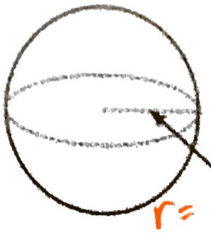
Notes 9-2
Composite Figures- Cylinders, Cones, Spheres

Int 2 | Unit 9

Warm-Up

Find the Volume of the 3-Dimensional Shapes. Round to the nearest tenth, and label units!

1.



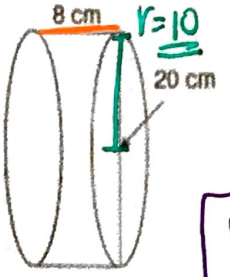
$V = \frac{4 \cdot \pi \cdot r^3}{3}$

$r =$ 7 in

$V = \frac{4 \cdot \pi \cdot (7)^3}{3}$

$V = 1436.8 in^3$

2.



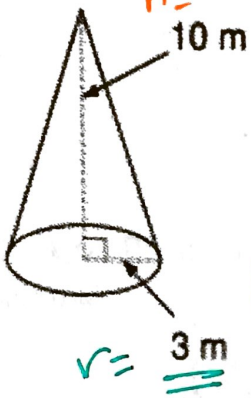
$h =$ 8 cm, $r = 10$, 20 cm

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

$V = \pi \cdot (10)^2 \cdot (8)$

$V = 2513.3 cm^3$

3.



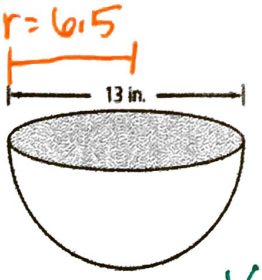
$h =$ 10 m, $r =$ 3 m

$V = \frac{\pi \cdot r^2 \cdot h}{3}$

$V = \frac{\pi \cdot (3)^2 \cdot (10)}{3}$

$V = 94.2 m^3$

4.



$r = 6.5$, 13 in.

$V = \frac{4 \cdot \pi \cdot r^3}{6}$

$V = \frac{4 \cdot \pi \cdot (6.5)^3}{6}$

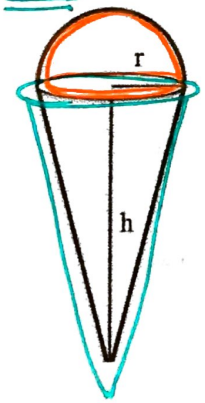
$V = 575.2 in^3$

5. Formula for Volume of a Rectangular Prism: $V = l \cdot w \cdot h$

Composite Figures:

2 or more 3-D figures put together (add) or taken apart (subtract)

Ex. 1: **Find the total volume of an ice cream cone composed of a hemisphere on top of a cone where the radius is 1.5 inches and the cone is 4 inches tall.**



Hemisphere:

$\frac{4 \cdot \pi \cdot r^3}{6}$

$\frac{4 \cdot \pi \cdot (1.5)^3}{6}$

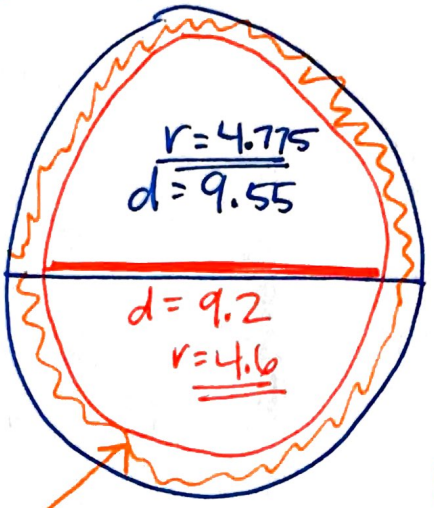
$7.1 in^3$

CONE:

$\frac{\pi \cdot r^2 \cdot h}{3} = \frac{\pi \cdot (1.5)^2 \cdot 4}{3} = 9.4$

$7.1 + 9.4 = 16.5 in^3$

Ex. 2: A basketball is a sphere that is made of rubber or leather and on the inside is a "bladder" filled with air. The diameter of a basketball is 9.55 inches and the "bladder" inside the basketball creates a sphere with a diameter of 9.2 inches. What is the volume of the material used to actually make the basketball?



