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Mr. Gasser

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Lab #1

## **The Measurement Lab**

**Purpose:** The purpose of this lab is to find the density of three different objects made of aluminum.

**Hypothesis:** I predict that all three densities of the objects should be pretty much the same because they are all made of aluminum.

### **Materials:**

- Aluminum cube
- Aluminum foil
- Aluminum rectangular solid
- Scale
- Scissors
- Micrometer
- Ruler

### **Procedure:**

- First, we cut the foil into a rectangle shape as best as we could.
- Next, we used the micrometer to measure the height of the foil.
- Then, we measured the rest of the foil, the cube, and the rectangular solid with the ruler. We found the length, width, and height of all of them.
- After we measured them with the ruler, we used the balance to measure the mass of all three objects.
- After we completed this part, we used our data to calculate the density of the three aluminum objects.

Data:

	Length	Width	Height	Volume
Cube	3.00 cm	3.00 cm	3.00 cm	27.0 cm <sup>3</sup>
Foil	14.91 cm	10.11 cm	.003 cm	.5 cm <sup>3</sup>
Rectangular solid	7.60 cm	2.50 cm	.60 cm	11 cm <sup>3</sup>

	Mass
Cube	83.18 g
Foil	.70 g
Rectangular solid	34.21 g

*Are you sure*

Calculations:

Volume

Volume = Length x Width x Height

Cube:  $3.00 \text{ cm} \times 3.00 \text{ cm} \times 3.00 \text{ cm} = 27.0 \text{ cm}^3$

Foil:  $14.91 \text{ cm} \times 10.11 \text{ cm} \times .003 \text{ cm} = .5 \text{ cm}^3$

Rectangular solid:  $7.60 \text{ cm} \times 2.50 \text{ cm} \times .60 \text{ cm} = 11 \text{ cm}^3$

## Density

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\text{Cube: } \frac{83.18 \text{ g}}{27.0 \text{ cm}^3} = 3.08 \text{ g/cm}^3$$

$$\text{Foil: } \frac{.70 \text{ g}}{.5 \text{ cm}^3} = 1 \text{ g/cm}^3$$

$$\text{Rectangular solid: } \frac{34.21 \text{ g}}{11 \text{ cm}^3} = 3.1 \text{ g/cm}^3$$

## Conclusion Statement:

After completing this lab, and finding the densities of all three aluminum objects, I have come to the conclusion that not all three objects came up with the same density like I had predicted in the beginning. The cube and the rectangular solid were very, very close. The cube's density was  $3.08 \text{ g/cm}^3$  and the density of the rectangular solid was  $3.1 \text{ g/cm}^3$ . However, the aluminum foil differed. The density of the foil was  $1 \text{ g/cm}^3$ .

## Sources of Error:

There are many different sources of error that could have caused the density of the foil to be altered. The first example of a possible source of error would be the ruler. We could have read the ruler slightly wrong or estimated off a little bit when we were guessing the next decimal place. Another possible source of error is the micrometer that we used as a class. It was really somewhere between  $.003 \text{ cm}$  and  $.004 \text{ cm}$ . This also could have thrown off our results slightly. Also, the foil might not have been cut in an exact rectangle. One end of the foil that we were measuring could be slightly longer or shorter than the other end. Lastly, I noticed that one side of the foil is shiny and one is not. Therefore, it is coated with something on one side, so it is not 100% aluminum. It is very possible that the coating has a lower density than pure aluminum.