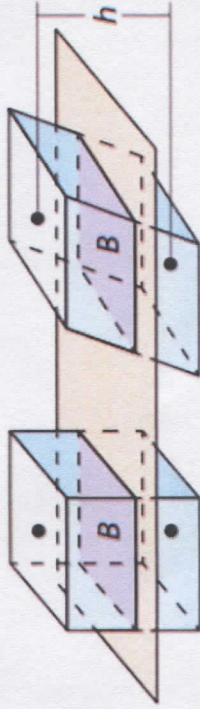


**OBJECTIVE 1: Terminology**

Volume: the number of cubic units contained in its interior.

Cavalieri's Principle: states that if two solids have the same height and the same cross-sectional area at every level, then they have the same volume.



**OBJECTIVE 2: Volume of a Prism**

$V = Bh$

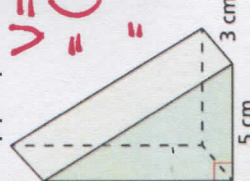
\*\*\*Case of the letters still matter!\*\*\*

V = volume in units cubed

B = Area of the base

h = height of the prism

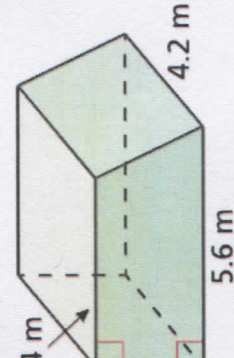
**TASK 1:** Find the volume of the prism. Include the set-up and the answer with appropriate units.

a)  
$$V = Bh$$

$$= (\frac{1}{2}bh)h$$

$$= \frac{1}{2}(5)(8)(3)$$

$$= 60\text{cm}^3$$

b)  
$$V = Bh$$

$$= (\frac{1}{2}(b_1 + b_2)(h))h$$

$$= \frac{1}{2}(5.6 + 4.4)(2.5)(4.2)$$

$$= 52.5\text{m}^3$$

**OBJECTIVE 3: Volume of a Cylinder**

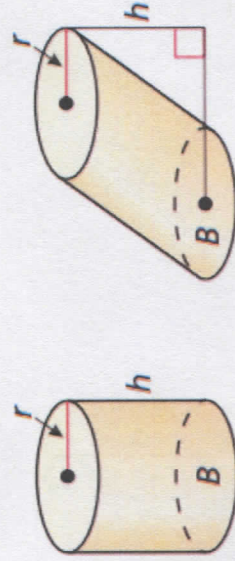
$V = Bh = \pi r^2 h$

\*\*\*Case of the letters still matter!\*\*\*

V = volume in units cubed

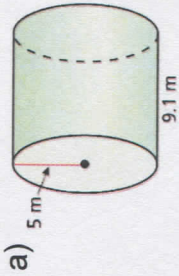
B = Area of the base

h = height of the cylinder





TASK 2: Find each indicated measure. Be sure to include correct units.

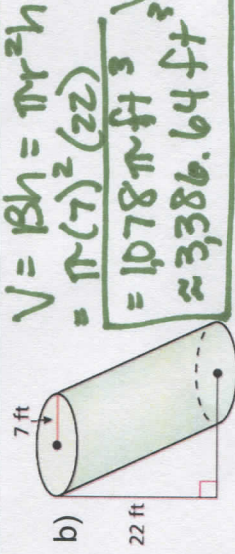


$$V = Bh = \pi r^2 h$$

$$= \pi (5)^2 (9.1)$$

$$\approx 227.5 \pi \text{ m}^3$$

$$\approx 714.71 \text{ m}^3$$



$$V = Bh = \pi r^2 h$$

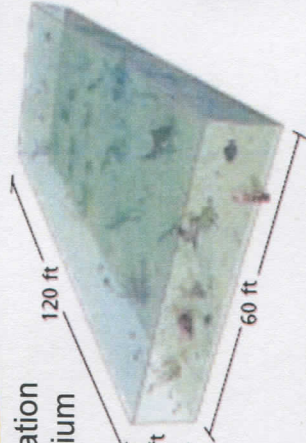
$$= \pi (22)^2 (7)$$

$$\approx 1078 \pi \text{ ft}^3$$

$$\approx 3386.64 \text{ ft}^3$$

TASK 3: Real-World Application

a) If the volume of an aquarium is 57600 ft<sup>3</sup>, find its height.



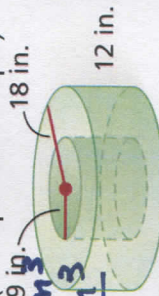
$$V = Bh = lwh$$

$$57600 = (120)(60)(h)$$

$$57600 = 7200h$$

$$h = 8 \text{ ft}$$

b) Find the volume of the toilet paper. (Composite shape)



$$V = B_{\text{cyl}} - B_{\text{cyl}}$$

$$= \pi r^2 h - \pi r^2 h$$

$$= \pi (18)^2 (12) - \pi (9)^2 (12)$$

$$= 2916 \pi \text{ in}^3$$

$$\approx 9160.9 \text{ in}^3$$

**OBJECTIVE 4: Density**

Density is the amount of matter than an object has in a given unit of volume.

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

b) You are building a rectangular chest. You want the length to be 6 feet, the width to be 4 feet, and the volume to be 72 cubic feet. What should the height be?

$$V = lwh$$

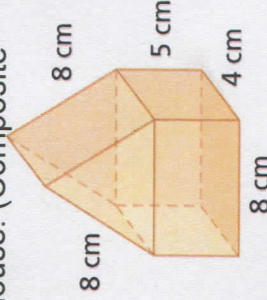
$$72 = (6)(4)h$$

$$h = 3 \text{ ft}$$

Still need help with:

- 1) Set up plan
  - 2) Create "formula for your plan"
  - 3) Sub in values to your "formula"
  - 4) Simplify
- ⇒ UNITS!

b) The total volume of the future dog house. (Composite shape)



$$V = \Delta + \text{prism}$$

$$= \left(\frac{1}{2}bh\right)h + lwh$$

$$= \frac{1}{2}(8)(8)(4) + (8)(8)(5)$$

$$= 64\sqrt{5} + 100 \text{ cm}^3$$

$$\approx 270.851 \text{ cm}^3$$

d) One cup is equal to 14.4375 in<sup>3</sup>. If 1 cylinder measuring cup has a radius of 2 in., what is the height? If the radius is 1.5 in., what is the height?

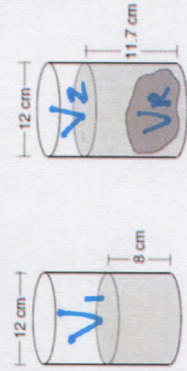
$$14.4375 = \pi (2)^2 h$$

$$h = 1.149 \text{ in}$$

$$14.4375 = \pi (1.5)^2 h$$

$$h = 2.043 \text{ in}$$

a) In Figure 1, a cylinder with a diameter of 12 cm is filled with water to a height of 8 cm. In Figure 2, a rock is submerged in the cylinder. Find the approximate volume of the rock.



$$V_R = V_2 - V_1 = 421.2\pi - 288\pi$$

$$= 133.2\pi \text{ cm}^3$$

$$\approx 418.46 \text{ cm}^3$$