

NAME _____

DATE _____

INSTRUCTOR _____

PERIOD _____

PARTNER(S) _____

LAB : DENSITY

INTRODUCTION: Density is the term used to describe the relationship between the mass of an object and its volume. Under given conditions of temperature and pressure, the density of a material is constant. The density of any earth material can be determined by measuring its mass and volume and using the equation:

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

OBJECTIVE: You will be able to calculate the densities of different materials and recognize that density is one of the most important properties of matter.

VOCABULARY:

mass:

weight:

volume:

displacement:

PROCEDURE:

1. Measure the *mass* of each object using a scale. Your answer will be in grams (g).
2. Find the *volume* of each object using the metric ruler and the equation: volume equals length \times width \times height ($v = l \times w \times h$) or by using the water displacement method. Your answer will be in cm^3 . *Displacement units can be in milliliters (ml).*
3. Calculate the *density* of each object by dividing the volume into the mass. (Use the equation shown above.)
4. Record these data on Report Sheet 1.
5. After completing Report Sheet 1 obtain the accepted density for the item from your instructor.
6. Using your density value and the accepted value, calculate percent deviation from the accepted value for *the item*. Use the equation found in the Earth Science Reference Tables.

REPORT SHEET 1 (show all work)

1. _____
 Mass = _____
 L = _____ W = _____ H = _____
 Volume = _____
 Density = _____

2. _____
 Mass = _____
 L = _____ W = _____ H = _____
 Volume = _____
 Density = _____

3. _____
 Mass = _____
 Volume = _____
 Density = _____

4. _____
 Mass = _____
 Volume = _____
 Density = _____

5. _____
 Mass = _____
 Volume = _____
 Density = _____

6. _____
 Mass = _____
 Volume = _____
 Density = _____

7. _____
 Mass = _____
 Volume = _____
 Density = _____

CALCULATE % ERROR

- Show all work.
- Label with the correct units.

1. ALUMINUM BAR

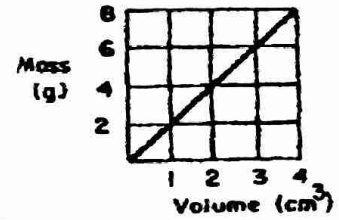
Your Value _____

Accepted Value _____

% Error _____

Applied Density Questions

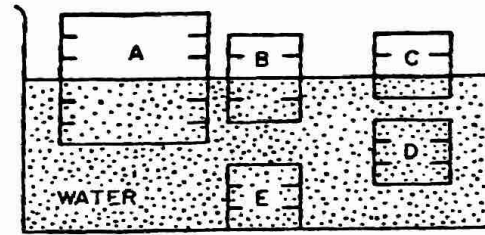
1. The graph shows the relationship between mass and volume for a certain material. What is the density of this material? Show your work include the proper units.



Base your answers to the following four questions on the diagram.

2. Which material has the greatest density?

3. Which materials have the same density?



4. Block A is cut into several pieces. When compared to the original block, the density of its piece will be....

5. Material D is removed from the container and compressed to half its size. What do you predict will happen when it is returned to the container?

6. Why do ships float higher in sea water than they do in fresh water?

- Sea water is more dense than fresh water
- Sea water is less dense than fresh water
- Sea water and fresh water have the same density
- The ship took on more cargo when it went from the fresh water into the salt water

7. As air on the surface of Earth warms, the density of the air

- decreases
- increases
- remains the same

8. As the temperature of a sample of water decreases from 4°C to 0°C , the density of the water will

- decrease
- increase
- remain the same

DISCUSSION QUESTIONS: (Answer in Complete Sentences)

1. What is the effect of shape on the density of samples of the same material?
2. The aluminum bar is cut in half. What is the density of each half compared to the original density of the bar?
3. Of the three phases of matter, which phase has the greatest density for most substances?
4. Water is an unusual earth material because it is densest in which phase?
5. There is water on the pan of the scale as you measure the mass of a mineral. If you were to ignore the water, what would be the effect on your density calculation?

CONCLUSION: Describe the procedure for determining the density of any material.
(Be complete.)