MEASUREMENT LAB

Do not write on the instruction sheet. Write on the data table sheet.

OBJECTIVES

- **To review common measurement units.**
- **To refine measurement skills.**

MAJOR UNITS IN SCIENTIFIC MEASUREMENT

Mass = gram (g) ... ***amount of matter in an object***
Length = meter (m) ... ***linear distance***
Temperature = Celsius (°C) ... ***kinetic energy (movement) of particles***
Volume = liter (L); cubic meter (m^3) ... ***three-dimensional space***
Time = second (s; sec) ... (*more practical for experiments)*

MATERIALS, PER STATION TRAY:
Beaker
Calculator
Graduated cylinder
Metric ruler
"Mystery object"

CLASSROOM EQUIPMENT
Balances
Textbooks

******* PROCEDURE *******

LENGTH, AREA, SOLID VOLUME

Use metric rulers provided. Record results in Data Table 1.

1) **Measure the length (top to bottom of front cover) of your textbook in centimeters (cm).**
2) **Measure the width (spine to end of book) of your textbook in cm.**
3) **Calculate the AREA of your textbook, if AREA = (LENGTH) x (WIDTH). The unit of area will be cm^2. Show all calculations on the back of your data sheet.**
4) **Measure the height (thickness) of your textbook in cm.**
5) **Calculate the VOLUME of your textbook, if VOLUME = (LENGTH) x (WIDTH) x (HEIGHT). The unit of volume will be cm^3. Solid volumes can be represented in any length unit cubed (x^3). Show all calculations on the back of your data sheet.**

MASS

Use one of the balances provided. Be sure you know how to "zero" the balance. Your teacher will tell you how many decimal places to use in your readings. Record results in Data Table 2.

1) **Measure the mass of a beaker.**
2) **Fill the beaker half full with water. Measure the mass of the beaker and water.**
3) **Calculate the mass of the water in the beaker. Show all calculations on the back of your data sheet. Pour the water down the sink and wipe the beaker dry.**
4) **Measure the mass of a "mystery object" from your teacher.**

MORE -->

WATER DISPLACEMENT VOLUME

When the volume of an irregular object cannot be measured by a ruler, this method is used. Record results in Data Table 3. Your teacher will tell you how many decimal places to use in your readings.

1) **Fill a graduated cylinder half full with water. Record the volume in mL.**
2) **Gently place the "mystery object" into the graduated cylinder. Gently tap out any air bubbles.**
3) **Record the new, higher water level.**
4) **Calculate the volume of the mystery object by subtracting the two water levels.**

DENSITY

You will calculate the density of the "mystery object" by the following formula:

$$\text{Density} = \frac{\text{MASS}}{\text{VOLUME}}$$

Record results in Data Table 4. The unit will be g / mL.

MEASUREMENT LAB

You may write on this sheet.

NAMES:

LAB STATION # _____

DATA TABLE 1: LENGTH, AREA, SOLID VOLUME

Textbook length (cm) _____

Textbook width (cm) _____

Area of textbook, L x W (cm^2) _____

Textbook height (cm) _____

Volume of textbook, L x W x H (cm^3) _____

DATA TABLE 2: MASS (g)

Beaker _____

Beaker + water _____

water _____

"mystery object": _____ _____

DATA TABLE 3: WATER DISPLACEMENT VOLUME

Water level in graduated cylinder _____ **mL**

Water level with "mystery object" in it _____ **mL**

Volume of "mystery object" _____ **mL**

DATA TABLE 4: DENSITY OF "MYSTERY OBJECT"

Mass of "mystery object" (from Data Table 2) _____ **g**

Volume of "mystery object" (from Data Table 3) _____ **mL**

Density of "mystery object" (D = M/V) _____ **g/mL**

CALCULATIONS (write on the back):
AREA of textbook; VOLUME of textbook; MASS of water in beaker; VOLUME of "mystery object;" DENSITY of "mystery object"