

STARTING THE YEAR WITH A BANG

(OR AT LEAST A POP)

A WORKSHOP PRESENTED TO;

The National Science Teachers Association

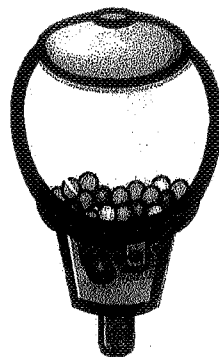
National Conference – Boston 2008

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Introduction

One of the greatest challenges faced by students and teachers alike is getting back into the “learning mode” at the beginning of each school year. In other words, “I don’t want to be here any more than you!” The following project is designed to totally immerse students in the methods of science, particularly gathering, organizing and analyzing data. Students will also be exposed to the metric system, creating data tables, graphing, averaging, variables, designing an experiment, writing a lab report and completing a science fair project – all in the first week of school. The idea is to have a set of reference points to which the teacher can point as the need for these various skills arises throughout the school year. Don’t tell the kids any of this though. Let them just think that you’re making them chew gum and blow bubbles in school. They may not realize it, but they’re about to learn a whole lot of science!

Standards

This lesson fully or partially incorporates the following National Science Education Standards (NSES):

Teaching Standard A: Teachers of science plan an inquiry-based science program for their students.

Teaching Standard B: Teachers of science guide and facilitate learning.

Teaching Standard C: Teachers of science engage in ongoing assessment of their teaching and student learning.

Teaching Standard D: Teachers of science design and manage learning environments that provide students with the time, space, and resources needed for learning science.

Teaching Standard E: Teachers of science develop communities of science learners that reflect the intellectual rigor of scientific inquiry and the attitudes and social values conducive to science learning.

Science as Inquiry Standards:

Abilities necessary to do scientific inquiry
Understanding about scientific inquiry

1. Identify questions that can be answered through scientific investigations.
2. Design and conduct a scientific investigation.
3. Use appropriate tools and techniques to gather, analyze and interpret data.
4. Develop descriptions, explanations, predictions, and models using evidence.
5. Think critically and logically to make the relationships between evidence and explanations.
6. Recognize and analyze alternative explanations and predictions
7. Communicate scientific procedures and explanations.
8. Use mathematics in all aspects of scientific inquiry.
9. Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.

10. Scientific explanations emphasize evidence, have logically consistent arguments and use scientific principles, models, and theories.

Materials

The following materials and supplies are needed to complete this lesson:

1. Three (or more) brands of bubble gum. Either none or all should be sugarless (unless you change the experiment to compare sugarless with regular gum). All should be the same flavor. At least one brand should be a different size from the others to allow students to learn the concepts of mass and controls along the way. (Big League Chew is a good choice here because it comes packed in pouches and is easy to measure out in portions.) Be sure to have enough gum for each student to have several pieces of each brand.
2. Some other less chewy treat for those kids who cannot chew gum but should still be in on the fun. Tootsie Roll Pops work well.
3. A supply of rulers equal to at least a third of each class.
4. A box of large paper clips
5. Data chart. I usually put one on the board in front of the room. Students copy it and fill in their own and I fill in the one on the board.
6. Class set of calculators to use in averaging.
7. A triple beam balance.
8. A simple lab report. Bill Nye has a good one at nyelabs.com.

9. Graph paper and colored pencils.

10. A camera. Some very good yearbook pictures come out of this project!

Day 1

Divide the class into groups of three. These groups will stay together throughout the entire project.

Give each group a ruler, two paper clips and a piece of gum for each student. Only one brand of gum should be used on the first day. Do not tell them why – yet. Do not let them start chewing yet.

Have each student take out a pencil and paper and give each group a calculator and a lab report form.

Instruct students that they are going to determine who in the class and in each group can blow the biggest bubbles. Have each group make a measuring device by unbending two paper clips and attaching them to the ruler so one clip is stationary at the one inch mark and the other paper clip slides.

Each student is to blow 10 bubbles, another will measure each bubble in **CENTIMETERS** (metric system only!) and the third will record the measurements. Have each student take turns measuring and recording for the others in his or her group. Finally, have each student determine the average size bubble that they blew. *This is where they learn how to **AVERAGE**.*

The person who blew the largest bubble will be the “designated blower” for the rest of the lesson. The two others will be the measurer and recorder.

Discussion

Now is the time to tell the kids that they are actually doing an experiment, to ask some key questions and to actually start the learning process (but don't tell them this part).

The experiment is to compare three different brands of bubble gum. Ask the kids to suggest a title for the experiment and put it on the sample science fair board.

Then ask: Can we prove which brand produces the *best* bubbles. So we now talk about **QUANTIFICATION**. We now have our question/problem. Which brand blows the biggest bubbles? Place the question on the science fair board.

Discuss the meaning of **HYPOTHESIS**. Explain that since each of them is more or less an expert on chewing gum, each should write down their own hypothesis. Place a hypothesis on science fair board.

Have each student complete as much as possible on their "lab report".

