Math 9 – Unit 5: Measurement Name: _____

Lesson #2: Rectangular and Triangular Prisms Date: Apr. 12?

Learning Goal: We are learning to calculate the surface area and volume for common 3D shapes and composite figures.

Some Strategies

- When looking at surface area $(\text{units})^2$
  - Draw the net or label each side of the shape with letters (so you don't forget any!)
  - Find the area of each 2D shape by itself, using yesterday's formulas, then add all of them together
- When looking at volume $(\text{units})^3$
  - Be careful what you pick as the base
  - Divide composite objects into smaller simple 3D shapes and find the volume of each, then add all of them together.

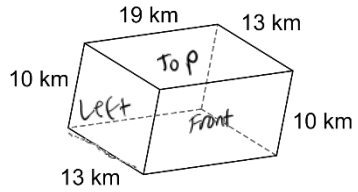
Important Formulas

Volume is always the "area of the base" × "the height"

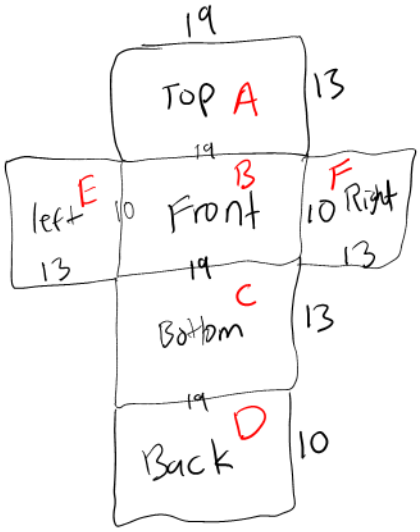
Volume of a rectangular prism: $V = lwh$ Volume of a triangular prism: $A = \frac{1}{2}bhl$ OR $A = \frac{bhl}{2}$

For each figure, draw the net, then calculate the surface area and the volume.

1.



$V = l \cdot w \cdot h$
$= 19 \cdot 10 \cdot 13$
$= 2470 \text{ km}^3$



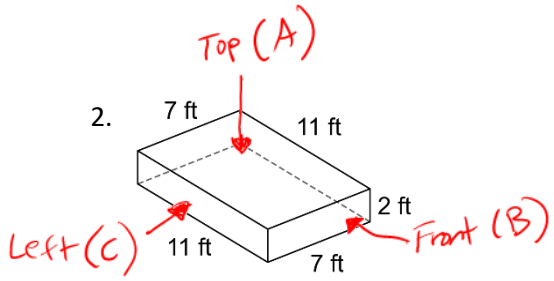
So, Surface area is the sum of these 6 sides.

$A = lw = 19 \times 13 = 247$
$B = 19 \times 10 = 190$
$C = 19 \times 13 = 247$
$D = 19 \times 10 = 190$
$E = 10 \times 13 = 130$
$F = 10 \times 13 = 130$
1134 km^2

Area = 2(Top + Front + left)

$A = 2(lw + wh + lh)$

2.



Area $\Rightarrow$ $2A = 2(7 \cdot 11) = 154\ ft^2$

$+$

$2B = 2(7 \cdot 2) = 28\ ft^2$

$+$

$2C = 2(11 \cdot 2) = 44\ ft^2$

$+$

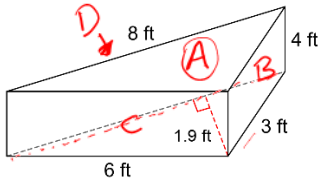
$S.A. = 226\ ft^2$

$V = lwh$

$= 11 \cdot 7 \cdot 2$

$= 154\ ft^3$

3.



Surface Area

$2 \cdot A = 2\left(\frac{8 \cdot 1.9}{2}\right) = 15.2\ ft^2$

$+$

$B = 3 \cdot 4 \quad = 12\ ft^2$

$+$

$C = 6 \cdot 4 \quad = 24\ ft^2$

$+$

$D = 8 \cdot 4 \quad = 32\ ft^2$

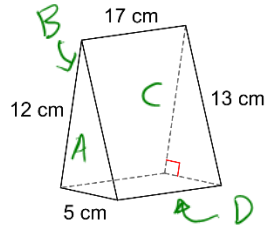
$83.2\ ft^2$

Volume = Area $\triangle$ $\times$ height

$= \left(\frac{8 \cdot 1.9}{2}\right) \times 4$

$= 30.4\ ft^3$

4.



Surface Area

$2A = 2\left(\frac{5 \cdot 12}{2}\right) = 60 \text{ cm}^2$

$B = 12 \cdot 17 = 204 \text{ cm}^2$

$C = 17 \cdot 13 = 221 \text{ cm}^2$

$D = 17 \cdot 5 = 85 \text{ cm}^2$

570 cm^2

Volume $= \left(\frac{bh}{2}\right)\ell$

$= \left(\frac{5 \cdot 12}{2}\right)(17)$

$V = 510 \text{ cm}^3$

Use the appropriate formula to solve for the missing measurement.

5. A rectangular prism has a volume of 5940cm^3 with a height of 15*cm* and a length of 33*cm*. What is the width of the box?

V h ℓ w?

$V = \ell w h$

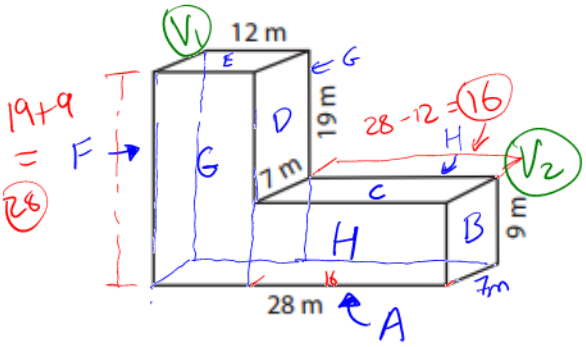
$5940 = (33)w(15)$

$\frac{5940}{495} = \frac{495w}{495}$

$12 = w$

The box is 12 cm wide.

6. Calculate the surface area and the volume of the composite figure.



$V_1 = lwh$

$= (28)(7)(12)$

$= 2352\ m^3$

$V_2 = (16)(7)(9)$

$= 1008\ m^3$

Total Volume $= 3360\ m^3$

Surface Area

$A = 28 \cdot 7 = 196 m^2$

$B = 7 \cdot 9 = 63 m^2$

$C = (7)(16) = 112 m^2$

$D = (7)(19) = 133 m^2$

$E = (12)(7) = 84 m^2$

$F = (28)(7) = 196 m^2$

$2G = 2(12)(28) = 672 m^2$

$2H = 2(16)(9) = 288 m^2$

Total: $1744 m^2$

Success Criteria:

- I can find the surface area of prisms by adding up the areas of each side
- I can find the volume of prisms by using the appropriate formula (area of the base × height)
- I can find the surface area of composite figures by breaking it down into smaller parts and finding the surface area of each part
- I can find the volume of composite figures by breaking it down into smaller parts and finding the volume of each part