

# The Popcorn Lab And Scientific Method

## General Experiment Outline Guide For the Scientific Method

**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.

**II. Statement of the Problem:** Identify the problem that exists

**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)

### **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?

You may want to include a test where you do nothing to your sample to see what would happen if it were "left alone." This is called the "Control."

Controls: List the things that you plan to keep the same during your experiment, so that they will not affect your results. (List at least 6.) If there will be a "control group" be sure to state what makes this group the "control"

**VI. Procedure:** List in a step by step way how to do the experiment. If you do a good job, someone reading your procedure will be able to repeat it accurately. You should include at least TEN trials or samples. Try to do your tests in a random (changing) order. Analyze results and discard any that show a major error.

**VII. Materials:** List the equipment you need to do the experiment. Be specific; list the kinds and amounts.

**VIII. Experimentation Observations & Results:** Use charts, graphs, photographs to record your data and observations. All calculations should be clearly labeled. MAKE NO CONCLUSIONS, simply present the results that occurred. Be sure to keep a journal of all information gathered while doing your investigation. For the actual science fair project you will record ALL results in a composition book which will be kept and placed in the back pocket for the science fair judging.

**IX. Conclusion:** be sure to answer ALL of these questions as best as you can.

A. What was proven? Analyze what your results meant. What were the differences between the factors or products you tested? Check the ingredients or makeup of your variable. (Be careful not to confuse close results with a major difference. Is it close enough to be considered of "no significant difference" due to possible experimental error?

B. What conditions may have affected your results causing an experimental error?

C. How would you change the design of the experiment to eliminate the problems and make it a better test?

D. What were some of the conditions that were impossible to control?

E. What did you learn from your experiment that you did not expect?

F. If your results are accurate, what recommendations would you make as a result of your experiment?

**X: Recommendations:** If you were to do this experiment again, what would you do different ?

**Popcorn Experiment Sample: Complete each section in handwriting. Attach this to the final version.**

**REMEMBER... This lab write up is due next Friday w/ computerized graphs.**

For this classroom experiment, each group of students should pop a bag of microwave popcorn and count the popped and unpopped kernels.

**I. Title :** \_\_\_\_\_

**II. Statement of the Problem:**

\_\_\_\_\_  
\_\_\_\_\_

**III. Purpose:**

\_\_\_\_\_  
\_\_\_\_\_

**IV. Hypothesis**

\_\_\_\_\_

**V. Variables & Controls (outlined/bullet points NOT sentences)**

Variables to be changed: \_\_\_\_\_

Variables to be measured: \_\_\_\_\_

Controls: \_\_\_\_\_

**VI. Procedure ( do this as a step by step )**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_

**VII. Materials**

A. 17 + bags of different microwave popcorn

B. microwave

**VIII. Experimental Results & Observations**

1. Complete chart for recording the collected data.
2. Also keep a record of everything observed as additional information to help in making conclusions.
3. Write 1-2 paragraphs of observations. Ideas: were some brands real greasy? Did some have a lot of unpopped kernels. Did some have only a few. Did some have a lot of broken pieces... etc
3. Create a graph that presents the data using your computer. NO hand drawn graphs!
4. You will be receiving data from all 5 classes. What do you observe with all that additional data?

Results: **Popped and Unpopped Microwave** Complete this table, and ATTACH to your final copy!

Popcorns Brand	Popped kernels	Unpopped Kernels
brand 1: _____	brand 1: _____	brand 1: _____
brand 2: _____	brand 2: _____	brand 2: _____
brand 3: _____	brand 3: _____	brand 3: _____
brand 4: _____	brand 4: _____	brand 4: _____
brand 5: _____	brand 5: _____	brand 5: _____
brand 6: _____	brand 6: _____	brand 6: _____
brand 7: _____	brand 7: _____	brand 7: _____
brand 8: _____	brand 8: _____	brand 8: _____
brand 9: _____	brand 9: _____	brand 9: _____
brand 10: _____	brand 10: _____	brand 10: _____
brand 11: _____	brand 11: _____	brand 11: _____
brand 12: _____	brand 12: _____	brand 12: _____
brand 13: _____	brand 13: _____	brand 13: _____
brand 14: _____	brand 14: _____	brand 14: _____
brand 15: _____	brand 15: _____	brand 15: _____
brand 16: _____	brand 16: _____	brand 16: _____
brand 17: _____	brand 17: _____	brand 17: _____
brand 18: _____	brand 18: _____	brand 18: _____

**Observations:** \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_

**IX. Conclusion** (answer these questions in the conclusion to produce a quality conclusion. Each question should have 4-5 sentences)

1. What was proved? Analyze what your results meant. What were the differences between the factors or products you tested? Check the ingredients or makeup of your variable. (Be careful not to confuse close results with a major difference.) Is it close enough to be considered of "no significant difference" due to possible experimental error?

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

2. What conditions may have affected your results causing an experimental error?

\_\_\_\_\_  
 \_\_\_\_\_

3. How would you change the design of the experiment to eliminate the problems and make it a better test?

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4. What were some of the conditions that were impossible to control?

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5. What did you learn from your experiment that you did not expect?

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6. If your results are accurate, what recommendations would you make as a result of your experiment?  
Comparing the number of popped vs unpopped.

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**Additional questions to be answered:**

1. If there is a difference between the initial mass of the corn and the popped corn, what happened to account for this change?

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2. How much variability is there in the samples of each kind of corn? Why do you think this is true?

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3. What happens to the reliability of the results as the sample size is increased?

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4. What practical problems are there in the unpopped kernels and the popped corn? How can you limit these?

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**X: Recommendations:** If you were to do this experiment again, what would you do different? (5 sentences min.) If you were to do this experiment again, what would you do different?

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