Day 2

Give each group all of the materials they had the day before. Determine who is the designated blower (the group member who blew the biggest bubble on day 1), who is the measurer and who is the recorder. Give each student a piece of gum (or candy if they cannot chew). *Do not let students begin.*

Discussion

It is important to have a discussion period at the start of this class because it is going to be difficult to get them to focus by the end. They will be having entirely too much fun.

Ask the kids why it is important to have so many groups doing the same experiment and why each brand of gum must be blown into bubble ten times. This is the time to explain the role of **REPETITION** in science.

Explain **MANIPULATED AND RESPONDING VARIABLES** and ask which is which in this experiment and why there can only be one manipulated variable.

Ask how we can **CONTROL** variables and ask why we have only one person in each group as the designated blower. Why do we use an average of 10 bubbles instead of just blowing one bubble with each brand? It also does not matter how big the bubbles are from one group to another as long as only one person blows all bubbles within a group.

Finally, still on the subject of controls, explain the concept of **MASS** as you take out the Triple Beam Balance and explain that each brand of gum must be tested in the same mass units which in this case are **GRAMS**.

Back to the Fun Stuff

Have the designated blower begin blowing bubbles with the first brand. One group member measures while the recorder prepares and fills in the group data chart.

get gum
that can
be measured
out in grams
to equal
mass of
other
gums

As each brand is blown into ten bubbles, the recorder averages the ten figures and the blower begins on the next brand. Each group can determine the mass of the larger brand of gum (if you can find a sanitary way to do so) or the teacher wearing plastic gloves can measure out the necessary amount for the entire class.

As each group completes their individual data charts, they read their results to the teacher who keeps a combined data chart for the whole class on the board. When every group is finished, each group determines the averages for the entire class using the data sheet on the board.

Day 3

This is the day to organize and analyze data as the students compare their group and class results to their hypothesis. *Now is the time to determine if an incorrect hypothesis means a faulty experiment!*

Students can bring their lab report up to date as the teacher brings the science fair board up to date adding variables, materials, and procedure. Students may also create a combined data sheet if the teacher has more than one section of this particular science course.

The rest of the period is spent learning **HOW TO MAKE A GRAPH**. (It is amazing how many kids know how to read a graph but have no idea how to make one.)

① Following a general discussion on how to graph, each student makes a bar graph of one brand of gum for ten different bubbles.

② Then the students make a line graph using the same data. Next the two other brands of gum are added to the same line graph using different colors so students can compare data on a single graph.

③

For homework the students are told to make a combined bar graph using the same data that they used for the combined line graph.

The teacher adds a graph onto the science fair board.

Day 4

This is **Technology Day**. Students go to the school computer lab where the computer teacher helps students put their data onto a spread sheet and then generate a series of graphs. There are a variety of ways to approach this day with students making graphs using their own group data, data from the class as a whole or the data taken from the total of the grade if the teacher has several sections of the same class. Whatever approach is used, students are able to generate many different types of graphs in a very short period of time.

Day 5

Results and Conclusions: This is the day where the class discusses the experiment and results and conclusions are placed on the science fair board. All written work is organized and turned in and basically (since the first week of school never goes as planned) all loose ends are tied up.

ASSESSMENT

Students are required to turn in a packet of the following information.

A hypothesis which was written at the beginning of the project speculating which brand of gum would produce the biggest bubbles.

A data chart of all information collected by their group

A bar graph showing the groups result for the size of ten bubbles of one brand.

A line graph showing the average size of the bubbles for all three brands by the entire class

A bar graph showing the same information as the line graph

Assessment

Hypothesis	10 points
Data Chart	15 points
Bar Graph 1	25 points
Line Graph 1	25 points
Bar Graph 2	25 points

