



## Early Popcorn History

- \* Though popcorn probably originated in Mexico, it was grown in China, Sumatra and India years before Columbus visited America.
- \*The oldest known corn pollen is scarcely distinguishable from modern corn pollen, judging by the 80,000-year-old fossil found 200 feet below Mexico City.

## Early Popcorn History

- \*It is believed that the first use of wild and early cultivated corn was popping.
- \*The oldest ears of popcorn ever found were discovered in the Bat Cave of west central New Mexico in 1948 and 1950. Ranging from smaller than a penny to about 2 inches, the oldest Bat Cave ears are about 5,600 years old.

## Early Popcorn History

- \*In tombs on the east coast of Peru, researchers have found grains of popcorn perhaps 1,000 years old. These grains have been so well-preserved that they will still pop.
- \* A Zapotec funeral urn found in Mexico and dating from about 300 A.D. depicts a Maize god with symbols representing primitive popcorn in his headdress.



## The History of Popcorn Poppers

- The ancient way to pop corn was to heat sand in a fire and stir kernels of popcorn in when the sand was fully heated.



## The History of Popcorn Poppers

- Exploring Paraguay during the 18th century, Felix de Azara told of a kind of popcorn with kernels on the tassel which, when "it is boiled in fat or oil, the grains burst without becoming detached, and there results a superb bouquet fit to adorn a lady's hair at night without anyone knowing what it was.
- I have often eaten these burst grains and found them very good."

## The History of Popcorn Poppers

- Native American poppers used the same elements as modern popcorn machines: heat, oil and a pan of some sort.
- Pans were made from materials ranging from soapstone to clay and metal.
- Some of these poppers were huge, reaching eight feet across.

## The History of Popcorn Poppers

- Some Native Americans, spread oil on an ear of popcorn and laid it near a fire, causing the kernels to pop attached to the ear.
- It was eaten similar to corn-on-the-cob.





- The first popcorn "machine" was invented by Charlie Cretors in 1885.
- Until then, poppers were made to sit in front of stores to attract attention.

## Recent Popcorn History

- \*Popcorn was very popular from the 1890s until the Great Depression.
- Street vendors used to follow crowds around, pushing steam or gas-powered poppers through fairs, parks and expositions.



- But vendors wanted to be close to the crowds, especially the crowds near movie theaters.
- So Charlie made poppers that could be pushed on foot, pulled by horse and mounted on trucks.

## The History of Popcorn Poppers

- Today, much of the popcorn you buy at movies and fairs is popped in poppers made by the Cretors family.



## The History of Popcorn Poppers



- \*Home poppers were first introduced around 1925, and a few years later they were being built in Junior High shop classes.

## Recent Popcorn History

- \*During the Depression, popcorn at 5 or 10 cents a bag was one of the few luxuries down-and-out families could afford.
- While other businesses failed, the popcorn business thrived.



## Recent Popcorn History

- An Oklahoma banker who went broke when his bank failed bought a popcorn machine and started a business in a small store near a theater.
- After a couple years, his popcorn business made enough money to buy back three of the farms he'd lost.



## Recent Popcorn History

- \*During World War II, sugar was sent overseas for U.S. troops, which meant there wasn't much sugar left in the States to make candy.
- Thanks to this unusual situation, Americans ate three times as much popcorn as usual.

## Movie Style popcorn

- Popcorn went into a slump during the early 1950s, when television became popular.
- Attendance at movie theaters dropped and, with it, popcorn consumption.



## The History of Popcorn Poppers

- When the public began eating popcorn at home, the new relationship between television and popcorn led to a resurgence in popularity.



## The History of Popcorn Poppers

- In 1945, Percy Spencer discovered that when popcorn was placed under microwave energy, it popped.
- This led to experiments with other foods, and the birth of the microwave oven.



## Recent Popcorn History

- Microwave popcorn -- the very first use of microwave heating in the 1940s -- has already accounted for \$240 million in annual U.S. popcorn sales.



