

3.6 Finding Volumes of 3-Dimensional Shapes

Part 1

Spheres

Old Area of 2-dimensional figures

$$\text{Area}_{\text{Triangle}} = \frac{1}{2} (\text{base})(\text{height})$$

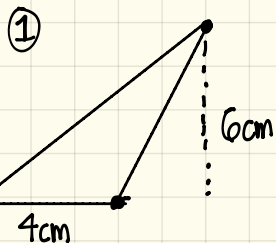
$$\text{Area}_{\text{Sq/Rect}} = (\text{base})(\text{height})$$

$$\text{Area}_{\text{Trapezoid}} = \frac{1}{2} (\text{base}_1 + \text{base}_2)(\text{height})$$

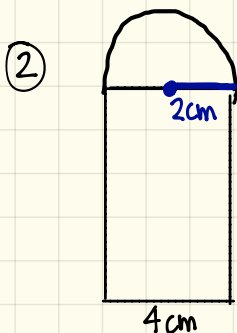
$$\text{Area}_{\text{Circle}} = \pi(\text{radius})^2$$

note: Finding area in a 2-dimensional figure means to find the amount of space occupied in the closed boundary.

Find the area of each.



$$\begin{aligned}\text{Area}_{\text{Tri}} &= \frac{1}{2} (\text{base})(\text{height}) \\ &= \frac{1}{2} (4\text{cm})(6\text{cm}) \\ &= 12\text{cm}^2\end{aligned}$$



Need to find Area of 2 figures:

$$8\text{cm Total Area} = \text{Area}_{\text{Rect}} + \text{Area}_{\text{Half Circle}}$$

$$\begin{aligned}\text{Area}_{\text{Rect}} &= (\text{base})(\text{height}) \\ &= (4\text{cm})(8\text{cm}) \\ &= 32\text{cm}^2\end{aligned}$$

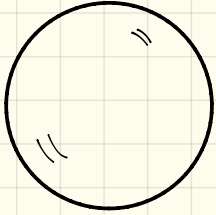
$$\begin{aligned}\text{Area}_{\text{Half Circle}} &= \frac{\pi(\text{radius})^2}{2} \\ &= \frac{\pi(2\text{cm})^2}{2} \\ &= 2\pi\text{cm}^2\end{aligned}$$

Diameter = 4cm
Radius = 2cm

$$\text{Total Area} = 32\text{cm}^2 + 2\pi\text{cm}^2 \approx 38.28\text{cm}^2$$

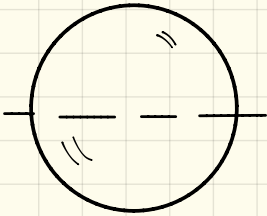
New Volumes of Spheres

Let's consider a sphere (3-Dimensional Figure).



$$\text{Volume}_{\text{Sphere}} = \frac{4}{3} \pi r^3$$

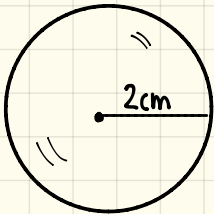
Volume of a 3-dimensional figure means the amount of space occupied in the closed boundary.



Hemisphere is the cutting of a sphere down the middle.

[Examples] Find the volume.

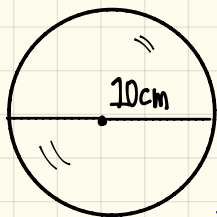
①



$$\text{Volume}_{\text{Sphere}} = \frac{4}{3} \pi r^3$$

$$\begin{aligned} V &= \frac{4}{3} \pi (2\text{cm})^3 \\ &= \frac{32\pi}{3} \text{cm}^3 \approx 33.51 \text{cm}^3 \end{aligned}$$

②



Diameter = 10cm
 Radius = 5cm

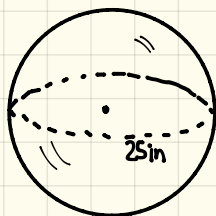
$$\text{Volume}_{\text{Sphere}} = \frac{4}{3} \pi r^3$$

$$V = \frac{4}{3} \pi (5\text{cm})^3$$

$$= \frac{500\pi}{3} \text{cm}^3 \approx 523.60 \text{cm}^3$$

③

The circumference of a great circle of a sphere is 25 inches.
 Find the volume of the sphere.



$$\text{Volume}_{\text{Sphere}} = \frac{4}{3} \pi r^3$$

$$V = \frac{4}{3} \pi (3.98\text{in})^3$$

$$V \approx 263.86 \text{in}^3$$

need to find radius:

$$C = 2\pi r$$

$$25 = 2\pi r$$

$$\frac{25}{2\pi} = \frac{2\pi r}{2\pi}$$

$$3.98 \approx r$$

$$3.98 \approx r$$