BAZOOKA

Super

BLC

BAZOOKA

Super

BLC

1 7.6

3.6

11.2

1 9.17

8.55

18.1

2 8.4

10.0

12.8

2 6.45

3.7

6.5

3 10.25

6.70

16.4

3 7.4

7.8

8.3

4 6.8

8.35

8.85

4 8.8

9.6

9.9

5 10.1

6.30

12.5

5 6.4

6.5

8.0

6 2.4

2.0

4.4

5 10.9

10.7

10.8

7 7.85

7.50

12.0

7 6.2

4.8

8.1

8 9.25

7.50

12.05

8 4.0

3.0

9.4

7.83

6.49

11.21

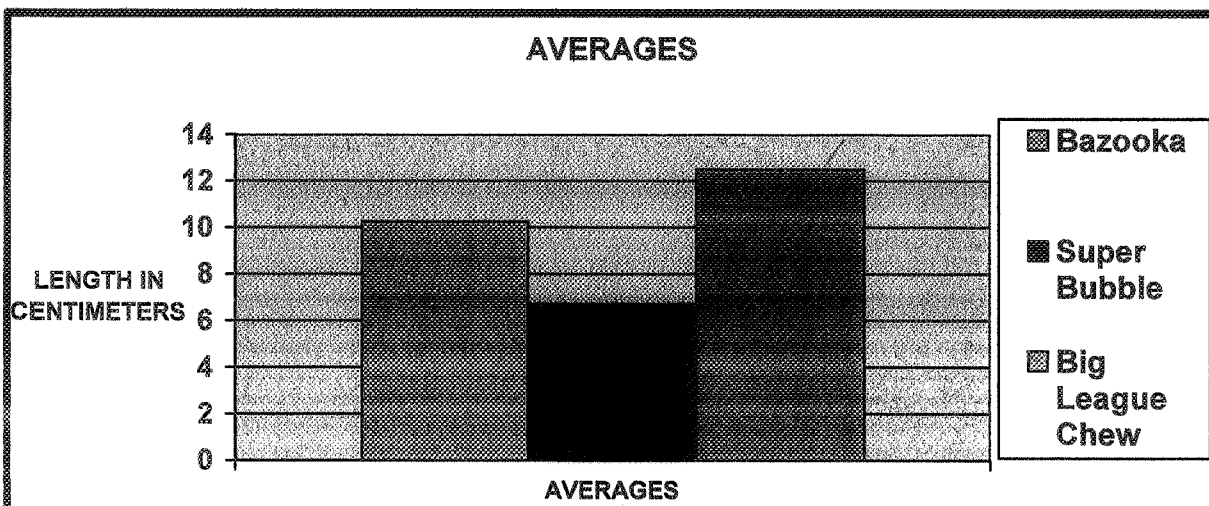
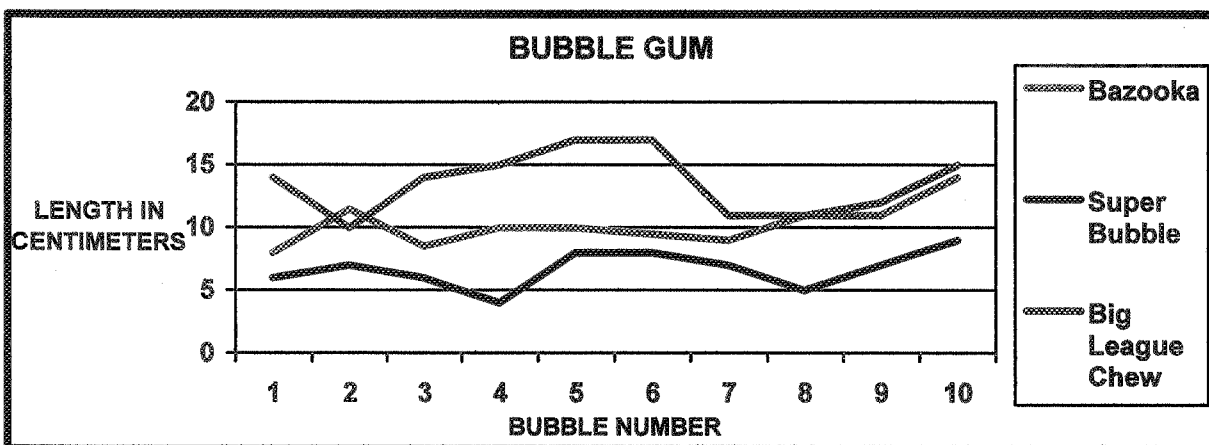
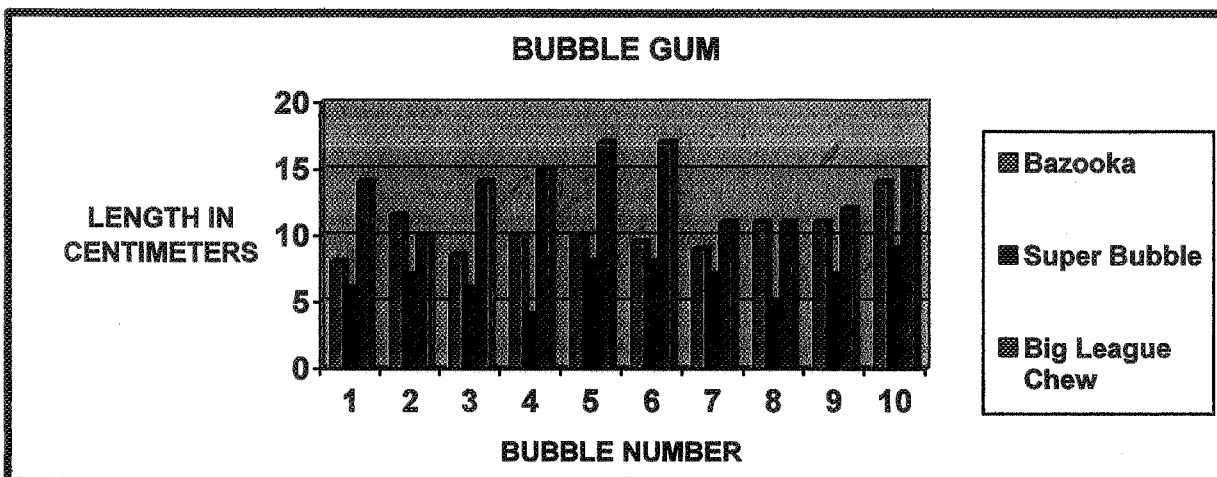
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6.83

