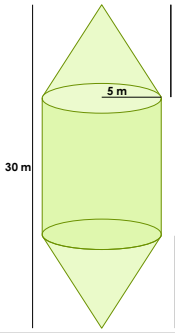
Warmup 3/(What Taylor Swift is feeling)

Pair up with someone at your table.
Each pair needs a whiteboard.



1) Find the volume.

Volume = cone + cylinder + cone

Each cone: = $\frac{1}{3}\pi r^2 h$

Each cone = $\frac{1}{3}\pi \cdot 5^2 \cdot 9$

Each cone = 75π

Cylinder = $\pi \cdot 5^2 \cdot 12$

Cylinder = 300π

Why ISN'T the cone 1/3 of the cylinder???

Total Volume = $75\pi + 300\pi + 75\pi$

Total Volume = $450\pi\ m^3$

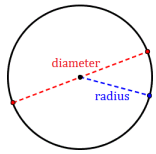
Total Volume ≈ $1413.7\ m^3$

FORMULAS REVIEW

Circles:

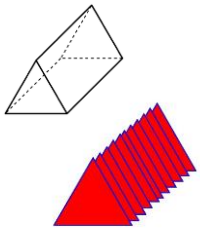
Circumference: $C = \pi d$ or $C = 2\pi r$

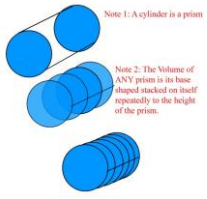
Area: $A = \pi r^2$



Prisms

Prisms have TWO bases that are connected by flat sides all around.





FORMULAS REVIEW

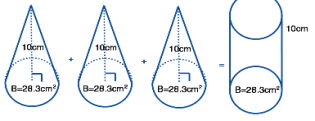
Any Prism: Volume = (Area of base) x height

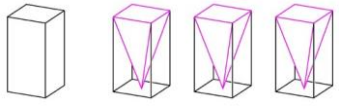
- Rectangular Prism: $V = (lw) \cdot h$
- Triangular Prism: $V = \left(\frac{1}{2}bh_1\right) \cdot h_2$
- Cylinder $V = (\pi r^2) \cdot h$

Pyramids/Cones

Pyramids & Cones have ONE base, and come to a point at the top.

3 pyramids = 1 prism. 3 cones = 1 cylinder.





Cones & Pyramids

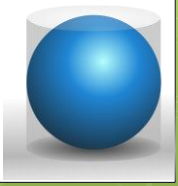
Any Pyramid: Volume = $\frac{1}{3} \cdot$ (Area of base) $\cdot$ height

- Rectangular/Square Pyramid: $V = \frac{1}{3} \cdot (lw) \cdot h$
- Cone $V = \frac{1}{3} \cdot (\pi r^2) \cdot h$

Volume of a sphere

The volume of a sphere is 2/3 of the cylinder it "fits" in.

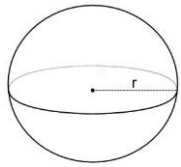
- $V(sphere) = \frac{2}{3}(\pi r^2 \cdot h)$
- $V(sphere) = \frac{2}{3}(\pi r^2 \cdot 2r)$
- $V(sphere) = \frac{4}{3}\pi r^3$



Spheres

Spheres:

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



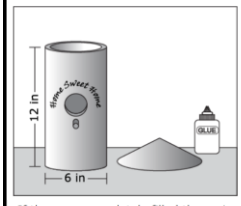
All 3-dimensional formulas have three variables!!!

- **Rectangular Prism:** $V = l \cdot w \cdot h$
- **Cylinder:** $V = \pi r^2 h$ $V = \pi \cdot r \cdot r \cdot h$
- **Cone:** $V = \frac{1}{3} \cdot \pi \cdot r \cdot r \cdot h$
- **Sphere:** $V = \frac{4}{3}\pi r^3$ $V = \frac{4}{3} \cdot \pi \cdot r \cdot r \cdot r$

All 2-dimensional formulas have three variables!!