## Recent Popcorn History

- Americans today consume 17.3 billion quarts of popped popcorn each year.
- The average American eats about 68 quarts (or 2 POUNDS!) of popcorn each year.
- Approximately 70 percent is eaten in the home (home popped and pre-popped) and about 30 percent outside the home (theaters, stadiums, schools, etc.).
- Unpopped popcorn accounts for approximately 90 percent of sales for home consumption.

## What is popcorn?

- Popcorn is actually a different type of corn than the more familiar sweet corn or field corn.
- White, yellow, red and black kernel types are available, but only white and yellow (both small and large) are grown commercially.



## What is popcorn?

- Two major factors influencing popcorn quality include kernel moisture and expansion ratio.
- A quality popcorn will have at least a 98 percent pop ratio at an ideal moisture of 13.5 percent.
- The other critical component is expansion ratio, which is the volume measurement of popped corn from one gram of popcorn kernels.
- Some varieties expand to over 40 cubic centimeters per gram.

## How does popcorn pop?

- Each kernel of popcorn contains a small drop of water stored inside a circle of soft starch. (That's why popcorn needs to contain 13.5 percent to 14 percent moisture.)
- The soft starch is surrounded by the kernel's hard outer surface. As the kernel heats up, the water begins to expand, and pressure builds against the hard starch.

## How does popcorn pop?



- Eventually, this hard surface gives way, causing the popcorn to explode.
- The hull rupture usually occurs at about 135 psi and a temperature of 180 degrees Celsius.
- As it explodes, the soft starch inside the popcorn becomes inflated and bursts, turning the kernel inside out.
- The steam inside the kernel is released, and the popcorn is popped!

## Popping PopCorn

## Old Maids



- Old Maids or those unpopped kernels of corn that are left at the bottom of popcorn bowls are generally the result of either kernels that don't have the proper moisture content (around 14%)
- or they have a cracked outer hull which means that the expanding steam can't build enough pressure to cause the kernel to pop.

## Demand

Consumer demand supported the production of popcorn on over 201,000 acres in 29 states during 2007, with volume reaching nearly 500,000 TONS of shelled popcorn.

Nebraska is the top popcorn-producing state, harvesting 294.5 million pounds of shelled popcorn, or 34 percent of all popcorn production. The states of Indiana, Illinois and Ohio are also top producers of popcorn; all produced between 110 and 221 million pounds of shelled popcorn

And there are some very special poppers available today!



## And now.... The Popcorn Lab

And the  
Scientific Method

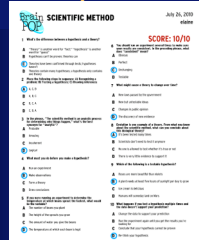


## The Scientific Method with Tim & Mobey

[http://glencoe.com/science/physics/physics\\_10th\\_edition/Chapter201/ScientificMethod.html](http://glencoe.com/science/physics/physics_10th_edition/Chapter201/ScientificMethod.html)

<http://www.brainpop.com/science/scientific-inquiry/scientificmethod/zoom.html>

## Brain Pop Answers

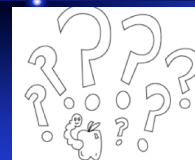


**QUESTION**  
**RESEARCH**  
**HYPOTHESIZE**  
**PREPARE**  
**EXPERIMENT**  
**COLLECT DATA**  
**CONCLUDE**

## General Experiment Outline Guide For the Scientific Method and The Popcorn Lab

- **I. Title:**
- This should tell what the experiment is investigating.
- It is the name of the experiment and may be in the form of a question.
- Be specific.
- Complete your title now

## II. Statement of the Problem



- Identify the problem....

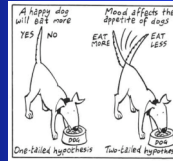
### III. Purpose:



- Identify the purpose.
- Why are you doing the experiment?
- "To see if...."

