

The Bubble-Gum Challenge

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Grade level: 8-9 (Earth or Physical Science)

Concept: Students will apply metric measurement skills and knowledge of the scientific method to test and analyze different brands of gum.

Alaska Standards:

Science Standards-

- A2 (Changes and interactions of Matter)
- B1 (Use the processes of science)
- B2 (Design and conduct scientific investigations)
- B5 (Ethical standards, factual reporting of results)
- C2 (Knowledge is validated by repeated experiments)
- D3 (Recommend solutions by applying scientific knowledge)

Math Standards-

- M.A.2 (Estimate and measure various dimensions)
- M.A.3 (Apply basic operations efficiently and accurately)
- M.A.6 (Collect, analyze, and display data in visual displays)
- M.A.6 (Make projections based on available data)
- M.E.1 (Apply mathematical skills and processes to science)

Writing Standards-

- E.A.1 (Write a coherent composition i.e. lab report)
- E.A.2 (Use the conventions of standard English)

Objective: Students will be challenged to discover which brands of bubble-gum are the best at stretching the farthest, blowing the biggest bubbles, and contain the most sugar. They will design experiments to test several brands, then research into the gum's ingredients that are responsible for these properties.

Materials:

Gear Up- Several different brands of bubble gum (enough for 1 piece/student)

Explore- Paper, pen/pencil per group

Experiment- Scales, filter paper, meter sticks, tape measures, science notebook/journal, students should bring 4 different brands of bubble-gum to test (enough for 3 trials/brand)

Interpret- Graph paper

GEAR UP- day 1

Teacher distributes 1 piece of bubble-gum to each student (use as many different brands as possible). Students should not start chewing their gum until the teacher says "Go". After 1 minute of chewing ask students to try to blow a bubble. Ask why some students can blow a bubble while others require more chewing. Ask why some bubble gum is hard to the touch and other kinds are soft.

Process Skills: Observing, Predicting, Communicating

EXPLORE- day 1

Have students get into groups of 4, with each student having a different brand of gum that they are still chewing from the Gear Up activity. As a group, the students should generate a list of observations and questions as to why different brands of gum have different properties. They should also brain-storm ways in which they could test the gum to find out which brands are the best at stretching, blowing bubbles, and contain the most sugar. Finally, they should decide who they are going to work with and which 4 brands of gum they will test for their experiments.

Process Skills: Hypothesizing, Communicating, Predicting

GENERALIZE- day 1

Have students select a spokesperson from each group to describe their observations, discoveries, and questions. List these observations and questions on the board. Help students to refine their testable questions in preparation for the experiments with the gum. What role does sugar play in bubble-gum? How could a scientist find out how much sugar was in one piece of gum? Are all pieces of bubble-gum the same size (weight in grams)? Why do some gums need to be chewed longer than others before one can blow a bubble?

Process Skills: Communicating and Inferring

EXPERIMENT- day 2, 3, 4 (maybe 5+)

Working in groups of 2, students must design an experiment to test each of the 3 properties (stretch, bubble-blowing ability, and sugar content) for each of their 4 brands of gum. I require each student to complete their own lab report even though they are working together. Students should write out their hypothesis, and step-by-step procedures for their first experiment, then have the teacher check it for repeatability. Students should be reminded of controlling all but one variable in their experiment and prior review of metric measurement using meter sticks and scales is a must!

Once the procedures have been approved, the students can begin their experiment. Each student should record his/her data in a data table. This process should be repeated with the other 2 experiments.

Process Skills- Observing, measuring, communicating, controlling variables

INTERPRET- when experiments are completed

Students will create a bar graph for each of their experiments displaying the data they collected. Graphs need to be properly labeled and should be neat. Students will then

write a scientific conclusion “abstract” to each of their experiments where they will: State the question/problem, summarize their procedures, analyze their data, and offer a scientific explanation for their results (this requires some research time).

Process Skills- Graphing, Analyzing, Concluding, Researching

APPLY

Students will select one of their brands of bubble-gum that appeared to be the best at stretching, or blowing bubbles, or contained the most sugar and create an eye-catching poster advertising the brand and it’s best property. Students could also write to the company, sharing their test results.

ASSESSMENT

Students will be assessed using the following rubric, “The Bubble Gum Challenge Scoring Guide”.

The Bubble Gum Challenge Scoring Guide

Requirements	Beginning (60)	Developing (75)	Accomplished (85)	Exemplary (100)
Procedures	Instructions on how to do the procedure are very incomplete, this experiment could not be repeated.	Instructions are not clearly numbered into logical steps and enough information is lacking for experiment to be repeated.	Instructions are numbered and most of the information needed to repeat investigation is included.	Step-by-step instructions are provided with enough detail given that it could be repeated by others not present.
Data Tables	Tables are not organized, or are missing the majority of the data. Type of measurement is not indicated.	Tables contain most of the required data, but are not consistently labeled. Type of measurement is indicated.	Tables contain all of the required data, but are missing a few labels. Type of measurement is indicated.	Tables are very neat, contain all of the required data, and are properly labeled. Type of measurement is indicated.

Graphs	Graphs are missing or do not accurately represent the data. Not a bar graph.	Graphs somewhat accurately represent the data, however, many titles, and labels are not present.	Graphs accurately represent the data, however 1 or 2 titles and labels are missing.	Graphs are very neat, properly labeled, and accurately represent the data.
Abstract	Most of the required content is not included. Grammatical and spelling errors abound.	Some required content is not included. Grammatical and spelling errors evident.	Contains most of the content required in the "Exemplary" column. Few grammatical and spelling errors.	Includes a sentence or two about: statement of the problem, hypothesis, procedures, results, conclusions, and an explanation for the results (rev. of lit). No grammatical or spelling errors.
Poster	Poster is not completed	Poster is completed but inaccurately advertises a gum's properties or is not very eye-catching or neatly done.	Poster is completed, accurately advertises a gum's properties, but could be more eye-catching or neatly done.	Poster is completed, accurately advertises a gum's properties, and is very eye-catching and neatly done.
Collaboration	Cannot work with others in most situations. Cannot share decisions or responsibilities.	Works with others, but has difficulty sharing decisions and responsibilities.	Works well with others. Takes part in most decisions and contributes fair share to group.	Works well with others. Assumes clear role and related responsibilities. Motivates others to do their best.
Graphs	Graphs are missing or do not accurately represent the data. Not a bar graph.	Graphs somewhat accurately represent the data, however, many titles, and labels are not present.	Graphs accurately represent the data, however 1 or 2 titles and labels are missing.	Graphs are very neat, properly labeled, and accurately represent the data.

Includes a sentence or Includes a sentence or two about background info (rev. of lit), statement of the problem, hypothesis, procedures, results, and conclusions.