- **Rectangle:** $A = l \cdot w$
- **Triangle:** $A = \frac{1}{2} \cdot b \cdot h$
- **Circle:** $A = \pi r^2$ $A = \pi \cdot r \cdot r$

One winter, Mr. Rogers built a birdhouse in his backyard. Mr. Rogers finished the main part of the birdhouse before it began to snow, but not the roof. The main part of the birdhouse is a right circular cylinder with a inner diameter of 6 inches and a height of 12 inches.



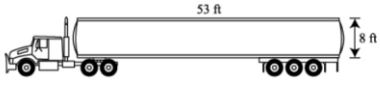
$V = \pi \cdot 3^2 \cdot 12$

$V \approx 339$

If the snow completely filled the main part of the birdhouse, what would be the approximate **volume**, in cubic inches, of the snow? (Round your answer to the nearest whole number.)

A 226
B 283
C 339
D 1357

A truck that carries gasoline is shown.



How much gasoline can the cylindrical tank hold?

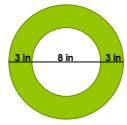
A 212π ft^3
B 424π ft^3
C 848π ft^3
D 3392π ft^3

$V = \pi \cdot 4^2 \cdot 53$

$V = 848\pi$

(Those are all pi symbols!!!)

Find the area of the shaded region.



Area = big circle – small circle
Diameter of big circle = 14, radius = 7
Diameter of small circle = 8, radius = 4

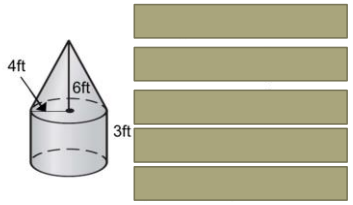
$A = \pi(7)^2 - \pi(4)^2$

$A = 49\pi - 16\pi$

$A = 33\pi$ (exact)

$A \approx 103.7\ in^2$ (rounded)

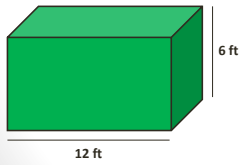
- Find the volume of the figure. Leave your answer as an **exact** answer (leave π in it)



Working backwards…

- **Find the width of the prism.**

$V = 288\ ft^3$



$V = lwh$

$288 = 12 \cdot w \cdot 6$

Multiply 12 & 6 first, then divide

OR

Divide each one separately

$288 = 72 \cdot h$

$18 = h$

Working backwards…

- **Find the height of the cylinder.**

$V = 882\pi\ m^3$

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

$\frac{882\pi}{\pi} = \frac{\pi \cdot 7^2 \cdot h}{\pi}$

$882 = 7^2 \cdot h$

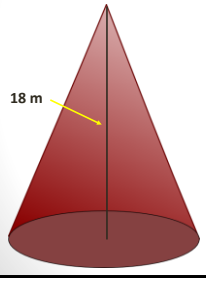
$882 = 49 \cdot h$

$18 = h$

Working backwards…

- **Find the radius of the cone.**

$V = 96\pi\ cm^3$



$V = \frac{1}{3}\pi r^2 \cdot h$

$96\pi = \frac{1}{3}\pi \cdot r^2 \cdot 18$

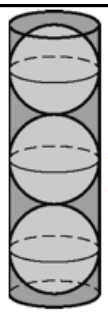
$96 = \frac{1}{3} \cdot r^2 \cdot 18$

$96 = 6 \cdot r^2$

$16 = r^2$

$4 = r$

The figure shows a can of three tennis balls. The can is just large enough so that the tennis balls will fit inside with the lid on. The diameter of each tennis ball is 2.5 in.



1. Find the total volume of the can. _____
2. Find the volume of empty space inside the can. _____

$\text{Can} = \pi \cdot 1.25^2 \cdot 7.5$

$\text{Can} \approx 36.8\ in^3$

$\text{Each ball} = \frac{4}{3}\pi \cdot 1.25^3$

$\text{Each ball} \approx 8.18\ in^3$

1. 36.8 in^3
2. 12.3 in^3

Homework

- Volume Worksheet