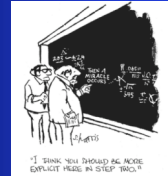
### IV. Hypothesis

- Before you do the experiment, what do you predict will happen?
- This should be based on Observations and Preliminary Research.
- "If...., then...., because..."
- Make this quantitative (ie: it needs a number value)



### Hypothesis

- Work with a team member and come up with a hypothesis.
- Write that hypothesis on your lab sheet.



### V. Variables & Controls:

- **Variable to be changed:**  
What is the one condition that you changed?  
What are you comparing or testing?
- **Variable to be measured:**  
What results are you going to measure & record?
- **Controls:** (List at least 6)  
List the things that you plan to keep the same during your experiment, so that they will not affect your results.
- If there will be a "control group" be sure to state what makes this group the "control". Work with your team, complete the answers to these questions.

### Types of Variables

- **Independent Variable**
- This is the one condition that you change in an experiment.
- **Example:** In an experiment measuring the effect of temperature on solubility, the independent variable is temperature.
- **Dependent Variable**
- This is the variable that you measure or observe. It gets its name because it is the factor that is *dependent* on the state of the independent variable.
- **Example:** In the experiment measuring the effect of temperature on solubility, solubility would be the dependent variable.
- **Controlled Variable**
- A controlled variable or constant variable is a variable that does not change during an experiment.

### VI. Procedure:

**Chocolate Chip Cookies**

**Ingredients:** (Quantities)

- 1 1/2 cups all-purpose flour
- 1 teaspoon baking soda
- 2 cups butter, softened
- 1 1/2 cups packed brown sugar
- 1 1/2 cup white sugar
- 1 1/4 teaspoon instant vanilla pudding mix
- 4 eggs
- 2 teaspoons vanilla extract
- 4 cups semisweet chocolate chips

**Directions: (Procedure)**

1. Preheat oven to 350 degrees F (175 degrees C).
2. Mix together the flour and baking soda, set aside.
3. In a large bowl, cream together the butter, brown sugar, and white sugar.
4. Beat in the instant pudding mix until blended.
5. Beat in the eggs and vanilla.
6. Blend in the flour mixture.
7. Finally, stir in the chocolate chips and nuts.
8. Drop cookies by rounded spoonfuls onto ungreased cookie sheets.
9. Bake for 10 to 12 minutes or till golden brown. Edges should be golden brown.

- List in a step by step way how to do the experiment, like a recipe.
- If you do a good job, someone reading your procedure will be able to repeat it accurately.
- You will be doing a single bag of popcorn, but remember the entire class is doing this experiment too, so there will be 18 trials done.

### VII. Materials:

**Chocolate Chip Cookies**

**Ingredients: (Observations)**

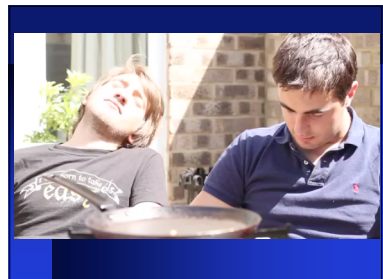
- 1 1/2 cups all-purpose flour
- 1 teaspoon baking soda
- 2 cups butter, softened
- 1 1/2 cups packed brown sugar
- 1 1/2 cup white sugar
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7. Finally, stir in the chocolate chips and nuts.
8. Drop cookies by rounded spoonfuls onto ungreased cookie sheets.
9. Bake for 10 to 12 minutes or till golden brown. Edges should be golden brown.

- List the equipment you need to do the experiment.
- Be specific; list the kinds and amounts.
- With your team members, write your procedures & material list now.

# Testing A Hypothesis



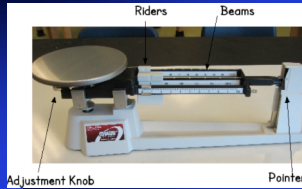
## Measuring Mass

- Mass is the amount of **matter** in an object.
- It's measured on a **balance** (also called a triple beam balance).
- Mass is measured in grams or kilograms.
- A science book is about 1.3 kilograms.
- A large paperclip is about 1 gram.



