

# Scientific Method: Water Drops on a Penny

## Abstract (Extra Credit): (Final Lab Report)

The abstract is a short paragraph summarizing purpose, problem examined, results, and outcomes of the lab. This will come at the front of the lab, but should be the last thing written.

## Introduction/Statement of Problem: (Science Journal Pre-lab + Final Lab Report)

A controlled experiment is an experiment that tests only one factor at a time through the control and manipulation of **variables**. We will be dealing with three types of **variables: independent, dependent, and controlled** (constants). **Independent variables** are what you change/manipulate during an investigation. You should only have ONE **independent variable** for any experiment. **Dependent variables** are what changes when the **independent variable** changes. They are **dependant** on the **independent variable**. **Controlled variables or constants** are the elements in the lab that stay the same. These are elements that can affect the outcome of the lab, but must remain the same so as not to introduce more than one **independent variable**.

In this introductory lab, we will be practicing following the rules of the scientific method (including forming a hypothesis, recording data, and writing a conclusion), with a special focus on identifying and properly manipulating our different variables.

You will be given a penny, an eye dropper, water, and soap. Using the eye dropper, you will drop the solution (one drop at a time) onto the surface of the penny. You will do a number of trials with a clean penny. You will then cover the penny with soap and repeat. Does the addition of soap to the surface of the penny affect how many drops will stay on the penny?

## Hypothesis: (Science Journal Pre-lab + Final Lab Report)

If the **independent variable** changes, then the **dependent variable** will change,  
If the penny is covered with soap, then \_\_\_\_\_.

## Variables: (Science Journal Pre-lab + Final Lab Report)

Independent Variable: \_\_\_\_\_

Dependent Variable: \_\_\_\_\_

Constants: \_\_\_\_\_

## Materials and Equipment: (Science Journal Pre-lab + Final Lab Report)

Penny	Water	Forceps
Eyedropper	Soap	Paper towel

## Procedure: (Science Journal Pre-lab + Final Lab Report)

### Clean Penny (No Soap)

1. Always start with a completely dry penny.
2. Be sure to always use the same penny, same side, and same eye dropper.
3. Place the penny on the paper towel.
4. Using an eyedropper, place drops of water (one at a time) onto the surface of the penny. You will continue to do this until any amount of water spills off of the penny. Be sure to record the number of drops.
5. Repeat this process for 5 trials.

### Penny Coated With Soap

1. Always start with a completely dry penny.
2. Using forceps, coat the penny with soap, letting excess soap run off back into the container.
3. Place the penny on the paper towel.
4. Using an eyedropper, place drops water (one at a time) onto the surface of the penny. You will continue to do this until any amount of water spills off of the penny. Be sure to record the number of drops.
5. Rinse and dry your penny.
6. Repeat this process for 5 trials.

### Data and Observations: (Science Journal + Final Lab Report)

Describe your penny. Be specific. Focus on observable details.

#### ***Penny, no soap, water drops: Number of drops***

Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Average

#### ***Penny, soap, water drops: Number of drops***

Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Average

Create a simple bar graph with dependent variable on y-axis, independent variable on x-axis. Be sure to include title and axis labels.

Independent variable: \_\_\_\_\_

Dependent variable: \_\_\_\_\_

### Analysis: (Science Journal + Final Lab Report)

What was the average number of drops for a penny with no soap?

What was the average number of drops for a penny dipped in soap?

Did any of your individual trials produce unusual (too many or too few) drop counts relative to the other trials?

What was the independent variable?

What was the dependent variable?

What were the constants?

How did changing the independent variable affect your dependent variable?

### Results/Conclusion: (Final Lab Report)

This section is answered in a paragraph format. You will write a summary of your data and findings. You will also address whether your hypothesis was correct or incorrect. You must include evidence from ***this lab*** that supports your conclusion. You should also include any possible sources of error. This is especially important if anything went wrong during the execution of the lab, but should be addressed regardless of any known errors.

Other questions you may address include:

Did you identify any possible improvements or changes if you were to do the lab again?

Did your lab or outcomes generate any additional questions to explore?