

Name:

Period:

## **LAB 5.2 – CALCULATING & MEASURING VOLUME**

### **BACKGROUND**

We have explored the concepts of linear measurements and area measurements and calculations. Now we add a third dimension to the mix as we begin measuring volume.

### **PROBLEM**

What ways can we measure volume?

### **MATERIALS**

- ◆ cartons
- ◆ rubber band
- ◆ Lab 5 data
- ◆ metric area grid
- ◆ metric ruler
- ◆ calculator (optional)

### **PROCEDURE**

1. Using the metric area grid paper, measure the **area of the base** of the small carton and the large carton. Record your data in table 5.2-1.
2. Use your metric ruler to measure the length of the sides of the base on the small carton, then calculate the area using the formula:  
**Length (cm) x Width (cm) = Area (cm<sup>2</sup>)**  
Record your data. Do the same for the large carton.
3. Use your data from Lab 5 to determine the depth to which the small carton sank in the water when filled ½ way with water.
  - a. Move the rubber band to that location on the carton and record the information on Table 5.2-1.
  - b. Calculate the submerged volume of the carton (volume of carton below the surface of the water):  
**Base Area (cm<sup>2</sup>) x Depth of Carton (cm) = Volume Below Rubber Band (cm<sup>3</sup>)**
  - c. Record your results in table 5.2-1.
4. Again using Lab 5 data, determine the depth to which the large carton sank when the water from the half-full small carton was poured into it. Put the rubber band at that depth on the large carton, and calculate the volume of the large carton that is under the rubber band. Record your results.
5. Enter your data on the computer.

## DATA

Table 5.2-1 Carton Measurements & Calculations

|                 | Area (cm <sup>2</sup> )<br><u>using grid</u> | Length<br>(cm) | Width<br>(cm) | <u>Calculated</u><br>Area (cm <sup>2</sup> ) | Depth of<br>Carton<br>(cm) | Calculated<br>volume<br>(cm <sup>3</sup> ) |
|-----------------|--|----------------|---------------|--|----------------------------|--|
| Small<br>Carton |  |                |               |  |                            |  |
| Large<br>Carton |  |                |               |  |                            |  |

## SUMMARY

***Summary and Challenge Questions must be typed or written neatly on a separate piece of paper.***

1. What are the metric units used in this lab for the following kinds of measurements?
  - a. Linear
  - b. Area
  - c. Volume
2. Explain why the formula Length x Width x Depth gives the same results as the formula Base Area x Depth.
3. Graph the class data comparing the submerged volumes of the small cartons and the large cartons.
4. What relationship do you see between these two values.
5. Explain your answer to #4.