Solids Lab

Background

Everyday, you pick up many objects, some large and some small. You may also notice that these objects have many different masses. If you pay close attention, you may find objects of the same size that have vastly different masses. Why is this? After all, if two objects are the same size, shouldn't they have the same mass? Not necessarily. Mass all depends on what objects are made of. You know from experience that a gallon of milk is much more massive than a fluffy pillow, even though the pillow may be much larger.

Experiences like these have led us to describe materials in a way that is independent of their physical sizes and shapes. The description is called **density** and can be used to compare and identify materials.

Lab Activity

You will now measure the densities of uniformly shaped (*regular*) and oddly shaped (*irregular*) solids. You will measure the densities of two regular cubes and an irregular solid. As you complete each step of the procedure, place a checkmark in the blank space to the left of the number.

_____1. Pick up one of the cubes and feel how massive it is. Put it back down and pick up the other cube. Judging by mass, are the two cubes made of the same material?

_____

_____2. Pick up the slab. Can you tell what material it is by its mass?

_____

Predict: Is Slab C the same material as Cube A or Cube B?

_____

_____3. Measure the mass of Cube A. Record your data in the table below. Measure the sides of the cube to the nearest tenth of a centimeter and calculate the volume to the nearest hundredths place by using the following formula:

length x width x height = volume

_____4. Calculate the density of Cube A. Round the density to the nearest hundredths place.

_____5. Repeat Steps 3 and 4 for Cube B and the irregular Slab C. You will need to use a different method for finding the volume of the irregular slab. Remember the Internet Density Lab? Measure just the rise of the water in the graduated cylinder. Remember, 1g/ml = 1cm^3.

_____6. Return the baggie containing 2 cubes, 1 slab, and 2 rulers to your teacher.

Solid Densities

Sample	Mass	Volume	Density
Cube A			
Cube B			
Slab C			

Debriefing

Answer the following questions based on the data you collected. Use complete sentences, of course.

1. Compare the data for the two cubes and the slab.

    A. Were any of the masses the same? _____ If so, which ones?
        _____

        _____
        _____

    B. Were any of the volumes the same? _____ If so, which ones?
        _____

        _____
        _____

    C. Were any of the densities the same? _____ If so, which ones?
        _____

        _____
        _____

2. If the two samples have the same density, you can conclude that they are made of the same material, regardless of the size differences. In this activity, the slab is made of the same material as one of the cubes. Based on your data, which cube is made of the same material as the slab?

    _____
    _____

3. Suppose you were given a substance that you could not positively identify. The sample has a mass of 243 grams and a volume of 90 cm^3. A teammate surfing the Internet discovers a list of common materials and densities shown below. Describe how you

could use the information you now have to identify the substance and tell what the substance is. (Show your calculation.)

_____
_____
_____
_____
_____

Material	Density
Acrylic Plastic	1.2
Aluminum	2.7
Brass	8
Chromium	6.5
Copper	8.9
Graphite	2.2
Lead	11.3
Manganese	7.2
Polyethylene	0.98
Polystyrene	0.05
Rubber	1.1
Silicon	4.6
Steel	7.8
Titanium	3.3
Tungsten	19
Vinyl Plastic	1.4
Wood	0.5

4. What substance was the slab made of? _____