

Volumes

- Volume is the amount of 3-d space an object takes up.

We will find volumes of the

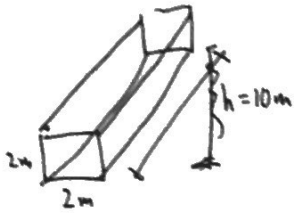
- prisms, pyramids, cylinders, cones, spheres.

Prisms & Cylinders

- For any prism or cylinder, right or oblique,

$$V = Bh, \text{ where } B = \text{area of base, } h = \text{height}$$

ex:



$$\begin{aligned} V &= Bh \\ &= (2 \cdot 2) \cdot 10 \\ &= \boxed{40 \text{ m}^3} \end{aligned}$$

ex:



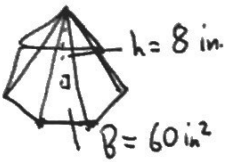
$$\begin{aligned} V &= Bh \\ &= (\pi r^2)h \\ &= \pi \cdot 1^2 \cdot 3 \\ &= \boxed{3\pi \text{ ft}^3} \end{aligned}$$

Cones & Pyramids

- For any cone or pyramid,

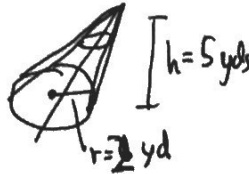
$$V = \frac{1}{3} Bh, \text{ where } B = \text{area of base, } h = \text{height}$$

ex:



$$\begin{aligned} V &= \frac{1}{3} Bh \\ &= \frac{1}{3} \cdot 60 \cdot 8 \text{ in}^3 \\ &= \boxed{160 \text{ in}^3} \end{aligned}$$

ex:

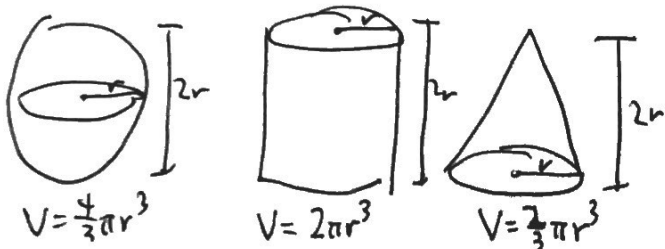


$$\begin{aligned} V &= \frac{1}{3} Bh \\ &= \frac{1}{3} \pi \cdot 2^2 \cdot 5 \\ &= \boxed{\frac{20}{3} \pi \text{ yd}^3} \end{aligned}$$

Spheres

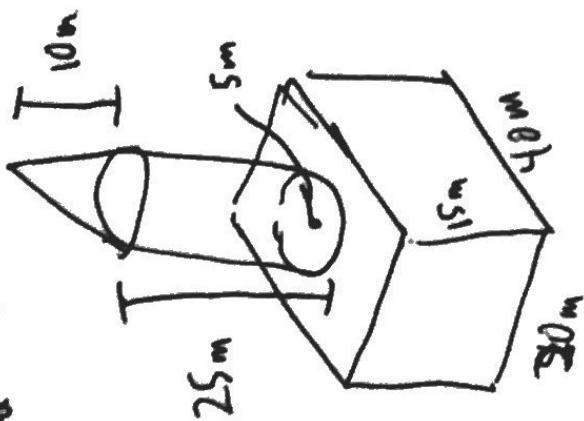
- The volume of a sphere of radius r is $\frac{4}{3} \pi r^3$.

Note: for sphere/cylinder/cone of the same height & radius



• the ratio is 2:3:1.
or $\frac{2}{3}:1:\frac{1}{3}$
sphere: cylinder: cone.

Ex: Find the volume of the composite solid.



$$V = V_{\text{box}} + V_{\text{cyl}} + V_{\text{con}}$$

$$= 20 \cdot 40 \cdot 15 + \pi \cdot 5^2 \cdot 25 + \frac{1}{3} \pi \cdot 5^2 \cdot 10 \text{ m}^3$$

$$= 12,000 + \frac{250}{3} \pi \text{ m}^3$$

$$\approx 14,279 \text{ m}^3$$