

GeoLab

Measuring in SI

Suppose someone asked you to measure the area of your classroom in square cubits. What would you use? A cubit is an ancient unit of length equal to the distance from the elbow to the tip of the middle finger. Since this length varies among individuals, the cubit is not a standard unit of measure. SI units are standard units, which means that they are exact quantities that have been agreed upon to use for comparison. In this GeoLab, you will use SI units to measure various properties of rock samples.

PREPARATION

Problem

Measure various properties of rocks and use the measurements to explain the relationships among the properties.

Materials

water
250-mL beaker
graph paper
balance
pieces of string
spring scale
rock samples

Objectives

In this GeoLab, you will:

- **Measure** the area, volume, mass, and weight of several rock samples.
- **Calculate** the density of each sample.
- **Explain** the relationships among the quantities.

Safety Precautions



PROCEDURE

1. Use the information in the *Skill Handbook* to design a data table in which to record the following measurements for each sample: area, volume, mass, weight, and density.
2. Obtain rock samples from your teacher. Carefully trace the outline of each rock onto the graph paper. Determine the area of each sample and record the values in your data table.
3. Pour water into the beaker until it is half full. Record this volume in the table. Tie a piece of string securely around one rock sample. Slowly lower the sample into the beaker. Record the volume of the water. Subtract the two values to determine the volume of the rock sample.
4. Repeat step 3 for the other rocks. Make sure the original volume of water is the same as when you measured your first sample.
5. Follow your teacher's instructions about how to use the balance to determine the mass of each rock. Record the measurements in your table.
6. Again, secure each rock with a piece of dry string. Make a small loop in the other end of the string. Place the loop over the hook of the spring scale to determine the weight of each rock sample. Record the values in your data table.

GeoLab Measuring in SI

DATA TABLE

ANALYZE

- 1.** Compare the area of each of your samples with the areas determined by other students for the same samples. Explain any differences.

- 2.** Compare the volume of each of your samples with the volumes determined by other students for the same samples. Explain any differences.

- 3.** Compare the weight and mass of each of your samples with the values for these quantities determined by other students. Again, explain any differences.

GeoLab Measuring in SI

ANALYZE

4. Use your measurements to calculate the density of each sample using this formula:
 $density = mass/volume$. Record these values in your data table.

CONCLUDE AND APPLY

1. How accurate do you think your measurement of the area of each sample is? Explain.

2. What were the variables you used to determine the volume of each sample?

3. How could you find the volume of a rock such as pumice, which floats in water?

4. Does mass depend on the size or shape of a rock? Explain.
