

Name \_\_\_\_\_ HR \_\_\_\_\_ Date \_\_\_\_\_

## Mass, Volume, and Density Study Guide

### Definitions:

**Matter** – anything that has a mass and volume.

**Mass** – the amount of matter in an object. The amount of “stuff” is measured in grams.

**Volume** - the amount of space an object takes up. We use  $\text{cm}^3$ , mL or L to measure volume. The formula to calculate volume is **L x W x H** for regular objects or **Finish mL – Start mL** for irregular objects.



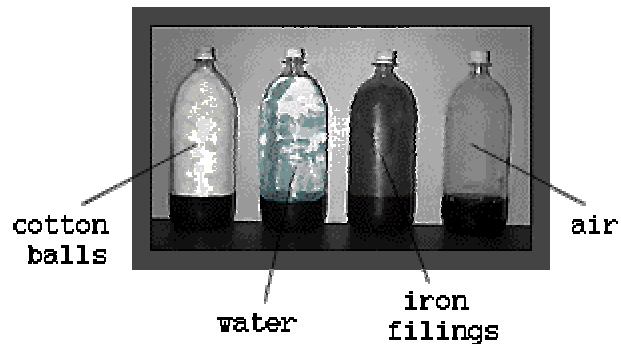
**A cube measuring 1cm x 1cm x 1cm takes up 1cm<sup>3</sup> of space, holds 1mL of water and has a mass of 1 gram!**

$$1 \text{ mL} = 1 \text{ cm}^3 = 1 \text{ g}$$

**Density** - the ratio of mass to volume. Everything has density, it is how much “stuff” is packed into a given space. The formula used to find density is: Density = mass/volume (**D = M/V**) and is measured as **g/cm<sup>3</sup>**. The density of water is **1.0 g/cm<sup>3</sup>**.

Use this picture to answer the following questions:

The volume of each soda bottle is 2 Liters, or 2,000 mL.



1. List 3 – 4 characteristics that are the **same** for all 4 soda bottles:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

2. List 3 – 4 characteristics that are the **different** for all 4 soda bottles:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

3. Which soda bottle do you think has the most **mass**? Explain: \_\_\_\_\_

\_\_\_\_\_

4. Which soda bottle do you think has the most **amount of stuff inside**? Explain why you think so: \_\_\_\_\_

\_\_\_\_\_

Use this formula:      **Density** =  $\frac{\text{mass}}{\text{volume}} = \text{g/cm}^3$

**Steps used to solve the problem:**

1. Write the formula:  $D = \frac{M}{V}$
2. Substitute the numbers into the formula:  $D = \frac{100 \text{ grams}}{500 \text{ cm}^3}$
3. Solve:  $D = 0.2 \text{ g/cm}^3$

**Density Problems:**

1. If the volume of the **water** in the soda bottle is  $2,000 \text{ cm}^3$  and the mass is 2,000 grams, what is the density of the **water** in the bottle?
  1. Write the formula:
  2. Substitute the numbers into the formula:  $D = \underline{\hspace{2cm}}$
  3. Solve:  $D =$
  
2. If the volume of the **cotton** in the soda bottle is  $2,000 \text{ cm}^3$  and the mass is 50 grams, what is the density of the **cotton** in the bottle?
  1. Write the formula:
  2. Substitute the numbers into the formula:  $D = \underline{\hspace{2cm}}$
  3. Solve:  $D =$
  
3. If the volume of the **iron filings** in the soda bottle is  $2,000 \text{ cm}^3$  and the mass is 15,720 grams, what is the density of the **iron filings** in the bottle?
  1. Write the formula:
  2. Substitute the numbers into the formula:  $D = \underline{\hspace{2cm}}$
  3. Solve:  $D =$

**Density Problems – pt 2**

Find the density of these objects as well as if they will float in water.

Object	Mass - grams	Volume - cm <sup>3</sup>	Density - g/cm <sup>3</sup>	Float/Sink Water 1.0g/cm <sup>3</sup>
<b>A. Corn Syrup</b>	<b>69</b>	<b>50</b>		
<b>B. Wood</b>	<b>7</b>	<b>100</b>		
<b>C. Mercury</b>	<b>408</b>	<b>30</b>		
<b>D. Copper Wire</b>	<b>220</b>	<b>25</b>		
<b>E. Plastic</b>	<b>46.5</b>	<b>50</b>		

- A.**
1. Write the formula:
  2. Substitute the numbers into the formula:  $D = \underline{\hspace{2cm}}$
  3. Solve:  $D =$
- B.**
1. Write the formula:
  2. Substitute the numbers into the formula:  $D = \underline{\hspace{2cm}}$
  3. Solve:  $D =$
- C.**
1. Write the formula:
  2. Substitute the numbers into the formula:  $D = \underline{\hspace{2cm}}$
  3. Solve:  $D =$
- D.**
1. Write the formula:
  2. Substitute the numbers into the formula:  $D = \underline{\hspace{2cm}}$
  3. Solve:  $D =$
- E.**
1. Write the formula:
  2. Substitute the numbers into the formula:  $D = \underline{\hspace{2cm}}$
  3. Solve:  $D =$