**8.G.9 Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.**

Leonardo is making gift packages. He has a cone shaped package and a cylindrical package. The cone and cylinder have the same radius and height. He wants to use the package with the greatest volume. Which package should Leonardo use?

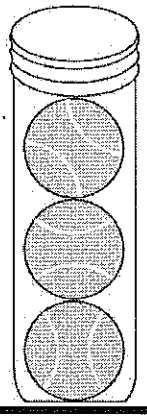
A) the cone
B) the cylinder
C) The cone and cylinder have equal volumes.
D) There is not enough information to tell.

A cylindrical container has a radius of 5 cm. The container is holding $225\pi$ cm$^3$ of water. What is the height of the container?

A) 15 cm
B) 9 cm
C) 22.5 cm
D) 45 cm

$V = \pi \cdot r^2 \cdot h$
$225\pi = \pi \cdot 5^2 \cdot h$
$\frac{225\pi}{\pi \cdot 25} = \frac{\pi \cdot 25 \cdot h}{\pi \cdot 25}$
$9 = h$

The height of this tennis ball can is 26 cm, and its radius is about 4.2 cm.

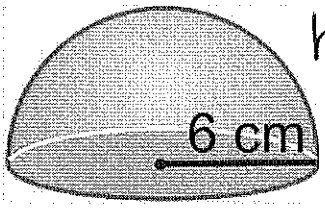


What is the best estimate for the volume of this can?

A) $220\pi$ cm$^3$
B) $110\pi$ cm$^3$
C) $460\pi$ cm$^3$
D) $1400\pi$ cm$^3$

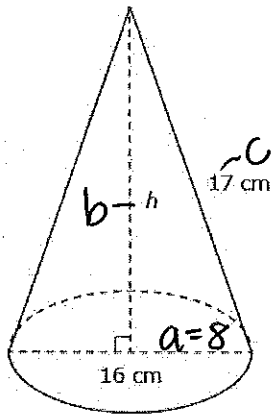
$V = \pi \cdot r^2 \cdot h$
$V = \pi \cdot (4.2)^2 \cdot 26$
$V = \pi \cdot 17.64 \cdot 26$
$V = \pi \cdot 458.64$
$V \approx 460\pi$

What is the volume of the hemisphere below:




A) $12\pi$ cm$^3$
B) $144\pi$ cm$^3$
C) $288\pi$ cm$^3$
D) $864\pi$ cm$^3$

hemisphere = ½ sphere
sphere: $\frac{4}{3}\pi \cdot r^3$
$\frac{4}{3}\pi \cdot 6^3$
$\frac{4}{3} \cdot \pi \cdot \frac{216}{1}$
hemi: $288/2\pi$ ← sphere: $288\pi = 864/3\pi$




**Part A:** What is the height, h, of the cone in centimeters? *Show your thinking.*

$a^2 + b^2 = c^2$
$8^2 + b^2 = 17^2$
$64 + b^2 = 289$
$b^2 = 225$
$b = 15$
height = 15

**Part B:** What is the volume of the cone in terms of pi? *Show your thinking.*

$V = \frac{1}{3}\pi \cdot 8^2 \cdot 15$
$V = \frac{960}{3}\pi = 320\pi$ cm$^3$

**Part C:** Jacob designs a party hat with the same diameter as the cone, but with a height 5 centimeters taller. How does the volume of the cone compare to the volume of the party hat Jacob designs? *Show your thinking.*

$V = \frac{1}{3}\pi \cdot 8^2 \cdot 20$
$V = \frac{1280}{3}\pi$
$V \approx 427\pi$
$427\pi > 320\pi$
(party hat) (cone)