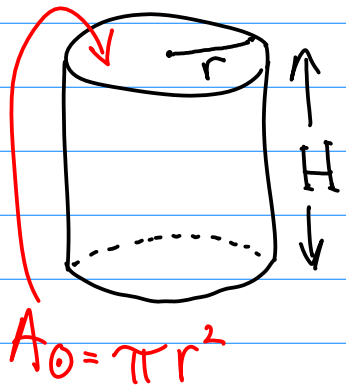
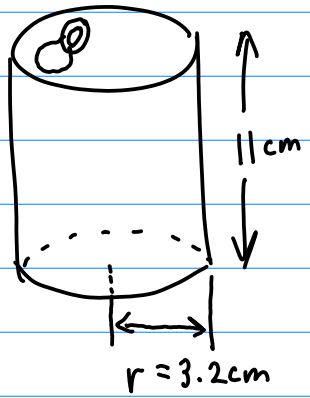
§§ 10.2 – 10.3 : Volume of Cylinders, Cones, Spheres

* Volume of a cylinder: $V_{PRISM} = A_{BASE} \cdot H$

$$\boxed{V_{CYL} = \pi r^2 \cdot H}$$



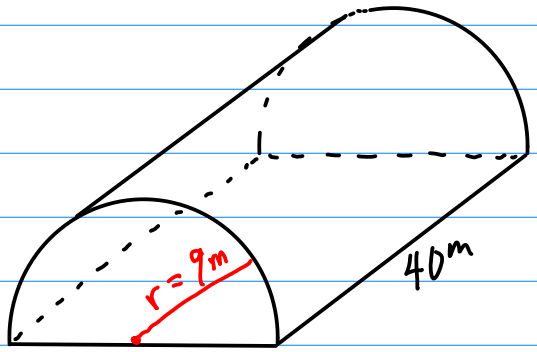
Ex: Coke can: $V = ?$



$$V_{CYL} = \pi r^2 H$$
$$= \pi \cdot (3.2\,cm)^2 \cdot (11\,cm)$$
$$= \pi \cdot 10.24\,cm^2 \cdot 11\,cm$$
$$\approx 3.14 \cdot 10.24\,cm^2 \cdot 11\,cm$$
$$\approx 354\,cm^3 \approx 354\,cc \approx 354\,mL$$

3.2 × 3.2 = 64, 96

Ex:



$V = ?$

bases are semicircular
→ half the volume of a full cylinder

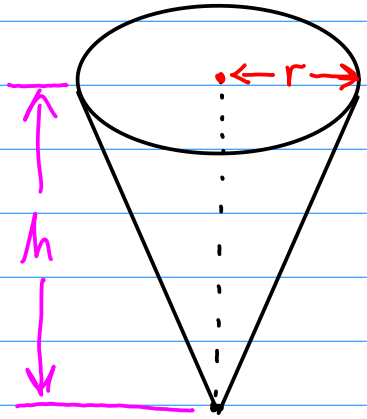
$$V_{CYL} = \pi r^2 H$$
$$= \pi \cdot (9\,m)^2 \cdot (40\,m)$$
$$= \pi \cdot 81\,m^2 \cdot 40\,m$$
$$= 3240\,\pi\,m^3$$
$$\div 2 =$$

$$\boxed{1620\,\pi\,m^3}$$

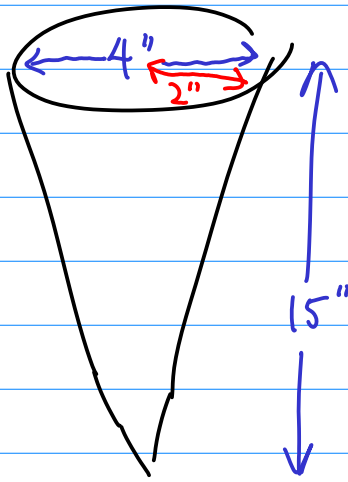
81 × 40 = 3240

* · Volume of a cone:

$$V_{CONE} = \frac{1}{3}\pi r^2 h$$



Ex:



V = ?