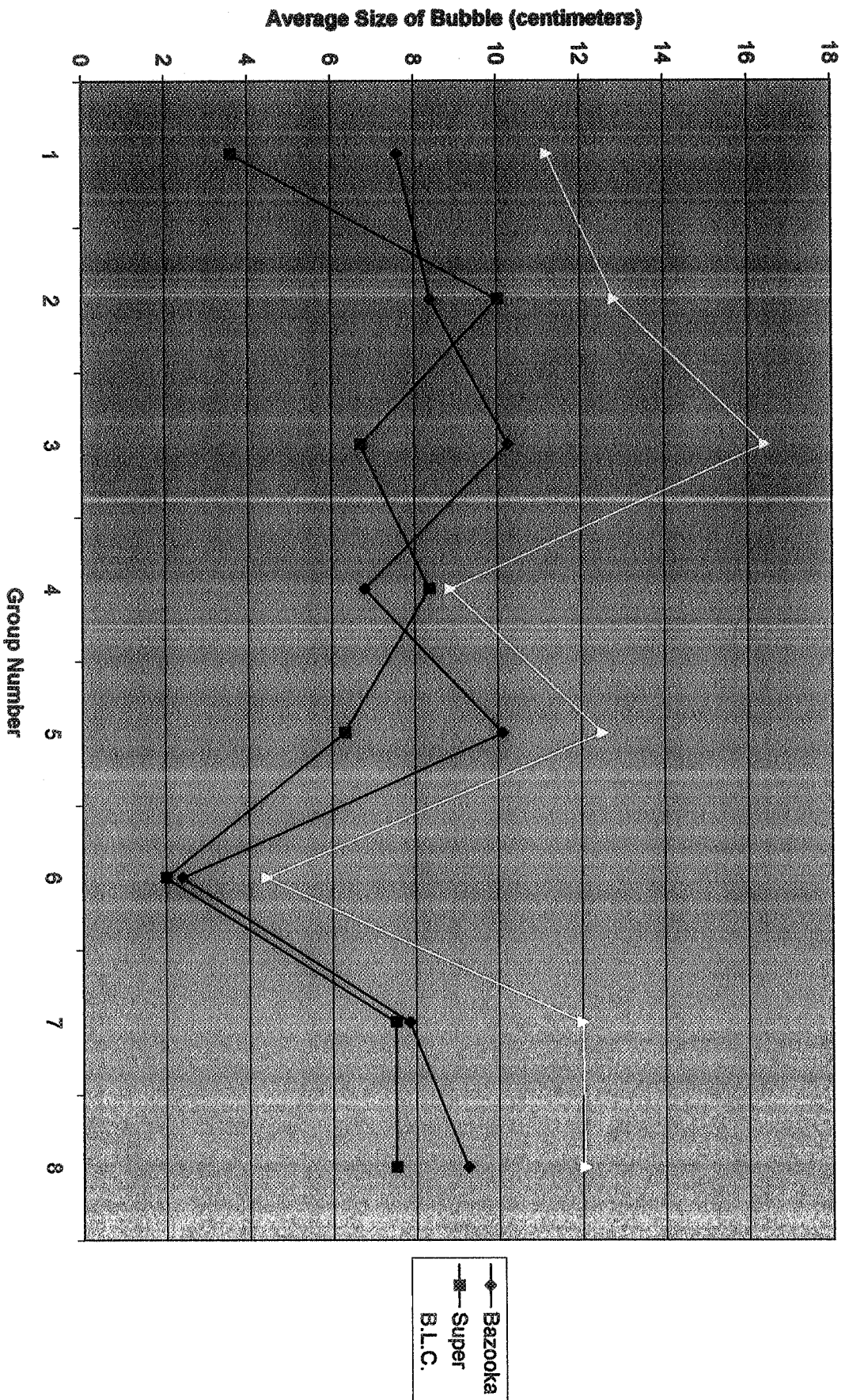
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Data and Analysis