## Please be careful with the Balances!!!!

- They are very delicate and prone to breakage.
- NEVER pick one up by the balance beams!



## Calibrating

- Before using a balance, check to be sure the balance is **calibrated** (or set to zero).
- Calibrate (set) the balance to zero if it isn't.

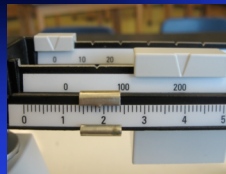


## Reading the Balance: You Try It!



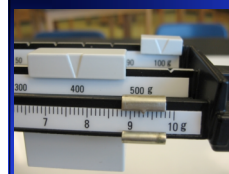
What does this balance read?  
Start at the middle: 300  
Go to the back: 20  
Move to the front: 3.5  
The final answer is:  
✓ **323.5 grams**

## Reading the Balance: You Try It!



2. What does this balance read?  
✓ **201.9 grams**

## Reading the Balance: You Try It!



3. What does this balance read?  
✓ **509.3 grams**

## MEASURING THE MASS OF THE POPCORN

- In just a moment you will measure the mass of the popcorn.
- Be sure to get an accurate mass measurement.
- Be sure to record it on your data table.
- When you have finished, you may put your popcorn into your table microwave. Set on "popcorn" and hit start.
- While it's cooking, get ALL the mass numbers from your table.

## VIII. Experimentation Observations & Results:

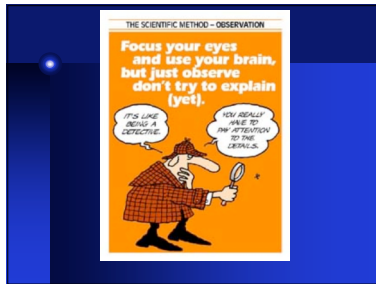
- Use the data table, and observation section to record your mass data and observations.
- I will now give everyone their popcorn number.
- Be sure to also record the brand on the data table!



- Immediately after the popping is done, you need to measure the popped mass and record.
- MAKE NO CONCLUSIONS- simply record the mass results that occurred.
- Finally, you get to open your bag of popcorn and count the popped kernels


## VIII. Experimentation Observations & Results:

SEE IT			
OBSERVATIONS			
LOOK	FEEL	SMELL	ROUGH
SOUND			
QUANTITATIVE NUMBERS			
QUALITATIVE DESCRIPTION			




### VIII. Experimentation

#### Observations & Results:



- When counting, set a standard about what is a complete kernel and what isn't.
- Record all information gathered while doing your investigation.
- Record your data on the class data table too!
- When you're done counting, you may eat!

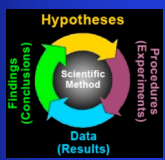
### Graph your results



- Each team will be assigned a team number.
- When you have data to contribute, be sure to come up to the front and type it in.
- Every team is responsible for recording the data that is posted AND graphing the results
- Include an explanation of what the graph is showing

### IX. Conclusion:

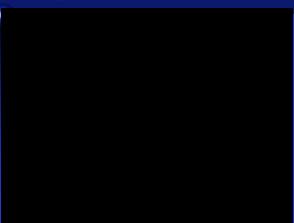
- Be sure to answer ALL of these questions in this section as best as you can.
- Was your hypothesis correct? Incorrect?



### X: Recommendations

- If you were to do this experiment again, what would you do different ?
- Write at least 5 sentences about what you learned, and what you would change to be more accurate and do it better.

### Popping in SLOOOOO Motion



### Final Notes...

- You and your team, or table group can work together to answer those questions, but everyone is responsible for completing a lab.
- This lab is due on Monday.
- This lab is not to be typed.
- Graphs are not to be computer generated, but hand drawn. You MAY produce a computer generated graph in addition to your hand drawn graph for 5 ee pts.
- Be sure to label and explain them, PLUS have different colors to represent each popcorn type

