

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

### Topic 1 - 3: REVIEW QUESTIONS -

#### DETERMINING THE DENSITY OF EARTH MATERIALS

1. Less dense materials float on more dense materials.
2. Density is the amount of mass in a given volume (mass per unit volume).
3. The formula for density is:

$$\text{density} = \frac{\text{mass}}{\text{volume}} \quad d = \frac{m}{v}$$

4. The mass of an object is obtained by weighing it (the value is in grams)
5. The volume of *an* object can be found by a number of methods. To determine, the volume of an object, use the following:

A. Measuring directly: Rectangular solid:  $V = l \times w \times h$  (Volume = Length x Width x Height)

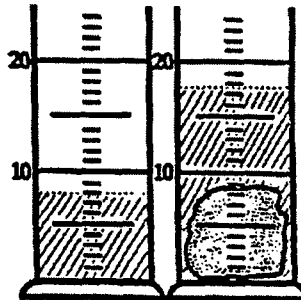
$$\text{Sphere: } V = \frac{4}{3} \pi r^3 \quad (\text{Volume} = \frac{4}{3} \times \pi \times \text{the radius cubed})$$

B. Water displacement: Place the object in a container of water and measure the amount of water that has been displaced (the difference between the initial water level and the level of water after the object has been placed in the water).

#### Questions:

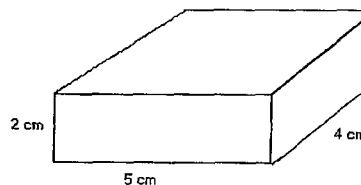
1. Refer to the diagram below to answer this question. What is the volume of the rock being measured?

- a) 8 ml
- b) 9.5 ml
- c) 10 ml
- d) 4. 11.5 ml



2. The diagram below represents a solid object with a mass of 160 grams. What is the density of the object?

- a) .25 g/cm<sup>3</sup>
- b) 4 g/cm<sup>3</sup>
- c) 120 g/cm<sup>3</sup>
- d) 160 g/cm<sup>3</sup>



3. If a small sphere with a mass of 90 grams displaces 12 ml of water, what is its density?

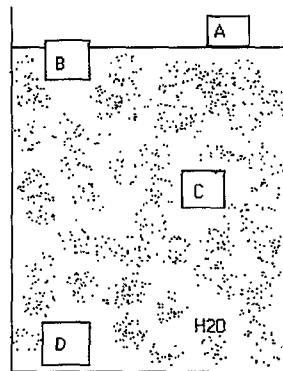
- a)  $7.5 \text{ g/cm}^3$
- b)  $12 \text{ g/cm}^3$
- c)  $90 \text{ g/cm}^3$
- d)  $102 \text{ g/cm}^3$

4. What is the density of an irregularly shaped object, which has a volume of 24 cubic centimeters and a mass of 144 grams?

- a)  $4 \text{ g/cm}^3$
- b)  $6 \text{ g/cm}^3$
- c)  $24 \text{ g/cm}^3$
- d)  $30 \text{ g/cm}^3$

5. Substances A, B, C and D are at rest in the container of liquid shown at the right. Which substance probably has the same density as the liquid?

- a) A
- b) B
- c) C
- d) D



6. Scientists have learned from Newton's Universal Law of Gravitation and other earth measurements that the average density of the earth is about  $5.5 \text{ g/cm}^3$ . If a typical earth sample taken from the crust is 50 grams with a volume of  $20 \text{ cm}^3$ , what then is the average density of the earth's crust?

- a)  $2.0 \text{ g/cm}^3$
- b)  $2.5 \text{ g/cm}^3$
- c)  $20 \text{ g/cm}^3$
- d)  $25 \text{ g/cm}^3$

### RELATING DENSITY TO MASS, VOLUME AND TEMPERATURE

1. If the volume of different materials is the same, the material with the larger mass will have a higher density.
2. If materials have equal masses, the material with the least volume. (the smallest one) is most dense.
3. Changes in temperature cause changes in volume which affect density.
4. As the volume of a gas or a liquid increases, and the mass remains the same the density decreases.
5. As the volume of a gas or a liquid decreases, and the mass remains the same, the density increases.
6. Atmospheric motions and ocean circulation are due to changes in density, caused by the effect of temperature changes on volume.

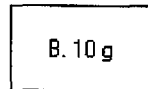
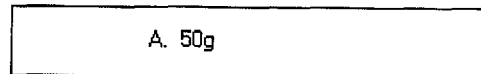
## Questions:

1. If we were to take a sample of steel and cut it into 4 different pieces of different pieces and shapes:

- a) the smallest would be the least dense.
- b) the lightest would be the most dense.
- c) the largest and heaviest would be the most dense.
- d) they would all have the same density.

2. The solid blocks shown below are all made of the same material. Which is the most dense?

- a) A
- b) B
- c) C
- d) they are all the same.



3. As the temperature of a gas decreases, the density generally

- a) increases.
- b) decreases.
- c) decreases, then increases.
- d) remains the same.

## THE PECULIAR NATURE OF WATER

- 1. Most materials are densest in their solid state.
- 2. Water is most dense in the liquid state - at 4°C.
- 3. Ice expands when freezing.
- 4. Ice is less dense than water
- 5. Seasonal mixing of lake water is due to water being most dense at 4°C.
- 6. Lakes freeze from the top down.
- 7. In winter, lakes are warmest on the bottom.
- 8. The existence, of fish and surviving in cold climates depends on the less dense ice floating on the denser water.

## QUESTIONS

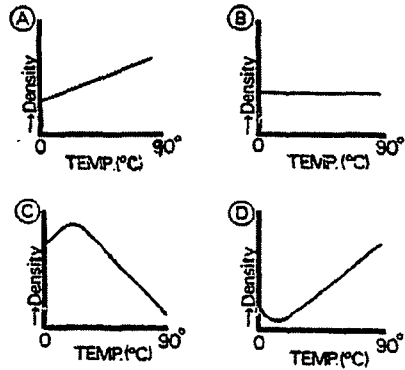
1. Which of the following is the most dense?

- a) lead in the liquid state
- b) lead in the solid state
- c) lead in the gaseous state
- d) they are the same density in any state

2. As the temperature of water increases from 0°C to 8°C the density of the water will:
- increase.
  - increase, then decrease.
  - decrease.
  - remain the same.

3. Which of the graphs to the right best represent the relationship between water density and temperature?

- A
- B
- C
- D



- Measure the length of this line in centimeters to the nearest tenth: \_\_\_\_\_
- The mineral sample with the dimensions of (4.2 cm x 2.4 cm x 1 cm) has a mass of 27.8 grams. What is the density? \_\_\_\_\_
- An object floats in a liquid. Write a complete sentence to describe the relative densities of the liquid and the object.
- What changes do not affect density? \_\_\_\_\_
- Solids are usually (more) (less) dense than liquids.
- Ice is (more) (less) dense than liquid water.
- Water at \_\_\_\_\_°C is a (liquid) (solid) (gas) and is (most) (least) dense.
- Compressing an object to half its size will cause the density to \_\_\_\_\_

Use the graph at right to answer 9 - 12.

- What is the density? \_\_\_\_\_
- If volume is 4 cm<sup>3</sup> mass is \_\_\_\_\_
- If mass is 18 g, volume is \_\_\_\_\_
- Plot the graph for liquid water.