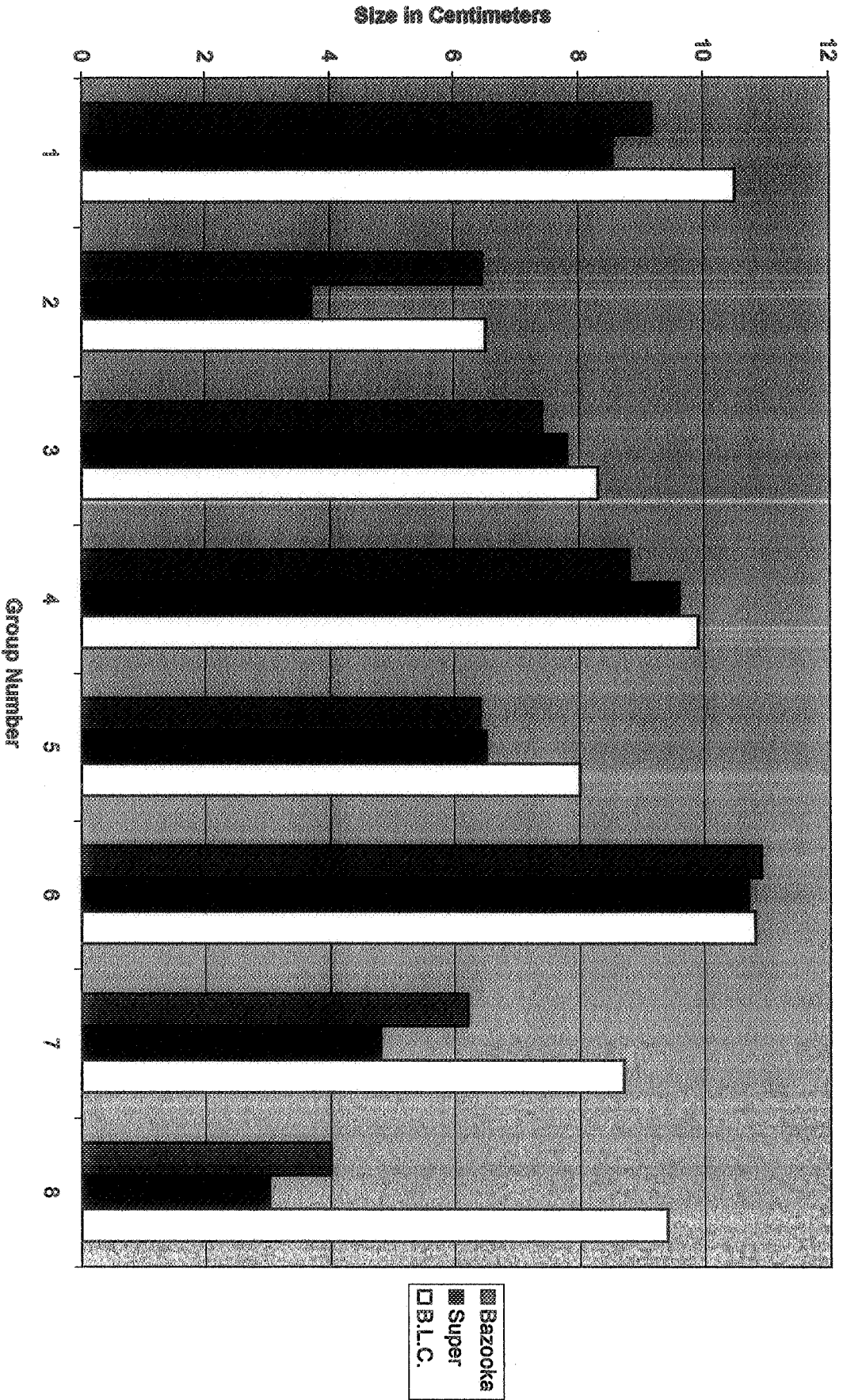
The results of this experiment allow us to determine which of the three brands of gum on average blow the biggest bubble.



Size of Bubbles 4th Period



Average Bubble Size 6th Period



Bubble Fun with Bubble Gum

By

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Advanced Physical Science

January 29, 2008

Instructor: Mr. Sweeney

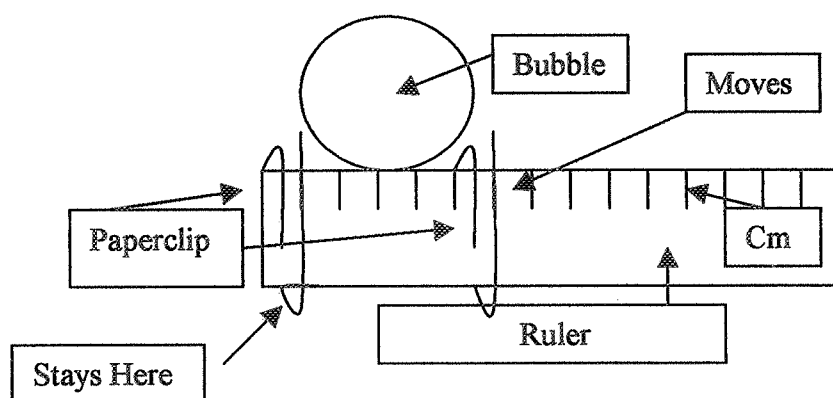
Abstract:

This lab report paper describes an experiment in which we are trying to find out which brand of bubble gum blows the biggest bubbles. The brands of sugar gum we used included Super Bubble, Big League Chew, and Bazooka. So this experiment would not be biased, we tested a wide variety of students where one person from a group of three people blew the 10 bubbles with 1 piece of gum from the brands listed above. In order to get specific and accurate results, we made sure that each piece of gum had the same amount of mass. We had to put the Big League Chew brand on a triple beam balance so it would equal the same mass as Bazooka and Super Bubble. In each group there was a bubble blower, a measurer (the person who measures the bubble), and a recorder who writes down all of the results. Measuring the bubble in centimeters, the measurer used a ruler with two paperclips attached to it. As the person blew the bubble, the measurer would keep one paperclip at the 1-centimeter mark and moved the other paperclip down the ruler to keep up with the size of the bubble until it popped. With all the bubbles blown and the average sizes of the bubbles put together, we found that Big League Chew blows the biggest bubbles, followed by Bazooka in a close second, and Super Bubble blew the smallest bubbles.

