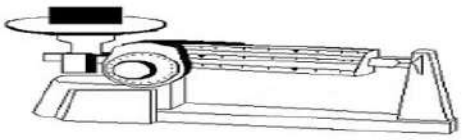
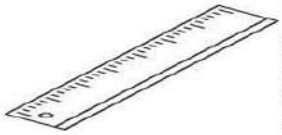
Name _____ Per ____ Date_____ Mail Box _____

DENSITY LAB PART 1 – MEASURMENT SKILLS





$$D = \frac{m}{V}$$

**Answer the following and reference your notes. Is the measurement and associated units correct or incorrect? Place a check ✓ if correct an X if incorrect.**

1. The density equaled 22g/mL ___
2. The volume is equal to 21.5g ___
3. The density equaled 0.8g/cm$^3$ ___
4. The mass equals 54mL ___
5. The mass equaled 8kg___
6. The volume equaled 10dekaliters ___
7. The mass equaled 62.3centigrams___
8. The density equaled 0.003kg/m$^3$ ___
9. The volume equaled 0.003g/m$^2$ ___
10. The volume equaled 123.456hg$^3$___
11. The triple beam measured 567L___
12. The graduated cylinder reads 89km___

---

**Matching:**

1. Mass ____ It is the amount of *space* occupied by a given sample of matter. The SI units can be for that of liquids or solids cubed.
2. Volume ____ It is the measure of the *amount* of matter an object has. The SI units are grams, kilogram (heavy) milligram (light).
3. Density ____ This is a *derived value* found by dividing mass by volume. The SI units are a metric of mass divided by a metric of volume.

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**Measuring Rectangular Solids:** Use the tools provided to calculate the mass, volume, and density of each of the blocks provided at your lab tables. You can do them in any order.

**Label all boxes with proper units to the nearest tenth. Acceptable error: (+ or – 1)**

| Object | Mass | Volume | Density |
|---|---|---|---|
| Block #1<br>Wooden cube | | | |
| Block #2<br>White block | | | |
| Block #3<br>Aluminum Block | | | |
| Block #4<br>Other (……) | | | |

**Measuring Irregular Shaped Solids:** Use the tools provided to calculate the mass, volume, and density of each of the blocks provided at your lab tables. You can do them in any order.
**Label all boxes with proper units to the nearest tenth. Acceptable error: (+ or – 1)**

| Object | Mass | Volume | Density |
|---|---|---|---|
| Cylinder #1<br>Brass | | | |
| Cylinder #2<br>Aluminum | | | |
| Cylinder #3<br>Polymer 1 Black | | | |
| Cylinder #4<br>Polymer 2 Grey | | | |

---

**Write Up Questions:**

| Type of Wood | Density ($g/cm^3$) |
|---|---|
| Pine | 0.373 |
| Hemlock | 0.431 |
| Elm | 0.554 |
| Birch | 0.601 |
| Ash | 0.638 |
| Maple | 0.676 |
| Oak | 0.711 |

**1.** Reference the table. Which of the following woods is likely to be the most resistant to weathering (hard)? _____

**2.** Which of the following woods would you suspect to be the most pliable (soft)? _____

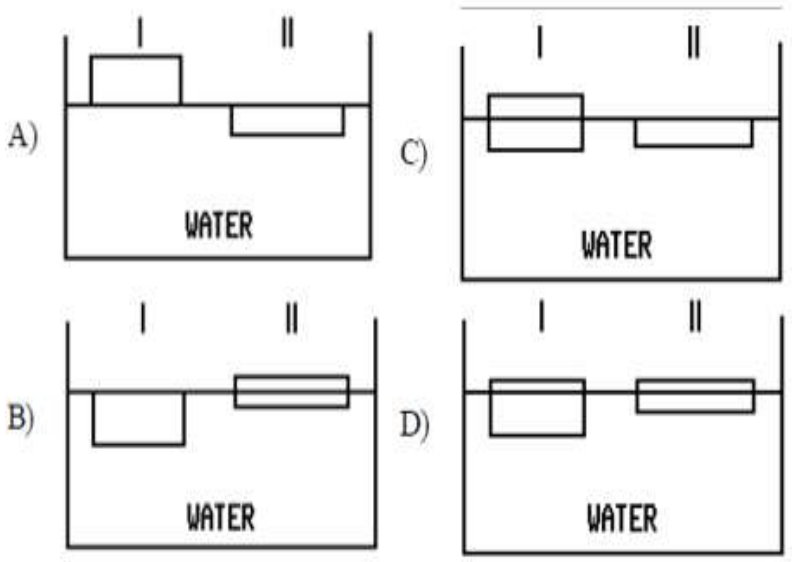
Consider the diagram on the right for 3 - 6. Write **T** True or **F** False on the line
Label the following states true or false. Hypothetical block of wood in water diagram below.

