Before we begin, are there any questions from last day's work?

6.4.2 # 1–3 2,

Today's Learning Goal(s):

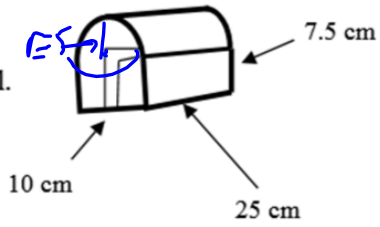
By the end of the class, I will be able to:

a) calculate the surface area or volume of a 3-dimensional solid
b) use the volume and density of a material to calculate it's mas

Last Day 6.4.2 #1

1. The mailbox shown is made up of a half-cylinder attached to a rectangular prism. The rectangular prism has no top where it is attached to the half-cylinder. The half-cylinder has a radius of 5 cm. The rectangular prism has a length of 25 cm, a width of 10 cm and a height of 7.5 cm.

   a) Determine the amount of aluminum needed to build the mailbox.
   b) Determine how much space is available in the mailbox to hold the mail.



a) $SA_{figure} = SA_{\frac{1}{2}\,cyl.} + SA_{r.prism}$

$= \frac{1}{2}(2\pi r^2 + 2\pi rh) + [10(25) + 2(10)(7.5) + 2(25)(7.5)]$

$= \frac{1}{2}(2\pi(5)^2 + 2\pi(5)(25)) + [250 + 150 + 375]$

$\doteq 1246.2388$

$\doteq 1246.2$

b) $V_{mailbox} = V_{\frac{1}{2}cyl} + V_{rectprism}$

$= \frac{1}{2}(\pi r^2 h) + lwh$

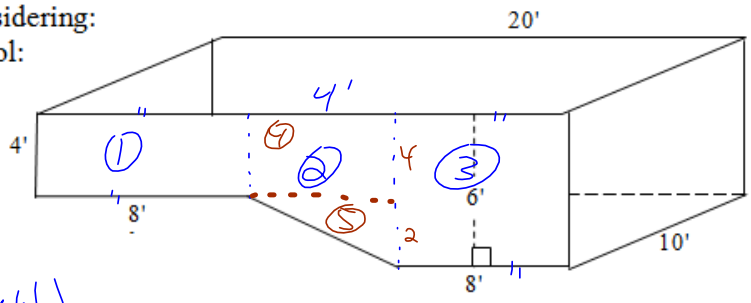
$= \frac{1}{2}\pi(5)^2(25) + (25)(10)(7.5)$

$\doteq 2856.7477$

$\doteq 2856.748\ cm^3$

Last Day 6.4.2 #2b

b) Here is the other pool he is considering:
Calculate the volume of this pool:



$A_1 = \ell w$
$= 8(4)$
$= 32$

$A_2 =$
$A_{Trap} = \frac{1}{2}h(a+b)$
$= \frac{1}{2}(4)(4+6)$
$= 20$

$A_3 = (8)(6)$
$= 48$

$A_4 = 4(4)$
$= 16$

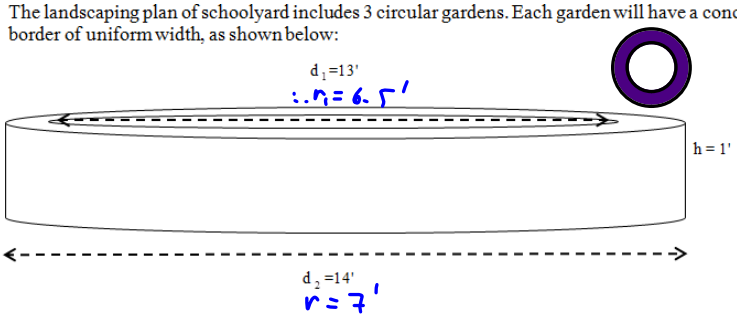
$A_5 = \frac{1}{2}bh$
$= \frac{1}{2}(2)(4)$
$= 4$

$\therefore A_{base} = 32 + 20 + 48$
$= 100\ ft^2$

$\therefore Vol_{pool} = A_{base} \times h$
$= 100(10)$
$= 1000\ ft^3$

Last Day 6.4.2 #3

3. The landscaping plan of schoolyard includes 3 circular gardens. Each garden will have a concrete border of uniform width, as shown below:



∴ r = 6.5'

r = 7'

a) Calculate the volume of concrete to be used to make 3 of these gardens.
b) If concrete costs \$ 5.70/ft³, what is the price of pouring these gardens, including tax? (Note: PST is 8% and GST is 5%)
c) The inside of the garden is to contain a 9" layer of topsoil and a 3" layer of wood chips.