Materials and Methods:

In order to do this experiment, we used a variety of different bubble gum brands such as Big League Chew, Bazooka, and Super Bubble. The type of gum is the manipulated variable, the different sizes of the bubbles are the responding variables, and the assigned bubble blower is the constant variable. After we split everyone into groups, we decided on who was going to blow the bubble, measure the bubble, or record the size of the bubble. The person who was chosen out of their group of three to be the bubble blower was the person who blew the biggest bubbles out of his two other group members. To measure the bubbles accurately by using the paperclips and the ruler, follow Figure 1. The bubble blower from each group got one piece of bubble gum from each brand and blew 10 bubbles for each brand. The recorder collected all of the data and found an average of the bubble's diameter in centimeters. Comparing all of the averages from the other groups. The brand of bubble gum that has the highest average size blows the biggest bubbles.

Figure 1:



Data and Analysis:

The data that we have collected has led us to conclude which brand of bubble gum blows the largest average-sized bubbles. Big League Chew blows the biggest bubbles with an average size of 4.4 centimeters, followed by Bazooka in a close second with an average-sized bubble of 2.4 centimeters. Super Bubble blew the least average sized bubble with the average of about 2 centimeters. With all the data we have collected, we still have room for some improvements. We could have done a few more things to make this experiment even more accurate. If all the groups had measured the bubbles the same way, perhaps we could have gotten some different numbers. Some groups could have measured the bubble by length and others could have measured the bubble by diameter. Another improvement to this experiment is that we could have used more people to blow the bubbles. The more people that blow the bubbles, the more accurate the results are going to be.

Attempts	Brands of Bubble Gum		
	Super Bubble	Bazooka	Big League Chew
1	1 cm	1 cm	2 cm
2	1 cm	2 cm	2 cm
3	2 cm	2 cm	2 cm
4	1 cm	2 cm	8 cm
5	1 cm	3 cm	7 cm
6	2 cm	1 cm	5 cm
7	1 cm	2 cm	4 cm
8	4 cm	5 cm	7 cm
9	2 cm	1 cm	4 cm
10	5 cm	5 cm	3 cm

Discussion:

According to our graphs, Big League Chew blew the biggest average bubble of 4.4 centimeters, followed by Bazooka in second with an average of 2.4 centimeters. Super Bubble blew the smallest bubbles with an average of 2 centimeters. In order for this project to be unbiased as well as accurate, the official bubble blower from each group of three blew equally portioned amounts of bubble gum 10 times with one piece of gum from each brand. There was no question; Big League Chew blows the biggest bubbles by far. Something we could have improved on this experiment is that we could have used more brands of bubble gum. An experiment needs a lot of variety, so I think we should have tested some different sugar gums and added a few sugar-free brands.

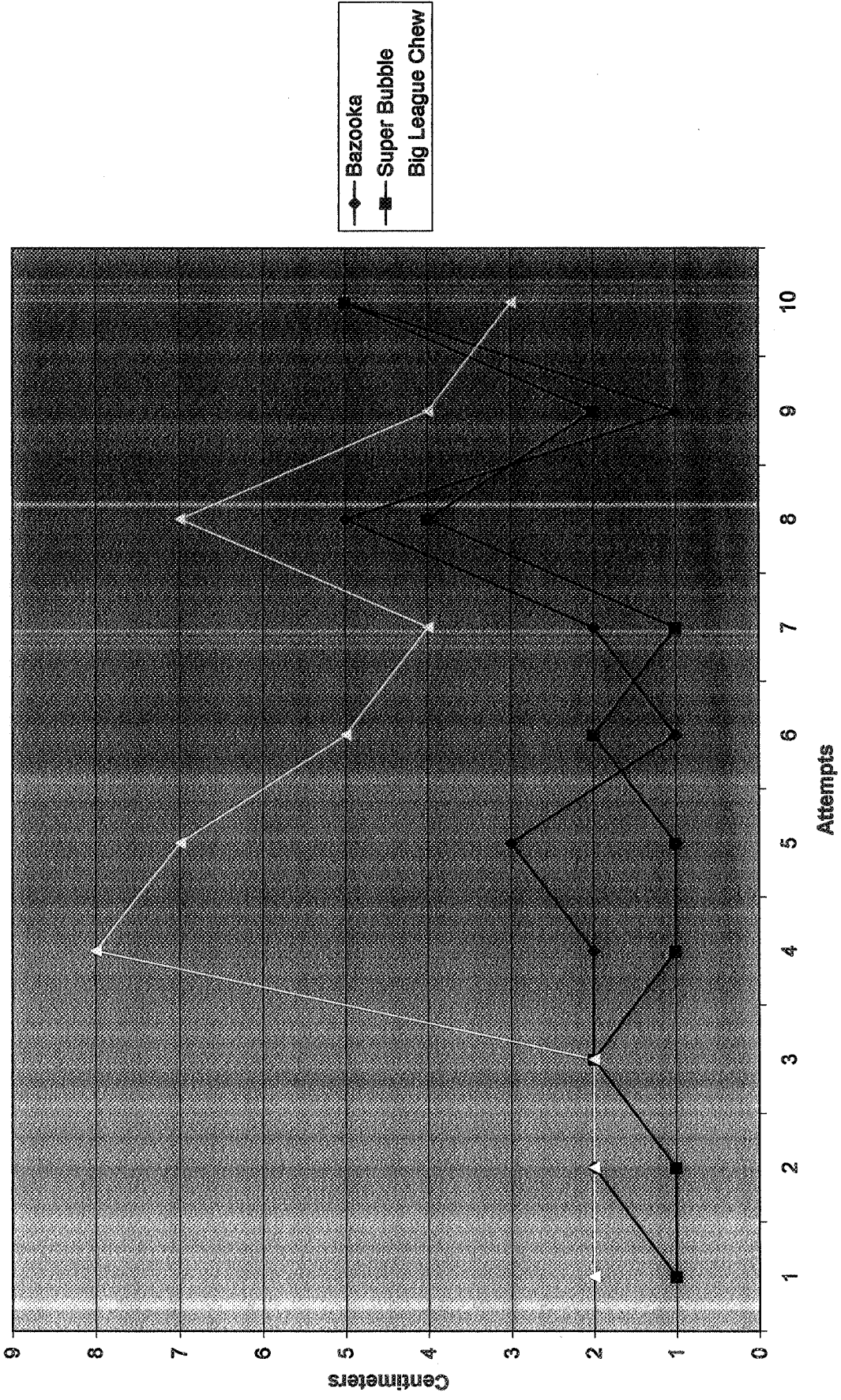
Conclusion:

We have determined that with an average of 4.4 centimeters, Big League Chew blew the other brands out of the ballpark. Bazooka blew the second largest bubbles with an average of 2.4 centimeters. In last came Super Bubble, with only average bubble size of two centimeters.

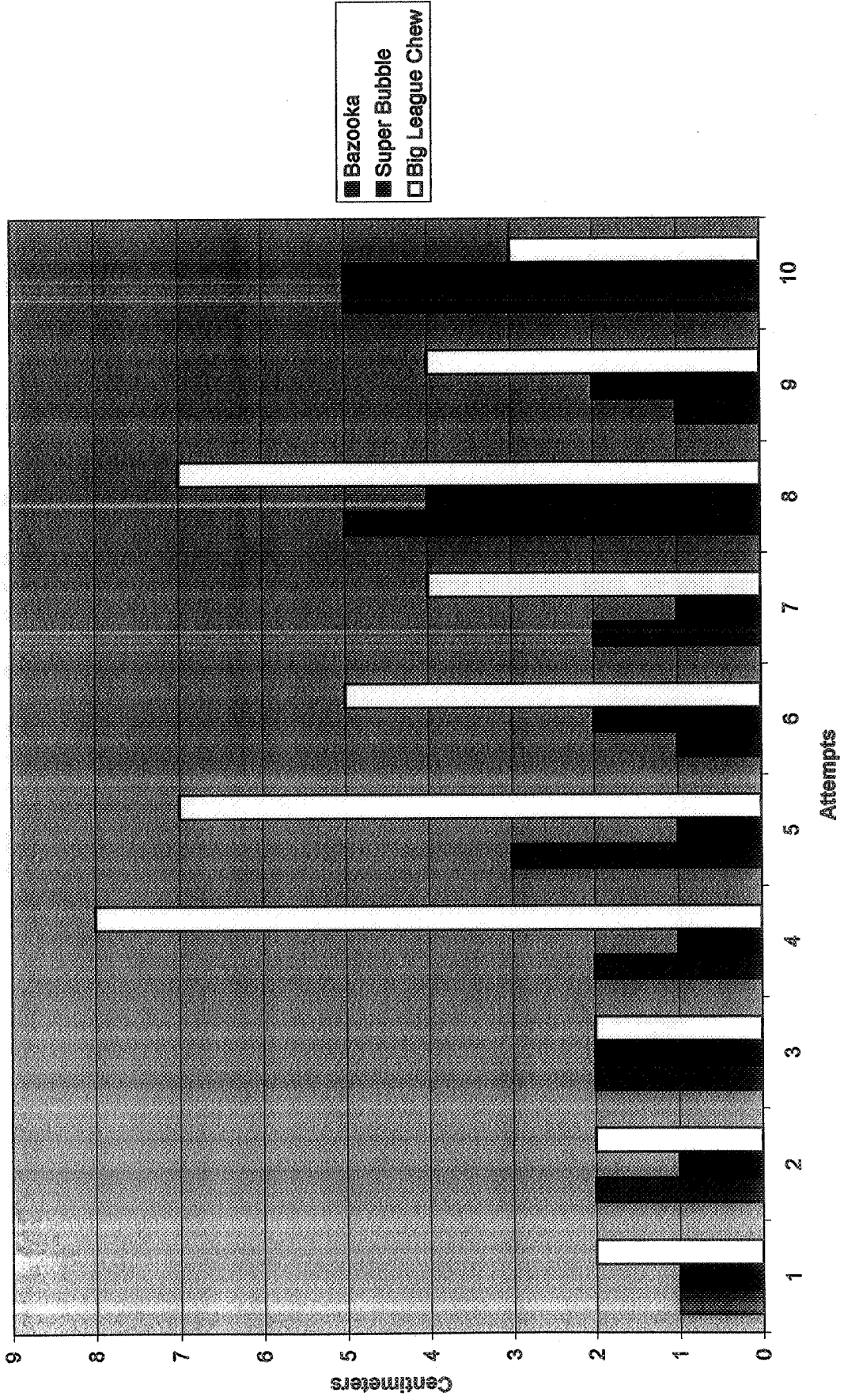
Acknowledgements:

Thanks to Mr. Sweeney for teaching us and letting us do this science experiment in class.