Large Sphere

subtract Smaller Sphere

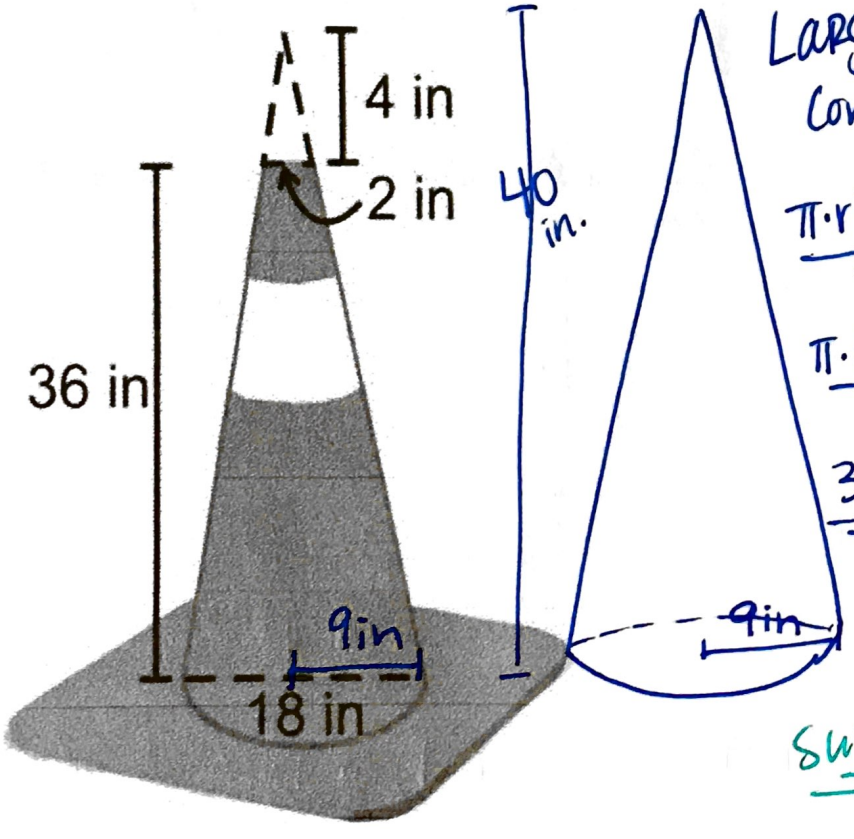
$V = \frac{\pi \cdot 4 \cdot (4.775)^3}{3} = 456.0\ in^3$

subtract

$V = \frac{\pi \cdot 4 (4.6)^3}{3} = 407.7\ in^3$

$48.3\ in^3$ of material

Ex. 3: A traffic cone has the top removed to create a flat top. What is the volume of the traffic cone?



