

Name \_\_\_\_\_

Date \_\_\_\_\_

Period \_\_\_\_\_

# Metric Measurement: Volume (Volume Lab)

## Background Information

Volume is the amount of space an object takes up. When working in the laboratory, it is frequently necessary to measure the volume of a substance. The method used to determine volume depends on the nature of the substance being measured. You will use several different procedures for measuring volume.

In this investigation you will learn how to accurately measure the volume of a liquid and the volume of both a regular solid and an irregular solid.

## Problem

1. How can you accurately measure:
  - a. The volume of a liquid?
  - b. The volume of a regular solid?
  - c. The volume of an irregular solid?
2. What units are used for volume in the metric system?

## Materials (per group)

100-mL graduated cylinder

30-cm Ruler

Weighted rectangular wood  
Block

Marble

Overflow can

250-mL beaker

Rock

## Procedure

### Part A. Measuring the volume of a liquid

1. Compare the accuracy of a beaker to the accuracy of a graduated cylinder by filling the beaker to the 50-mL mark with water and then pouring the water into the graduated cylinder. If the cylinder is made of glass, the surface of the liquid will be slightly curved. To accurately measure the volume, your eye must be at the same level as the bottom of the meniscus. This is the mark on the graduated cylinder you must read (see Figure 1). Record the volume of the water to the nearest mL.

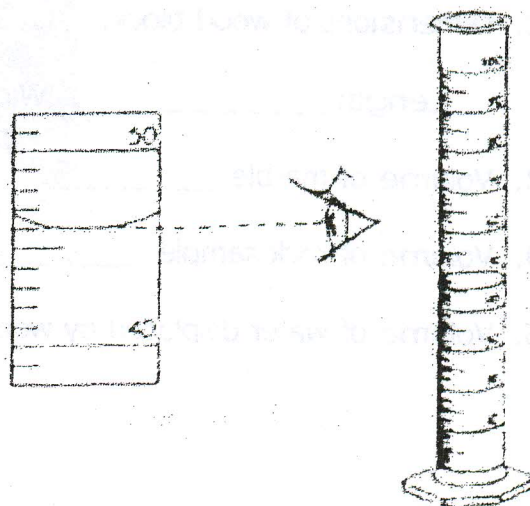


Figure 1

**Part B. Measuring the volume of a regular solid**

1. Using the ruler, measure the length, width and height of the wood block. Record the dimensions and calculate the volume ( $L \times W \times H$ ). Remember and to indicate the units.

**Part C. Using water displacement to measure the volume of an irregular solid**

1. To find the volume of a small irregular object, such as a marble, fill the graduated cylinder half full (to the 25-mL mark if using a 50-mL cylinder or to the 50-mL mark if using a 100-mL cylinder) and carefully drop in the marble. Note the new level of the water and record it. To find the volume of the marble, subtract the volume of the water from the volume of the water with the marble in it.

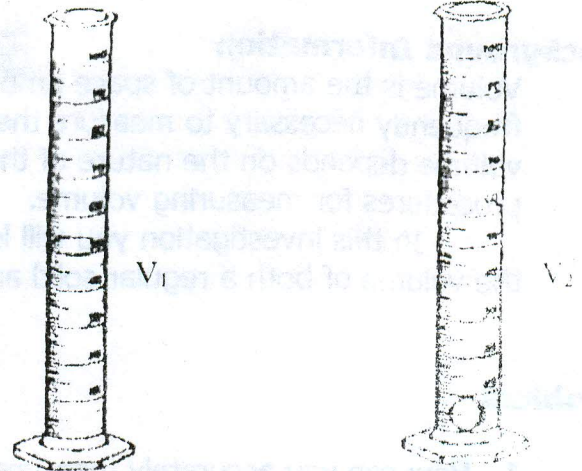


Figure 2

2. Since the rock is too large to fit into the graduated cylinder, an overflow-can should be used to measure its volume. Fill the overflow can higher than the spout and allow the excess water to run into the sink (or another container). Carefully drop the rock into the overflow can and collect the water that flows out in the graduated cylinder. This volume is the same as the volume of the rock. Record the volume.
3. Repeat step 2 using the weighted wood block. Record your observations.

**Observations**

1. What is the volume of 50-mL of water from your beaker as measured in your graduated cylinder? \_\_\_\_\_
2. Dimensions of wood block:  
Length \_\_\_\_\_ Width \_\_\_\_\_ Height \_\_\_\_\_
3. Volume of marble \_\_\_\_\_
4. Volume of rock sample \_\_\_\_\_
5. Volume of water displaced by wood block \_\_\_\_\_



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**Observations**

**DATA TABLE 1**

Object	Mass (g)
Coin	
Paper clip	
Rubber stopper	

**DATA TABLE 2**

Mass of empty beaker (g)	Mass of beaker with 50 mL of water (g)

**DATA TABLE 3**

Mass of weighing paper (g)	Mass of weighing paper and table salt (g)

**Conclusions**

1. What is the mass of 50 mL of water? \_\_\_\_\_
2. Which rider on the balance should always be moved first when finding the mass of an object? \_\_\_\_\_  
\_\_\_\_\_
3. What is the mass of the largest object your balance is able to measure? \_\_\_\_\_
4. What is the mass of the smallest object your balance is able to measure accurately? \_\_\_\_\_  
\_\_\_\_\_
5. After using your balance, how should it always be left? \_\_\_\_\_  
\_\_\_\_\_