$\frac{9}{12}$ $\frac{3}{12}$

i) Calculate the volume of both layers.
***Hint: It will help to have the thickness changed to feet for (ii)**
ii) The cost of topsoil is \$0.77/ft³, and the cost of wood chips is \$0.90/ft³. Calculate the combined cost of topsoil and wood chips for the 3 gardens, including tax.
iii) What is the total cost of the 3 gardens?

a) $Vol_1 = 21.206\ ft^3$

∴ Volume 3 gardens $\doteq 63.618$

$\doteq 64\ ft^3$

b) Cost $= 64\ ft^3 \times \frac{\$5.70}{ft^3}$

$= \$364.80$ → with tax

Total Cost $= \$364.80 \times 1.13$

$= \$412.224$

$\doteq \$412.22$

c) $Vol_{inside\ cylinder} = \pi(6.5)^2(1)$

$\doteq 132.7322$

$\doteq 132.732\ ft^3$

$V_{Topsoil} = \frac{9}{12}$ of ↑ $\doteq 99.549$

$V_{Woodchips} = \frac{3}{12}$ of ↑ $\doteq 33.183$

× 3 cylinders

$\doteq 298.6476$

$\doteq 298.648\ ft^3$

$\doteq 99.549\ ft^3$

$Cost_{Soil} = 299 \times \$1.77$

$= \$230.23$

$Cost_{Soil\ w\ tax} = 230.23 \times 1.13$

$= \$260.16$

$Cost_{Wood} = 100 \times \$0.90$

$= \$90$

$Cost_{tax} = 90 \times 1.13$

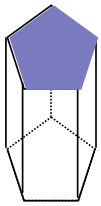
$= 101.70$

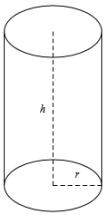
$Total\ Cost_{Project} = 260.16 + 101.70 + 412.22$ (Concrete)

$= \$774.08$

Define and discuss Prisms

- named by the shape of the base
  - ex. triangular prism, rectangular prism, trapezoidal prism, pentagonal prism
  - discuss slicing perpendicular to the base
    - exception: the cylinder

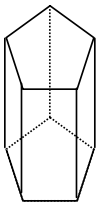




The volume of a prism can be found quickly using the formula:

- $Vol_{prism} = A_{base}$ x height

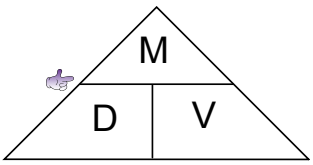
Ex. 1 Determine the volume of the prism if the A_{base} is 10 cm^2.



- $Vol_{prism} = A_{base}$ x height
  - = 10 x 8
  - = 80 cm^3

Density formula:

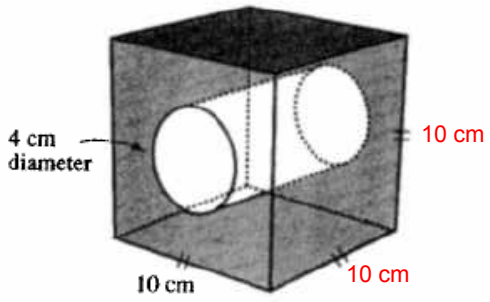
- Density = $\frac{\text{Mass}}{\text{Volume}}$



- Mass = Density x Volume
- The density of water is 1 g/ml.

Example 1 **6.5.2: Volume**

A metal casting has the dimensions shown.



If the density of the material is 6.8 g/cm³, determine the mass of the casting, in kilograms.

Solution *Any class ideas on an approach to the problem?*

Determine the volume,
then multiply by the density to get the mass.
Recall: Mass = Density x Volume

- $Vol_{prism} = A_{base}$ x height
  - $= A_{base}$ x 10
  - $= 87.4336$ x 10
  - $= 874.336$ cm³

- $A_{base} = A_{rectangle} - A_{circle}$
  - $= lw - \pi r^2$
  - $= (10)(10) - \pi(2)^2$
  - $\doteq 87.4336$

- Mass = Density x Volume
  - = 6.8 g/cm³ x 874.336 cm³
  - = 5945.4848 g
  - = 5.945 kg
  - the mass of the casting is 5.945 kg

Worksheets in Google Classroom:

6.5.1 5, 7, 8, 10 or 12

6.5.2 4, 5, 7-9

Project Renovation due tomorrow