Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Density of Solids – How Sweet it is!

**Purpose**

The purpose of this lab is to investigate density by determining which is more dense, a Snickers or a Three Musketeers bar.[[1]](#endnote-2)

**Procedure**

 **Materials**

1. Snickers 5. Cup
2. Three Musketeers 6. Water
3. Ruler 7. Knife
4. Triple beam balance 8. Paper towel

**Sequence of Steps**

1. Read the “Background” section for this lab. Highlight significant information and use this as a resource when completing the lab.
2. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Unwrap, but DO NOT EAT YOUR CANDY!!!
3. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Measure the length, width, and height of the snickers bar in centimeters. Record your findings in “observations”.
4. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Determine the volume of the snickers bar by multiplying the length by the width, then by the height. Because you are multiplying the units and well as the numbers, this will give you an answer in cm3. Record below your findings in “observations”.
5. Determine the mass of the snickers bar on the triple beam balance. Record in “observations”.
6. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Repeat steps 2-5 for the Three Musketeers Bar.
7. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Determine the density of each bar by dividing the mass by the volume. Show your work and record in “observations”.
8. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Knowing that the density of water is 1 g/cm3, predict whether each bar will float or sink in water. Record your prediction.
9. Drop each bar into the water, observe, IMMEDIATELY REMOVE, and record below.
10. Cut each bar in half vertically. Draw and label what you see.
11. Bring your work to your teacher to view your results.

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**BACKGROUND**

 Density is a measure of how tightly packed the particles are in a substance. It is often easiest to think of density in terms of how heavy something is, but this does not always give us the best picture. For example a kilogram of feathers has the same mass as a kilogram of gold. They do not, however, have the same density. That is the particles (atoms) of gold are much closer together than are the feathers. Therefore, a kilogram of feathers would take up significantly more space than a kilogram of gold. Conversely, if you had two identical bags, one full of gold and one full of feathers, the bag full of gold would have a much greater mass. Since it is not easy to picture what density really is, we need a better way to talk about and find the density of a substance. We can use two important pieces of information from the above example, mass and volume to calculate the density. Mass is a measure of the amount of “stuff” that makes up a substance. The “stuff” is more accurately called matter. Matter can be an atom, a molecule, or an entire object. Basically, anything you can think of is matter. In general, the more massive an object is, the heavier it is. Volume is the amount of space something takes up. The more space a substance takes up, the greater the volume.

The technical definition of density is the amount of matter in a given volume. That is, how much “stuff” is packed into a certain amount of space? Therefore, if you know the mass and volume of a substance, you can very easily calculate the density. The formula used to calculate density is:

Density = mass

volume

There are many units that can be used to express density. Here are a few common examples: g/ml (grams per milliliter), g/L (grams/liter), g/cm3 (grams per cubic centimeter), g/cc (grams per cubic centimeter.) For example, if it was determined that a box had a mass of 150 g and a volume of 15 cm3, then the density would be equal to 10 g/cm3. Water has a density of 1 g/ml or 1 g/cm3. That means that every ml of water will have a mass of 1 g.

**HYPOTHESIS**: If a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has particles that are packed more tightly than a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is more dense than a

**![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]() Observations**

VOLUME

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CANDY** | **LENGTH (cm)** | **WIDTH (cm)** | **HEIGHT (cm)** | **VOLUME (cm3) – show work** |
|  |  |  |  |  |
|  |  |  |  |  |

DENSITY

|  |  |  |  |
| --- | --- | --- | --- |
| **CANDY** | **MASS (g)** | **VOLUME (cm3)** | **DENSITY (g/cm3) – show work** |
|  |  |  |  |
|  |  |  |  |

WATER TEST

|  |  |  |
| --- | --- | --- |
| **CANDY** | **PREDICTION (sink or float)** | **OBSERVATIONS (sink or float)** |
|  |  |  |
|  |  |  |

WHAT’S INSIDE **Snickers Three Musketeers**

**ANALYSIS**: (Answer using complete sentences and actual data.)

1. Which candy bar is more dense? Explain how you know using actual data and by comparing the two.
2. What do you predict is the cause of the difference in densities between the two candy bars? Explain.
3. Draw and label a subatomic picture of the two pieces of candy. You can use dots to represent the molecules.

 **Snickers Three Musketeers**

1. Looper, Jim (2008).How Sweet it Is, Lab. *Sheldon High School Science Dept.* [↑](#endnote-ref-2)