$$V_{CONE} = \frac{1}{3}\pi r^2 h$$

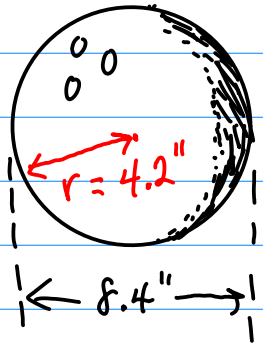
$$= \frac{1}{3}\pi (2\,in)^2 (15\,in)$$

$$= \frac{1}{3}\pi\, 4\,in^2\, 15\,in$$

$$= \boxed{20\pi\, in^3}$$

* · Volume of a Sphere: $\boxed{V_{SPHERE} = \frac{4}{3}\pi r^3}$

Ex: $V_{BOWLING\ BALL} = ?$ 8.4" wide



$$V_{SPHERE} = \frac{4}{3}\pi r^3$$

$$= \frac{4}{3}\cdot\pi\cdot(4.2\,in)^3$$

$$= \frac{4}{3}\pi \cdot 74.1\ in^3$$

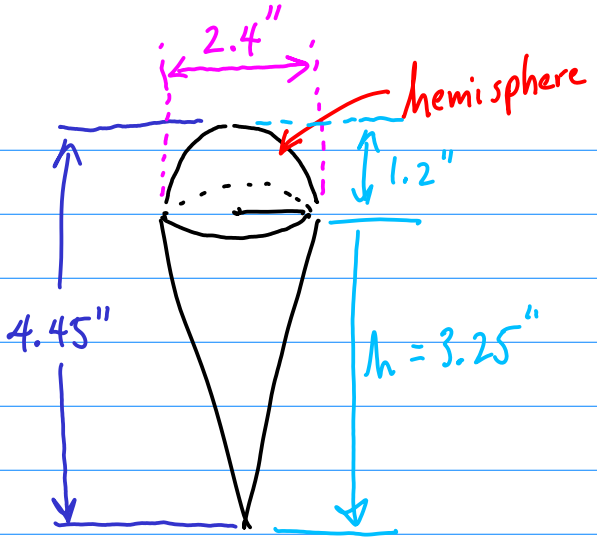
$$\approx \frac{4}{3}\cdot 3.14 \cdot 74.1\ in^3$$

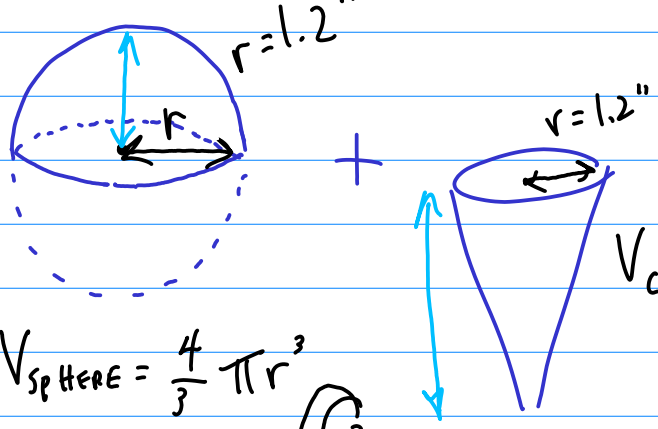
$$\approx \boxed{310\ in^3}$$

4.2^3

$4.2 \times 4.2 \times 4.2$

Ex: $V_{\text{ICE CREAM CONE}} = ?$





$4.45 = h + 1.2$
$-1.20 \quad -1.2$
$3.25 = h$

$V_{\text{SPHERE}} = \frac{4}{3}\pi r^3$

$= \frac{4}{3}\pi (1.2")^3$

$= \frac{4}{3} \cdot \pi \cdot 1.728 \text{ in}^3$

$\approx 7.23 \text{ in}^3 \xrightarrow[\text{hemi-sphere}]{\div 2} 3.62 \text{ in}^3$

$V_{\text{CONE}} = \frac{1}{3}\pi r^2 h$

$= \frac{1}{3}\pi (1.2")^2 (3.25")$

$= \frac{1}{3} \cdot \pi \cdot 1.44 \text{ in}^2 \cdot 3.25 \text{ in}$

$\approx 4.90 \text{ in}^3$

$V_{\text{ICE CREAM CONE}} = V_{\text{HEMISPHERE}} + V_{\text{CONE}}$

$\approx 3.62 \text{ in}^3 + 4.90 \text{ in}^3$

$\approx \boxed{8.52 \text{ in}^3}$