11.6 Volume of Spheres Notes Name Key

Geometry 3313 Date _____ Period _____

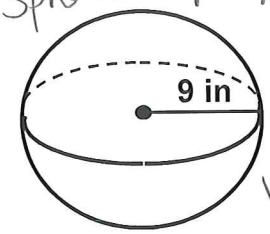
Learning Target:
I can apply the volume formulas for Spheres and Hemispheres to solve problems.

VOLUME OF A SPHERE = $\frac{4}{3}\pi r^3$ **or** $\frac{4\pi r^3}{3}$**, where r is the radius of the sphere**

VOLUME OF A HEMISPHERE = $\frac{2}{3}\pi r^3$ **or** $\frac{2\pi r^3}{3}$**, where r is the radius of the hemisphere**

For each solid, find the exact and estimated volumes. If necessary, round to the nearest tenth.

1. Sphere $r=9$



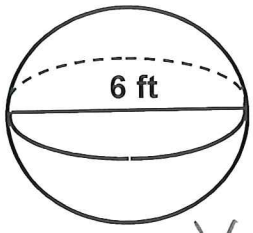
$V=\frac{4\pi(9)^3}{3}$

$V=972\pi\ in^3$

Exact Volume = $972\pi\ in^3$

Estimated Volume = $3053.6 in^3$

2. Sphere $r=3$



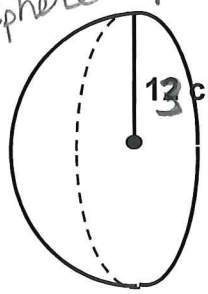
$V=\frac{4\pi(3)^3}{3}$

$V=36\pi\ ft^3$

Exact Volume = $36\pi\ ft^3$

Estimated Volume = $113.1\ ft^3$

3. Hemisphere $r=13$

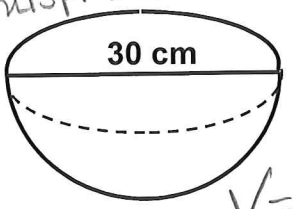


$V=\frac{2\pi(13)^3}{3}$

Exact Volume = $\frac{4394\pi\ cm^3}{3}$

Estimated Volume = $4601.4\ cm^3$

4. Hemisphere $r=15$



$V=\frac{2\pi(15)^3}{3}$

Exact Volume = $2250\pi\ cm^3$

Estimated Volume = $7068.6\ cm^2$

5. A hemisphere has a volume of 4500π mm^3. Find the radius.

$V = \frac{2\pi r^3}{3}$

$(3)\ 4500\pi = \frac{2\pi r^3}{3}(3)$

$\frac{13500}{2} = \frac{2r^3}{2}$

$\sqrt[3]{r^3} = \sqrt[3]{6750}$

$r = 18.9$ mm

6. A regulation size basketball has a volume of 455.9 cubic inches.

a. What is the radius of the basketball?

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

$(3)\ 455.9 = \frac{4\pi r^3}{3}(3)$

$\frac{1367.7}{4\pi} = \frac{4\pi r^3}{4\pi}$

$\sqrt[3]{r^3} = \sqrt[3]{108.8}$

$r = 4.77$ inches

b. If the circumference of a basketball is 28 inches, is it a regulation basketball?

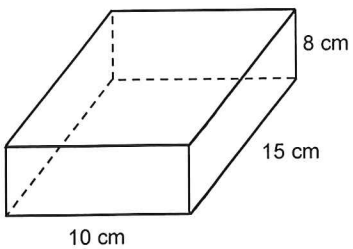
$C = 2\pi r$

$\frac{28}{2\pi} = \frac{2\pi r}{2\pi}$

$r = 4.46$ in

No. It is not a regulation size because $4.46 < 4.77$

7. John had several water balloons that were perfect spheres each with a diameter of 7 cm. If he breaks the water balloons and used them to fill the container below, what is the maximum number of water balloons that he could break without overfilling the container?



$r = 3.5$

$V_{prism} = (10)(15)(8)$

$V = 1200\ cm^3$

$V_{sphere} = \frac{4\pi(3.5)^3}{3} = 179.6\ cm^3$

$\frac{1200}{179.6} = 6.68$

He could break 6 balloons without overfilling