Large Cone

$\frac{\pi \cdot r^2 \cdot h}{3}$

$\frac{\pi \cdot (9)^2 \cdot 40}{3}$

$3392.9\ in^3$

Small Cone

$\frac{\pi \cdot r^2 \cdot h}{3}$

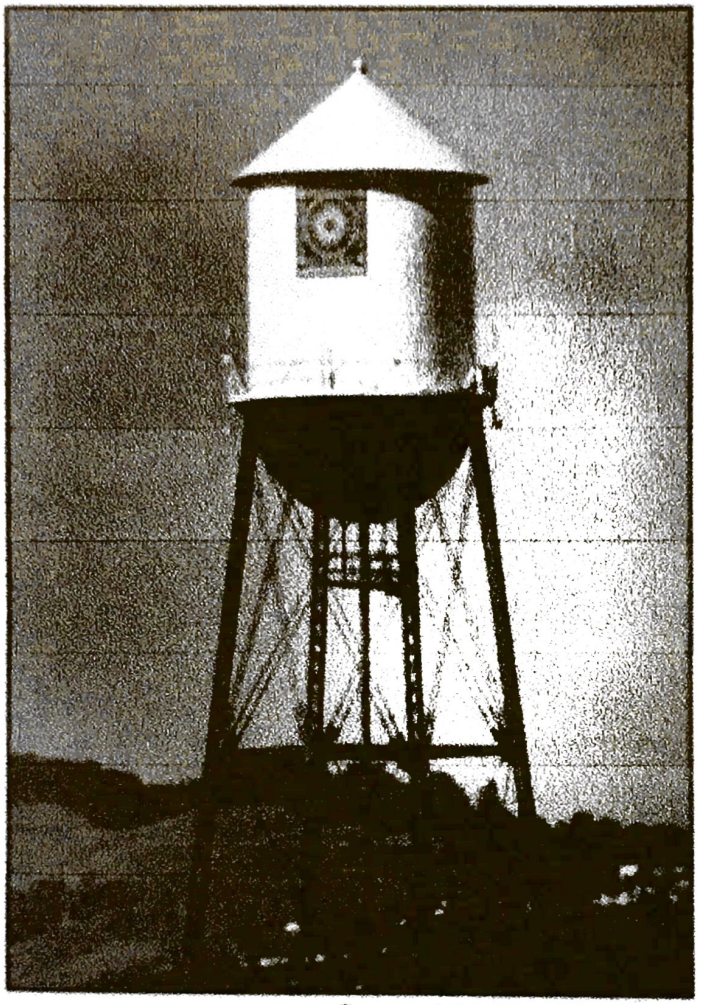
$\frac{\pi \cdot (1)^2 \cdot 4}{3}$

$4.2\ in^3$

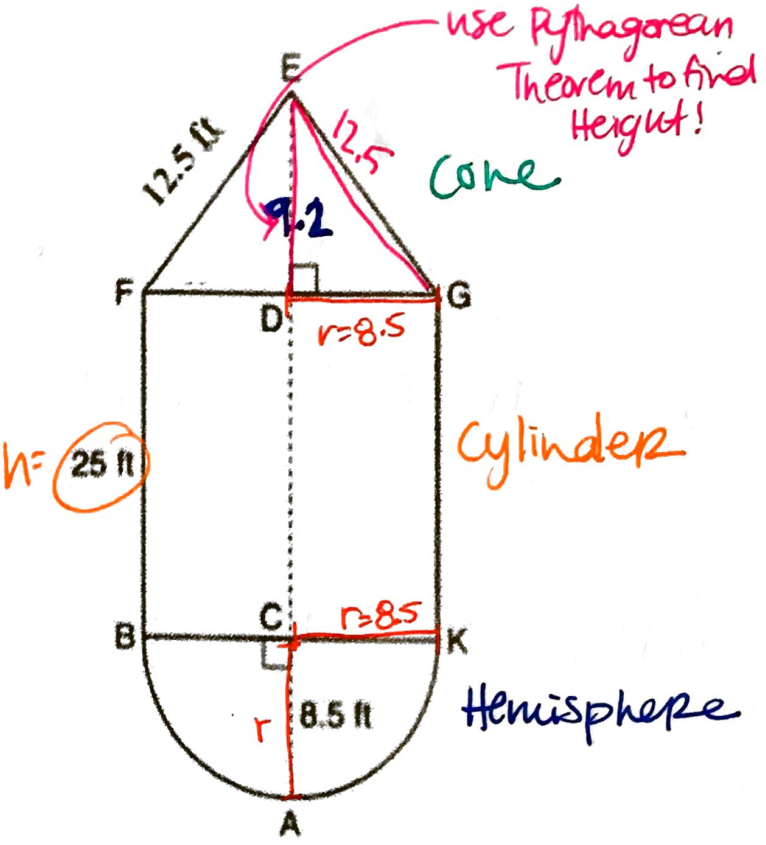
$= 3388.7\ in^3$

Subtract because it is cut off.

Ex. 4. A water tower is shown in the picture and diagram. Find the volume of water that it could hold if it was full.



Source: http://en.wikipedia.org



CONE

$a^2+b^2=c^2$

$(a)^2+(8.5)^2=(12.5)^2$

$a^2+72.25=156.25$

$\sqrt{a^2}=\sqrt{84}$

$a=9.2$ in

$\frac{\pi r^2 h}{3}=\frac{\pi(8.5)^2 \cdot 9.2}{3}=696.1\ ft^3$

Cylinder

$\pi \cdot r^2 \cdot h$

$\pi \cdot (8.5)^2 \cdot (25)$

$5674.5\ ft^3$

add them up!

$7656.8\ ft^3$

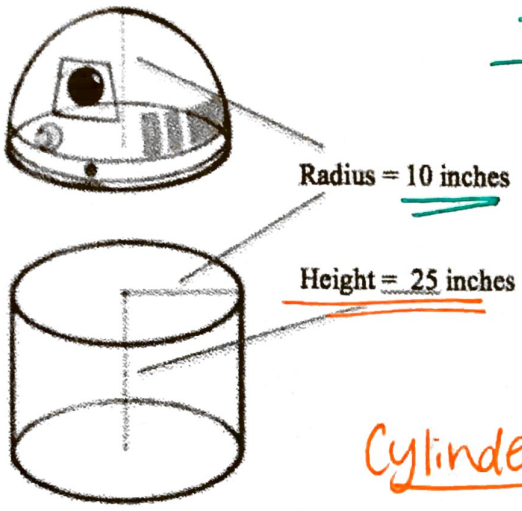
Hemisphere

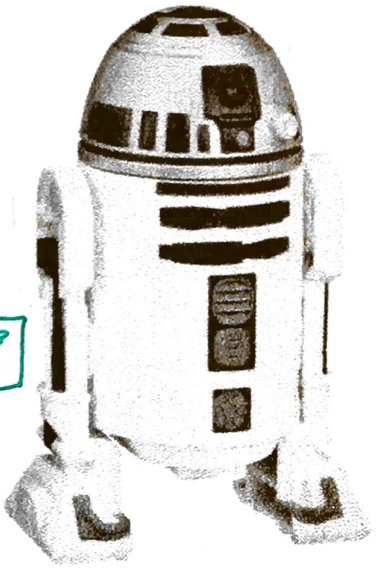
$\frac{4 \cdot \pi \cdot r^3}{6}$

$\frac{4 \cdot \pi \cdot (8.5)^3}{6}$

$1286.2\ ft^3$

Ex. 5: Find the volume of the body of R2-D2 if he is composed of a cylinder topped by a hemisphere.





Hemisphere

$\frac{4 \cdot \pi \cdot r^3}{6} = \frac{4 \cdot \pi \cdot (10)^3}{6}$

$= \boxed{2094.4 \text{ in}^3}$

Cylinder

$\pi \cdot r^2 \cdot h = \pi \cdot (10)^2 \cdot 25$

7853.98

$\boxed{7854.0} \text{ in}^3$

Add together $= \boxed{9948.4 \text{ in}^3}$

Bonus Question: Is the following diagram true? Explain