Which Candy Bar Really “Satisfies” Your Hunger?

If Density is the amount of matter (mass) that will fit in a given space (volume), then wouldn't the candy bar with the highest density satisfy your hunger the best? So which candy bar has the highest density, Milky Way or Three Musketeers? Let's find out!

Buoyancy is the ability of an object to float in water or air. As we discovered in class, the density of pure water is always 1.0g/cm³. An object with a density of more than 1.0g/cm³ will sink and an object with a density of less than 1.0g/cm³ will float. Will either of the candy bars sink? or float? Let's find that out too!

Density and Buoyancy are both physical properties of matter. Remember – One milliliter equals one cubic centimeter (1.0mL = 1.0cm³).

Define the Problem

Which candy bar has the greater density? Milky Way or Three Musketeers?

Research

Density is calculated by finding the object's mass and volume and using the formula

\[
\text{Density} = \frac{\text{Mass}}{\text{Volume}}
\]

Form a Hypothesis

If the __________________ is placed in water then it will ________________.

If the __________________ is placed in water then it will ________________.

Materials

2 “Fun Size” candy bars – (1 Milky Way and 1 Three Musketeers)
Triple Beam Balance
Metric Ruler
Small Beaker of Water (about half full)
Paper Towel
Plastic Knife
Calculator and Lab Sheet
Procedure

1. Remove the wrappers from the candy bars and place them on the paper towel. On the paper towel, write the name beside each type of candy bar.

2. Fill the empty beaker about half full with tap water.

3. Using the triple beam balance, measure the mass for each candy bar. Record your measurements in the data table below.

4. Carefully measure the length, width, and height of each candy bar. Record your measurements in the table below.

5. Calculate the volume of each candy bar using the formula $V = L \times W \times H$. Record your calculations in the table.

6. Calculate the density for each candy bar using the data from the table.

   Milk Way – mass $\frac{\text{mass}}{\text{volume}} = \frac{\text{mass}}{\text{volume}} = \frac{\text{mass}}{\text{volume}}$

   3 Musketeers - mass $\frac{\text{mass}}{\text{volume}} = \frac{\text{mass}}{\text{volume}} = \frac{\text{mass}}{\text{volume}}$

7. Based on your density calculation for each candy bar, and knowing that the density of water is 1.0 g/cm$^3$ - would you like to change your prediction? If so, change it now.

Data

<table>
<thead>
<tr>
<th>Candy Bar</th>
<th>Mass (g)</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Volume cm$^3$</th>
<th>Density g/cm$^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milky Way</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Musketeers</td>
<td></td>
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</tr>
</tbody>
</table>

Observations

1. One at a time, place each candy bar in the beaker of water. Record your observation below. (floats or sinks)

   The Milky Way ___________________________ in water.

   The 3 Musketeers ___________________________ in water.
2. Using the plastic knife, cut each candy bar in half and draw what you see inside of each candy bar.

![Milky Way](image1)

![3 Musketeers](image2)

**Analysis and Conclusion Questions**

1. Was your hypothesis for each candy bar correct? Explain.

2. Which candy bar was the most dense or “satisfying”?

3. Based on your data and observations, what makes one candy bar more dense than the other?

4. What could you do to the 3 Musketeers bar to make it sink?

5. Do the half bars of candy have a different mass and volume than when they were a whole candy bar? Explain.

6. Would the half bars of candy still sink or float like they did when they were a whole candy bar? Explain.