Bubble Fun with Bubble Gum



Bubble Fun with Bubble Gum





Bubble Gum Trivia Challenge

Name _____

Test your knowledge of bubble gum!

- ___ 1. How many sticks of gum does the average American chew in a year?
A. 200 B. 300 C. 400
- ___ 2. How many tons of gum are chewed every year?
A. 50,000 B. 75,000 C. 100,000
- ___ 3. If all the five-chunk packs of Bubble Yum ever chewed in the U.S. since its introduction in 1975 were laid end-to-end, how many times would it circle the earth at the equator? A. 2 B. 5 C. 7
- ___ 4. San Luis Obispo, California, is the home of 'Bubble Gum Alley'. What is it?
A. An alley with brick walls covered with ABC (already-been-chewed) gum wads.
B. The place where bubble gum was invented.
C. The home of the largest collection of bubble gum machines.
- ___ 5. Richard Walker holds the record for the Chomp Title by chewing 135 sticks of gum for the longest time. How long did he chomp?
A. 5 hours B. 6 hours C. 8 hours
- ___ 6. The Topps company holds the record for having made the largest single piece of bubble gum. How many pieces of normal-sized Bazooka did it equal?
A. 5000 B. 8000 C. 10,000
- ___ 7. The 1952 Mickey Mantle rookie card is the most valuable Topps Company card. How much did it sell for at auction?
A. \$75,000 B. \$120,000 C. \$1,000,000
- ___ 8. What is the Official Gum of Major League Baseball?
A. Bubble Yum B. Bazooka C. Topps
- ___ 9. When was the first successful bubble gum invented?
A. 1891 B. 1906 C. 1928
- ___ 10. Susan Mont"Gum"ery Williams is the Guinness Record Holder Of the Worlds Largest Gum Bubble. How big was it?
A. 19 inches B. 23 Inches C. 27 inches



Bubble Gum Trivia Challenge

Answer Key

1. How many sticks of gum does the average American chew in a year? Answer: B. 300
2. How many tons of gum are chewed every year? Answer: C. 100,000
3. If all the five-chunk packs of Bubble Yum ever chewed in the U.S. since its introduction in 1975 were laid end-to-end, how many times would it circle the earth at the equator? Answer: C. 7 (and a little more!)
4. San Luis Obispo, California, USA is the home of 'Bubble Gum Alley'. What is it? Answer: A. An alley with brick walls covered with ABC (already-been-chewed) gum wads.
5. Richard Walker holds the record for the Chomp Title by chewing 135 sticks of gum for the longest time. How long did he chomp? Answer: C. 8 hours
The first person to win the 'Chomp Title' was Sue Jordan, who chewed eighty pieces of Doublemint gum for five hours and twelve minutes! Clyde Steward McGehee, of North Carolina, broke that record by chewing 105 sticks of Juicy Fruit for six hours and Richard Walker broke that record by chewing 135 sticks of gum for eight hours.
6. The Topps company holds the record for having made the largest single piece of bubble gum. How many pieces of normal-sized Bazooka did it equal? C. 10,000
Topps presented the gum to baseball player Willie Mays in 1974. Mays then cut it into small chunks and gave it to children in nearby hospitals.
7. The 1952 Mickey Mantle rookie card is the most valuable Topps Company card. How much did it sell for at auction? Answer: B. \$120,000
8. What is the Official Gum of Major League Baseball? Answer: A. Bubble Yum
9. When was the first successful bubble gum invented? Answer: C. 1928
The first known bubble gum, "Blibber Blubber," appeared in 1906. It failed to catch on because it was too sticky and too brittle so it didn't hold together when it was chewed. The first successful bubble gum was invented by Walter E. Diemer in the summer of 1928. A 23-year-old accountant who knew nothing about chemistry, Diemer created his invention in a tiny laboratory in Philadelphia. The only food coloring he had on hand was pink. "It was an accident," Mr. Diemer said in an interview with The Lancaster Intelligencer Journal in 1996. "I was doing something else and ended up with something with bubbles."
10. Susan Mont"Gum"ery Williams is the Guinness Record Holder Of the Worlds Largest Gum Bubble. How big was it? Answer: B. 23 Inches

Many of the facts for the questions were found at Bubble Gum Fact page at <http://mmwww.northville.k12.mi.us/STUDENTS/2005/dugganla/Hpage4.htm>.

T. Trimpe 2001