**3. Consider image** A) _____
I is pine while II is maple

**4. Consider image** B) _____
I might be hemlock while II is maple

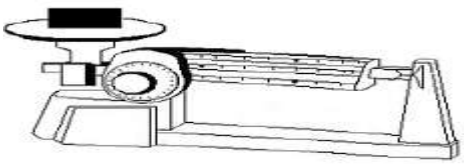
**5. Consider image** C) _____
I is birch while II might be maple

**6. Consider image** D) _____
I might be pine while II might be oak



Name _____ Per ____ Date_____ Mail Box _____

**DENSITY LAB PART 2 –Amazing Layer Density Tower**



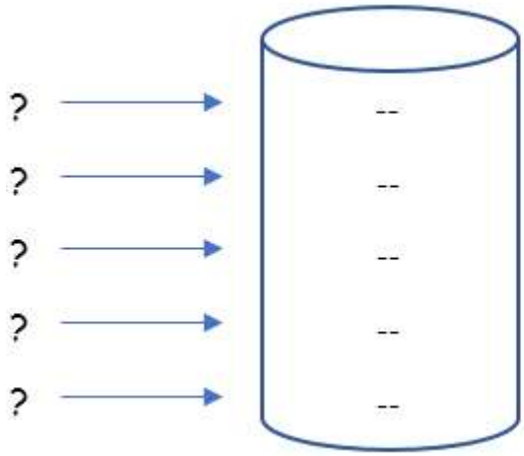
$$D = \frac{m}{V}$$

Objective:
Accurately find the density of two common liquids provided by Mr. Burns. milk and isopropyl alcohol

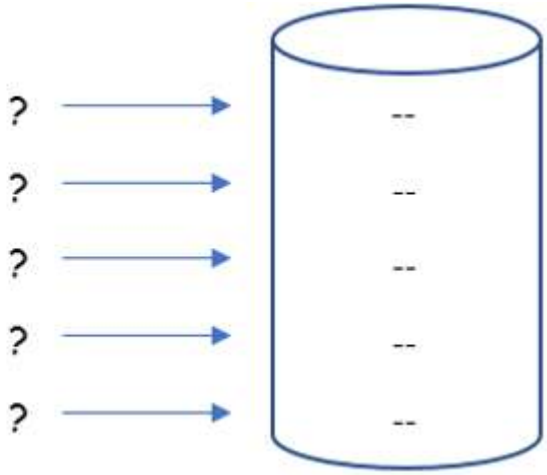
Data table:
1. Find the mass and record the volume of each of the liquids provided and report density.

| Object | Mass | Volume | Density |
|---|---|---|---|
| Liquid #1 (……) | | | |
| Liquid #2 (……) | | | |
| Liquid #3 (……) | | | |
| Liquid #4 (……) | | | |
| Liquid #5 (……) | | | |

Create a hypothesis diagram of how the liquids will stack themselves in the graduated cylinder.
Draw & Label here:




What actually happened? Draw Here:



Procedures:

1. **SLOWLY** pour the milk and then dish soap into the cylinder.
2. Don't add water. Density of water from classroom tap calculated as of 2019 was 0.93g/ml. Standard reference by contrast in 1 g/ml. Debate/ discuss
3. **Slowly** pour the vegetable oil, and then finally rubbing alcohol into the center of the container.
4. Wait for the liquids to settle
5. Once the liquids settle and you have completed a hypothesis, place various solid **objects (provided by Burns)** into the graduated cylinder and note the results.

---

Questions:

1. Based on your observations of how the liquids have stratified themselves where do you think (object 1) _____ will ultimately settle based on your estimation of its density in the Amazing liquid density column?

_____

_____

2. Write a hypothesis. Where do you think (object 2) _____ will end up when dropped into the Amazing liquid density column. Was your hypothesis correct or incorrect? Explain/ elaborate.

_____

_____

3. A solid can be less dense than a liquid. Explain, defend, elaborate on this statement.

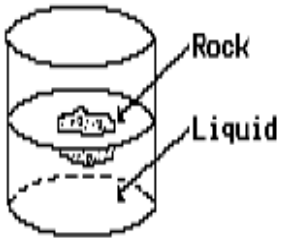
_____

_____

_____

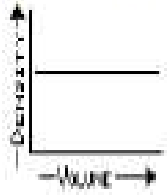
SEE AND ANSWER ALL MULITPLE CHOICE

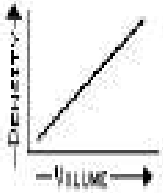
The diagram below shows a glass jar containing a clear liquid and a floating rock. Which conclusion about the relative density of the rock and the liquid is true?

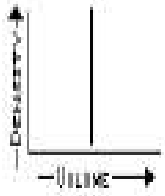


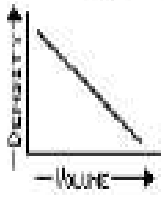

A) The rock and the liquid have the same density.
B) The rock is less dense than the liquid.
C) The rock is more dense than the liquid.

