{3}$

$$
=\frac{2}{3}
$$

$\qquad$
$\qquad$ $\mathrm{m}^{3}$
2. (open)

Surface Area: $\qquad$


Volume: $\qquad$
3. A closed hemisphere with radius $\sqrt{3} \mathrm{ft}$. (exact)

Surface Area: $\qquad$

Volume: $\qquad$

## Surface Area and Volume of Composite Figures

Find the total Surface Area and Volume of the following shapes.
1.

2.

3.

5. 12 in
6.


