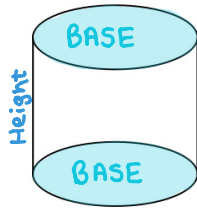


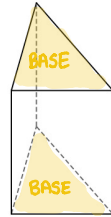
# Cylinders and Prisms

What is common?

- They all have two bases that are identical.
- The height runs perpendicular to the two bases.



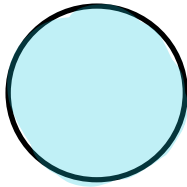
Cylinder



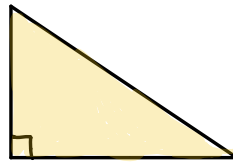
Prism

What is different?

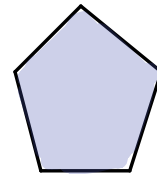
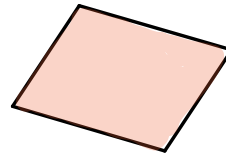
Cylinders have circular bases and prisms have bases that are polygons (flat sides)



Cylinder  
Base



Prism  
Bases



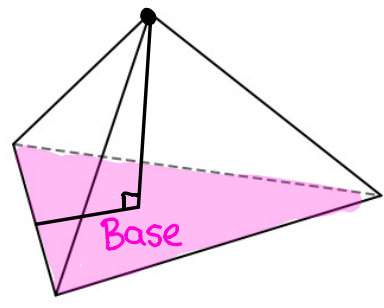
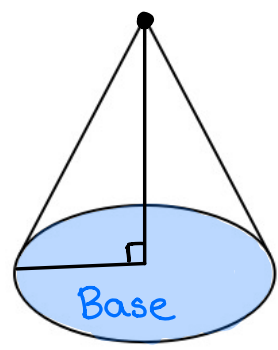
How do I calculate volume?

$$\text{Volume} = \left( \begin{array}{c} \text{Area of} \\ \text{Base} \end{array} \right) \times \left( \begin{array}{c} \text{Height of} \\ \text{Solid} \end{array} \right)$$

# Cones and Pyramids

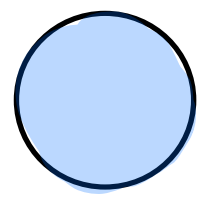
What is common?

- They meet at a point!
- The height is always measured perpendicular through point.

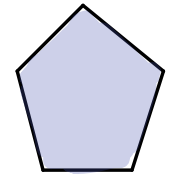
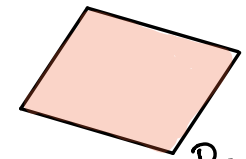
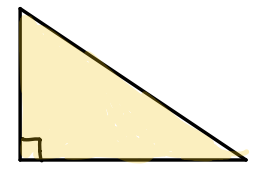


What is different?

Cones have circular bases and pyramids have bases that are polygons (flat sides)



Cylinder Base

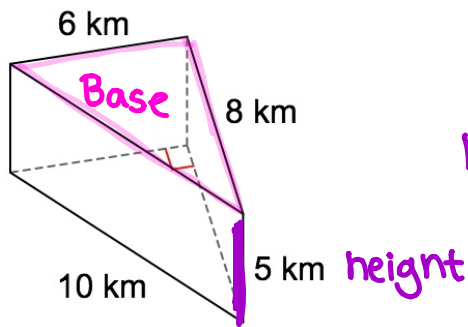


Prism Bases

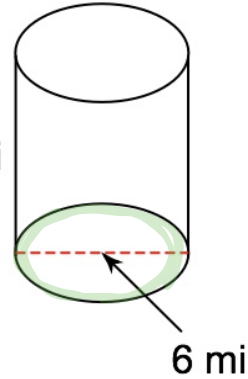
How do I calculate volume?

$$\text{Volume} = \frac{1}{3} \left( \text{Area of Base} \right) \times \left( \text{Height of Solid} \right)$$

Examples: Find the volume of the shapes below:

