

**TITLE:** How Do You Measure in Metric?

**PROBLEM:** Is there a relationship between the solid's volume found using:  $V=L \times W \times H$  and the liquid volume that fits into it measured with a graduated cylinder? How does the liquid volume of the water in milliliters compare to the mass of the water in grams?

**HYPOTHESIS:**

**Materials:** Graduated cylinder, metric ruler, calculator, triple beam

**PROCEDURE:**

- 1) Calculate the **volume** of the container using the length x width x height for a rectangular solid or **cylinder** =  $b \times h = \pi \times r^2 \times h$ . Record in **cubic centimeters (cm<sup>3</sup>)**.
- 2) Use the triple beam to determine the **mass** of the empty container in **grams (g)**. Record on data table.
- 3) Leave the container on the triple beam and fill it with water until another drop would make it overflow.
- 4) Find the combined **mass** of the carton and water. Record on table.
- 5) Find the **mass** of just the water. (HOW? ASK!) Record on data table.
- 6) Determine the **volume** of the water in **mL** in the container. Begin emptying the container into a graduated cylinder with your eyedropper. When it is safe, begin to pour the rest into the graduated cylinder. You may have to do this more than once. Add up your **milliliters (mL)** to determine the total liquid **volume** in the carton.
- 7) Compare the carton's volume in **cm<sup>3</sup>** with the water in **mL** that fit into it. Find the ratio by dividing volume of the container by the volume of the water.
- 8) Compare the **mass** of the water in **g** with the volume of the water in **mL**. Find this ratio by dividing mass of water by the volume of the water.
- 9) Repeat all steps with a different container.

**OBSERVATIONS:**

**Container 1**

Container Volume		Volume of just water	
Container Mass		Compare cm <sup>3</sup> / mL	
Container & Water Mass		Compare g / mL	
Mass of water			

**Container 2**

Container Volume		Volume of just water	
Container Mass		Compare cm <sup>3</sup> / mL	
Container & Water Mass		Compare g / mL	
Mass of water			

**CONCLUSION:** Answer the questions posed in the problem. Use **YOUR data** to compare you answers in your hypothesis with your results.