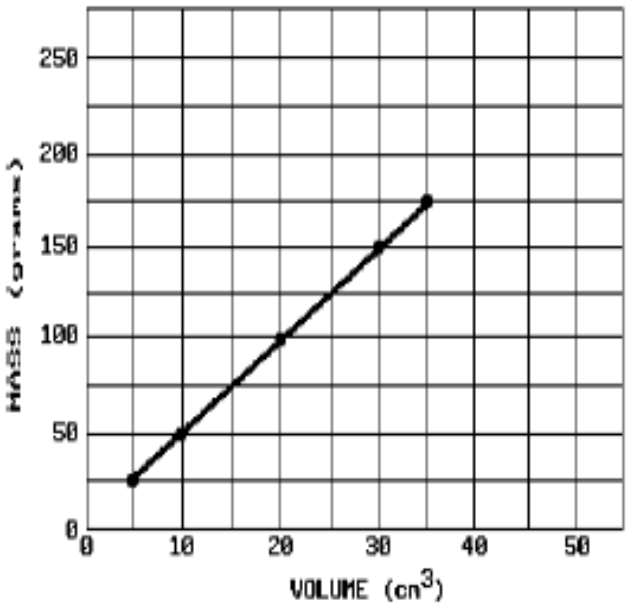
A student calculates the densities of five different pieces of aluminum, each having a different volume. Which graph best represents this relationship?

A)



C)



B)



D)





The graph above shows the mass and volume for five different samples of the mineral pyrite.

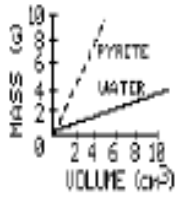
9) According to the graph above, the density of pyrite is about

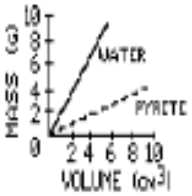
A) 0.5 g/cm$^3$
B) 7.5 g/cm$^3$
C) 2.5 g/cm$^3$
D) 5.0 g/cm$^3$

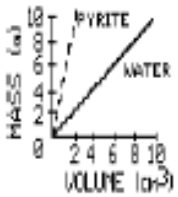
10) If one of the original samples of pyrite were cut in half, the density of each half would be

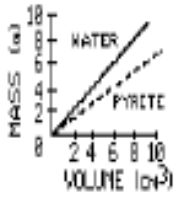
A) less than the original sample
B) the same as the original sample
C) greater than the original sample

11) The density of pyrite and the density of water were plotted on the same graph. Which diagram below best represents how the graph should appear?

A)



C)


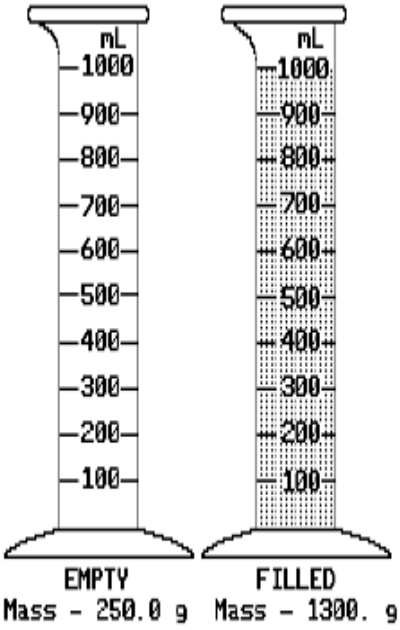

B)



D)



12) If a sample of pyrite has a volume of 50 cm$^3$, its mass would be

A) 350 g
B) 15 g
C) 150 g
D) 250 g

As shown below, an empty 1,000.-milliliter container has a mass of 250.0 grams. When filled with a liquid, the container and the liquid have a combined mass of 1,300. grams.

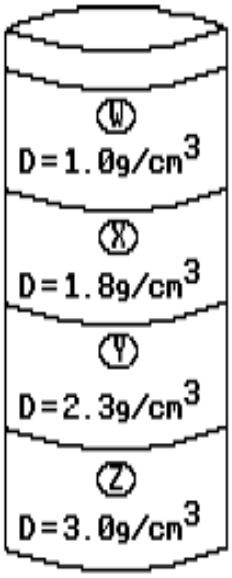



What is the density of the liquid?

A) 0.95 g/mL
B) 1.05 g/mL
C) 1.00 g/mL
D) 1.30 g/mL

SEE AND ANSWER ALL MULITPLE CHOICE

The diagram below represents a cylinder which contains four different liquids, *W*, *X*, *Y*, and *Z*, each with a different density (*D*) as indicated. A piece of solid quartz having a density of 2.7 g/cm$^3$ is placed on the surface of liquid *W*. When the quartz is released, it will pass through




A) *W* and *X*, but not *Y* or *Z*
B) *W*, *X*, *Y*, and *Z*
C) *W*, but not *X*, *Y*, or *Z*
D) *W*, *X*, and *Y*, but not *Z*

As a volume of air expands due to heating, the density of this air will

A) remain the same
B) increase
C) decrease