



Scales of Measurement

Lab Preview

Directions: Answer these questions before you begin the Lab.

1. What physical properties are you measuring in this lab?

2. Why is the sharp object safety symbol shown?

How would you describe some of the objects in your classroom? Perhaps your desktop is about one-half the size of a door. Measuring physical properties in a laboratory experiment will help you make better observations.

Real-World Question

How are physical properties of objects measured?

Materials

triple beam balance
100-mL graduated cylinder
metersticks (2)
non-mercury thermometers (3)
stick or dowel
rock sample
string
globe
water

Goals

- Measure various physical properties in SI.
- Determine sources of error.

Safety Precautions 

WARNING: Never “shake down” lab thermometers.

Procedure

1. Go to every station and determine the measurement requested. Record your observations in the data table on the next page and list sources of error.
 - a. Use a balance to determine the mass, to the nearest 0.1g, of the rock sample.
 - b. Use a graduated cylinder to measure the water volume to the nearest 0.5 mL.
 - c. Use three thermometers to determine the average temperature, to the nearest 0.5°C, at a selected location in the room.
 - d. Use a meterstick to measure the length, to the nearest 0.1 cm, of the stick or dowel.
 - e. Use a meterstick and string to measure the circumference of the globe. Be accurate to the nearest 0.1 cm.



(continued)

Data and Observations

Measurement and Error		
Sample at Station	Value of Measurement	Causes of Error
a.	mass = _____ g	
b.	volume = _____ mL	
c. (location)	average temp. = _____ °C	
d.	length = _____ cm	
e.	circumference = _____ cm	

Conclude and Apply

1. **Compare** your results with those provided by your teacher.

2. **Calculate** your percentage of error in each case. Use this formula.

$$\% \text{ error} = \frac{\text{your value} - \text{teacher's value} \times 100}{\text{teacher's value}}$$

3. Being within five to seven percent of the correct value is considered good. If your error exceeds ten percent, what could you do to improve your results and reduce error?

Communicating Your Data

Compare your conclusions with those of other students in your class. **For more help, refer to the Science Skill Handbook.**