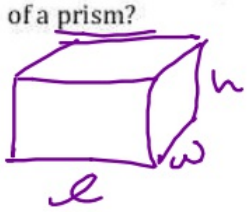
Graphs and Volume Day 3 IN CLASS

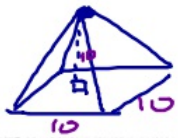
Deriving Formulas & Cavalieri's Principal

1. I have a 10 cm by 10 cm by 10 cm cube. What is its volume? What is the formula for the volume of a prism?



Rectangular box $V = \ell \cdot w \cdot h$
"Amazon" $1000\ cm^3$

2. I have a square pyramid with a 10 cm by 10 cm base and a 10 cm height. Estimate the volume of the pyramid.



$V = \frac{1}{3} \cdot (\ell \cdot w) \cdot h$

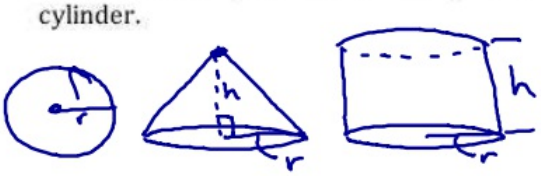
$= \frac{1}{3} (B) \cdot h$

$V = \frac{1000}{3}\ cm^3 \approx 333.33\ cm^3$

3. Your teacher is going to do a demonstration with water. Estimate how many pyramids of water will fill the cube.

4. How many pyramids of water actually filled the cube? What is the formula for a pyramid?

5. Now let's compare a cone and a cylinder. Estimate how many cones of water will fill the cylinder.



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

$V = \frac{1}{3}(B)h$

6. What is the formula for a cone?

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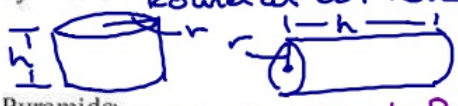
Volume Formulas

Prisms: Rectangular Box

$V = \ell \cdot w \cdot h$ units^3

Cylinders: Round at both ends



$V = (\pi r^2)h$

$= (B)h$

Pyramids: Comes to a single Point

$V = \frac{1}{3}(B)h$

$B: (\ell \cdot w)$ $B: (\frac{1}{2}\ell w)$

Cones: Comes to a point from circle

$V = \frac{1}{3}(B)h$

$B: \pi r^2$

Spheres:

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

Cavalieri's Principle:

7. Imagine a stack of quarters (look at the pictures on the board). Find the volume of the stack of quarters.

a) What information would be helpful to know?

b) What is the volume of the stack of quarters? Justify your answer.

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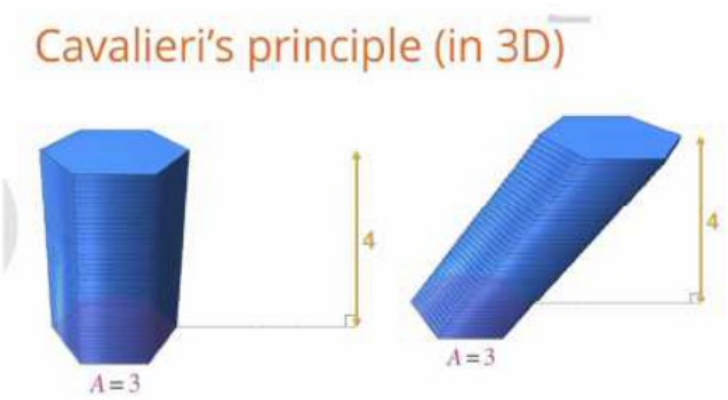
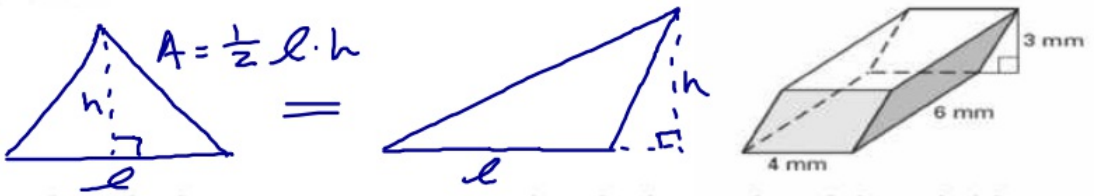
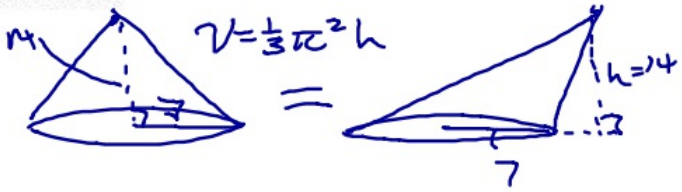


Cavalieri's Principle: If two solids have the same Base and the same height at every level, then the two solids have the same Volume

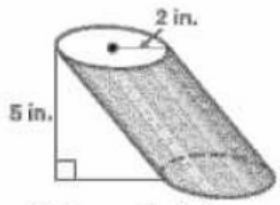
8a. Using Cavalieri's Principal draw the ~~rectangular~~ prism that has the same volume as the oblique prism below.



b. Find & explain how your answer to part A and Cavalieri's Principle can help you find the volume of the above oblique prism. List your answer as both exact and approximate to the hundredths place. Units!



9a. Using Cavalieri's Principal draw the cylinder that has the same volume as the oblique cylinder below.



b. Find & explain how your answer to part A and Cavalieri's Principle can help you find the volume of the above oblique cylinder. List your answer as both exact and approximate to the hundredths place. Units!