Bubbling with Excitement Over Research Questions.

To answer the research question *Will there be a difference in bubble length among different chewing times of 15, 30, and 45 seconds?*

Gather all your supplies

* Bubble gum Brand A, Brand B, and Brand C (They can be difference brands, but they need to all be sugarless or have sugar.)
	+ Need:
		- 3 pieces of bubble gum Brand A per student
		- 1 piece of bubble gum Brand B per student pair
		- 1 piece of bubble gum Brand C per student pair
* Paper ruler (<https://www.avery.com/resources/avery-printable-ruler.pdf>)
	+ Teacher will need to print on standard printer paper from the link above
* Scissors (to cut out paper ruler)
* Stopwatch

*Activity 1:* *Bubble Size and Chewing Time*

1. Carefully read all directions before you start collecting data.
2. After you have gathered your materials, get into pairs.
3. Make sure everyone has three pieces of Brand A gum.
4. Student A will unwrap the gum, place it in their mouth, and chew their piece of bubble gum for 15 seconds and then blow the biggest bubble they can.
5. Student B will start the timer when Student A started to chew for 15 seconds. Then student B will use the paper ruler to measure the maximum size of the bubble of Student A at the time that it bursts.
6. Student B will record the maximum bubble size for Student A in the table below. You can also create a chart on the white board so all students can write in their bubble length.
7. Before moving on, complete steps #4-6 for all students in the club.
8. Now, repeat steps #4-6 but each person will chew for 30 seconds.
9. Finally, repeat steps #4-6 but each person will chew for 45 seconds.
10. Now that you have bubble lengths for everyone in the club for 15, 30, and 45 seconds answer the following questions:
	1. What did you manipulate? The time you chewed the gum.
	2. What did you measure? Bubble length at the time it burst.
	3. What did you keep the same? When we started the timer, how we measured the bubble length, and the brand of gum.

For HSTA projects we will look at four different types of variables. Independent variables are variables we manipulate, dependent variables are variables we measure, control variables are variables that do not get manipulated (not all projects have controls), and constant variables are variables that stay the same throughout the project.

Based on the hands on you just completed for the research question: *Will there be a difference in bubble length among different chewing times of 15, 30, and 45 seconds?*

* What is your independent variable? The time you chewed the gum.
* What is your dependent variable? Bubble length at the time it burst.
* Do you have a control variable? Yes or No, if yes what is it? No
* What are your constant variables? When we started the timer, how we measured the bubble length, and the brand of gum.

Based on the data below, can you make any observations about chewing time and bubble length? We haven’t talked about data but, have students look at the data to answer the questions below. It might be easier to find the average for each chewing time or do a quick graph.

* Does the bubble length increase as chewing time increases? Yes or No
* Does the bubble length decrease as chewing time increases? Yes or No
* Does the bubble length increase as chewing time decreases? Yes or No
* Does the bubble length decrease as chewing time decreases? Yes or No

*Chart for Activity 1:* *Bubble Size and Chewing Time*

|  |  |
| --- | --- |
|   | **Chewing Time** |
|   | **15 seconds** | **30 seconds** | **45 Seconds** |
| Student A |   |   |  |
| Student B |   |   |  |
| Student C |  |  |  |
| Student D |  |  |  |
| Student E |  |  |  |
| Student F |  |  |  |
| Student G |  |  |  |
| Student H |  |  |  |
| Student I |  |  |  |
| Student J |  |  |  |

*Activity 2:* *Bubble Size and Bubble Gum Brand*

*Now, we will try to answer the research question: Will there be a difference in bubble length among Brand A, Brand B, and Brand C gum?*

1. Carefully read all directions before you start collecting data.
2. After you have gathered your materials, get into pairs.
3. Make sure everyone has one piece of Brand A, B, and C gum.
4. Student A will unwrap the Brand A gum, place it in their mouth, and chew their piece of bubble gum for 60 seconds and then blow the biggest bubble they can.
5. Student B will start the timer when Student A started to chew for 60 seconds. Then student B will use the paper ruler to measure the maximum size of the bubble of Student A at the time that it bursts.
6. Student B will record the maximum bubble size for Student A in the table below. You can also create a chart on the white board so all students can write in their bubble length.
7. Both students will need to wash their mouth out with water to clear out the flavor of the first brand. Will this impact results? Are there other things we should do the same to eliminate differences?
8. Before moving on, complete steps #4-7 for all students in the club.
9. Now, repeat steps #4-7 but each person will chew Brand B.
10. Finally, repeat steps #4-7 but each person will chew Brand C.
11. Now that you have bubble lengths for everyone in the club for all three brands answer the following questions:
	1. What did you manipulate? Brand of gum.
	2. What did you measure? Bubble length at the time it burst.
	3. What did you keep the same? When we started the timer, how we measured the bubble length, and chewing time.

Based on the hands on you just completed for the research question: *Will there be a difference in bubble length among Brand A, Brand B, and Brand C gum?*

* What is your independent variable? Brand of gum.
* What is your dependent variable? Bubble length at the time it burst.
* Do you have a control variable? Yes or No, if yes what is it? No
* What are your constant variables? When we started the timer, how we measured the bubble length, and chewing time.

Based on the data below, can you make any observations about Brand and bubble length? We haven’t talked about data but, have students look at the data to answer the questions below. It might be easier to find the average for each chewing time or do a quick graph.

* Which brand produced the longest bubble? A, B, or C

|  |  |
| --- | --- |
|  | **Gum Brand** |
|   | **Brand A** | **Brand B** | **Brand C** |
| Student A |   |   |  |
| Student B |   |   |  |
| Student C |  |  |  |
| Student D |  |  |  |
| Student E |  |  |  |
| Student F |  |  |  |
| Student G |  |  |  |
| Student H |  |  |  |
| Student I |  |  |  |
| Student J |  |  |  |