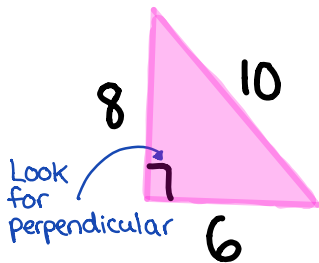


height 7 mi

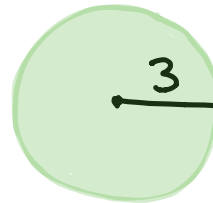


① Find the base area

① Find the base area



$$A = \frac{1}{2}(6)(8) = 24$$



$$A = \pi(3)^2 = 9\pi$$

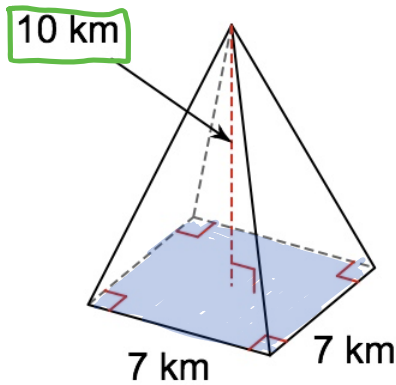
② Multiply by the height of the shape

② Multiply by the height of the shape

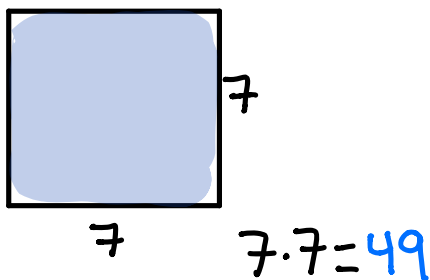
$$(24) \cdot (5) = \boxed{120 \text{ km}^3}$$

$$(9\pi) \cdot (7) = 63\pi$$
$$\boxed{197.9 \text{ mi}^3}$$

Examples: Find the volume of the shapes below:



① Find the base area

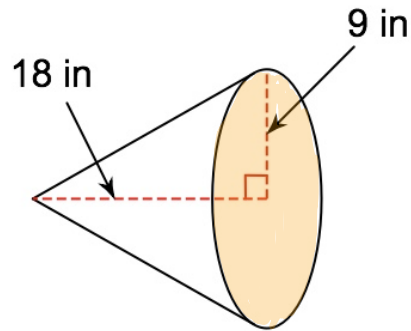


② Multiply the area by the height

$$(49)(10) = 490$$

③ Divide by 3:

$$\frac{490}{3} = \boxed{163.3 \text{ km}^3}$$



① Find the base area



② Multiply by the height of the shape

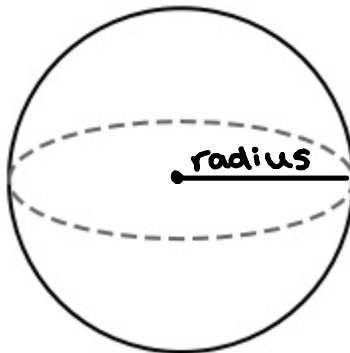
$$(81\pi) \cdot (18) = 4580.4$$

③ Divide by 3:

$$\frac{4580.4}{3} = \boxed{1526.8 \text{ in}^3}$$

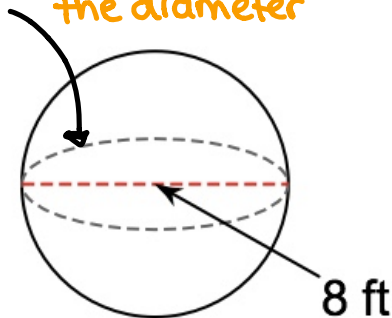
# Spheres

Definition: A 3D shape with a constant radius throughout



Example: Find the volume of the sphere below:

The radius is half the diameter



$$\text{Radius} = 4$$

$$V = \frac{4}{3} \pi (4)^3$$
$$= \frac{4}{3} \pi (64)$$

$$= 268.1 \text{ ft}^3$$