Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Partner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**LAB: Practice Scientific Method with Chewing Gum**

***Question: Does the size (mass) of a piece of gum affect how long the flavor of a piece of gum lasts? (i.e.bigger gum = more flavor?).***

In this lab you will follow directions and compare the starting and ending mass for each of the 3 flavors of gum to find which has the longest lasting flavor.

**Hypothesis:** (should be stated as: “If….and….then…”) **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Independent Variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Dependent Variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Control Variables: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Materials:** 2 pieces each of 3 different brands of gum, wax paper**,** triple beam balance

**Pre-Lab Questions** (These must be answered before you can start the lab)

1. How many sticks of each brand of gum do you need? \_\_\_\_\_\_\_\_\_\_\_
2. What units of measurement are being used in this lab? \_\_\_\_\_\_\_\_\_\_
3. Why do you want the gum to be dry? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. How do you calculate change in mass? 5) How do you calculate % change in mass?
5. When finished with the pre-lab questions, have your instructor initial here\_\_\_\_\_

**Procedure:**

1. Obtain 2 pieces of each brand of gum from the cart.
2. Obtain 3 square pieces of wax paper from the cart.
3. Set up your triple beam balance on a flat surface. Make sure all the riders are to the left. Make sure your balance is “Zeroed”.
4. Place the wax paper on the pan of the triple beam balance and record the mass.
5. Unwrap your two pieces of the same gum (make sure you wash your hands first before touching the gum).
6. Place both pieces of unwrapped gum on the wax paper and record the **Initial Mass** in the **first row** (T0) of the data table below***.***
7. Leave the wax paper on the balance. Place both piecesof gum in your mouth, Start timer, and chew until all the flavor is gone.
8. When all the flavor is gone, record the time.
9. Place the gum between your teeth and suck it dry. (Why would you want the gum to be dry?)
10. Using the same piece of wax paper, place chewed gum on wax paper to determine the **Final Mass**. Record in chart below.
11. Repeat for each gum.
12. Clean up: Discard gum and wax paper into garbage and have teacher initial this line \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Data Table / Results**

**Table 1: Mass of 3 brands of gum after 2 minute intervals of chewing.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Brand 1:**  | **Brand 2:**  | **Brand 3:** |
| **Initial Mass (g)**(Before chewing) |  |  |  |
| Time to lose flavor |  |  |  |
| **Final Mass (g)**(after chewing)  |  |  |  |
| **Change in Mass**(Final Mass – Initial Mass) |  |  |  |
| **% Change in Mass**(Change in Mass / Initial Mass) x 100 |  |  |  |

**ANALYSIS:**

1. Graph your data by plotting a BAR GRAPH comparing the “before” and “after” mass for each brand of gum.
2. Create another bar graph of “Time to lose flavour” for each brand of gum.

Label the x-axis (horizontal) with the gum brands and y-axis (vertical) with percent change in mass or the time. Units for each axis, legend, and a descriptive title of the graph.

**CONCLUSION:**

1. Restate the purpose of the lab: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Which brand had the longest lasting flavor? Why do you think it did? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Did the data support your hypothesis? Why or why not? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Why did we measure % Change in Mass? Why not just Change in Mass? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Why is the gum losing mass as you chew the gum? Where does it go? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. EVALUATE: What were some possible sources of error with this lab? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_7) What could you do differently to avoid problems stated above? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. QP: What do you think would happen to the mass of the gum if you kept chewing the gum for a few hours? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. QP: We measured another variable in this activity. State another Scientific Question that we could test concerning \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Check: Did you…
* Answered all the questions in complete sentences?
* Give your graph a title?
* Have you labelled all components of your graph? With units?
* Stapled your graph to your lab?

Assessment:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Competencies | Emerging | Developing | Proficient | Extending |
| **Communication**I used complete sentences and appropriate scientific terms.I can clearly represent my data in graphical form. |  |  |  |  |
| **Questioning and Predicting**I can write a complete hypothesis that includes variables.I can write a specific and testable question |  |  |  |  |
| **Evaluating**I can discuss sources of error and suggest improvements |  |  |  |  |

Lesson Plan:

Who chews gum? What is your favorite gum? What makes a good gum? Discuss.

Write down suggestions

On board: what factors affect flavor/ how long it lasts?

How can we test this? Write Hypoth, id variables,

Move to lab, read prelab Qs.

Revamp Lab Q

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Brand 1:**  | **Brand 2:**  | **Brand 3:** |
| **Initial Mass (g)**(Before chewing) |  |  |  |
| **Final Mass (g)**(after chewing)  |  |  |  |
| **Change in Mass**(After – Before) |  |  |  |
| **% Change in Mass**(Change in Mass / Initial Mass) x 100 |  |  |  |