

1. What is the scientific method?

It is a **PROCESS** that is used to find **ANSWERS** to questions about the world around us.

2. Is there only one “scientific method”?

No, there are several **VERSIONS** of the scientific method. Some versions have more **STEPS**, while others may have only a few. However, they all begin with the identification of a **PROBLEM** or a **QUESTION** to be answered based on observations of the world around us and provide an **ORGANIZED** method for conducting and analyzing an experiment.

3. What is a hypothesis?

It is an **EDUCATED GUESS** based on observations and your knowledge of the topic.

4. What is data? It is **INFORMATION** gathered during an experiment.

5.

IDENTIFY THE PROBLEM

What do you want to know or explain? Use observations you have made to write a question that addresses the problem or topic you want to investigate.

FORM A HYPOTHESIS

What do you think will happen? Predict the answer to your question or the outcome of the experiment.

CREATE AN EXPERIMENT

How will you test your hypothesis? Develop a procedure for a reliable experiment and address safety rules.

PERFORM AN EXPERIMENT

Follow the steps in your procedure to perform your experiment. Record data and observations!

ANALYZE THE DATA

Is the data reliable? Does your data and observations from the experiment support your hypothesis?

Yes

No

Is your data inaccurate or the experiment flawed?

Yes

No

Rewrite your procedure to address the flaws in the original experiment.

MODIFY THE EXPERIMENT

Write a conclusion that summarizes the important parts of your experiment and the results.

COMMUNICATE THE RESULTS



Sinkin' Lincoln Lab

(back of notes)

Prediction:

How many drops of water can you fit on one side of a penny? _____

Things to think about ...

- (1) Would it matter if it's heads up or tails up?**
- (2) Would the age of the penny make a difference?**

Part A: Perform a **CONTROL** test for comparison with later results.

Step 1: Rinse a penny in tap water and dry completely.

Step 2: Place the penny on paper towel.

Step 3: Use an eye dropper to place drops of **WATER** on the penny (one at a time) until ANY amount of water runs over the edge of the penny.

Step 4: Record the number of drops for that trial in the table.

Repeat Steps 1 - 4 three more times before calculating your average.

Trial 1	Trial 2	Trial 3	Trial 4	Average

***Average: Add all #s, HIT equal size, and then divide by 4
(Round to one decimal place!)***



Sinkin' Lincoln Lab (back of notes)

What were the results of your first experiment?

Were you close to your prediction?

If we coated the penny with soapy water, would it hold more or less drops?

Group	Average
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
Class Average	

Part B: Perform tests with the **TESTING LIQUID**.

Step 1: Start with a “clean” penny. Rinse the penny in tap water and dry completely. Be sure to remove as much residue as possible - without using soap!

Step 2: Hold the penny with the tweezers provided, then dip it into the **TESTING LIQUID**. Allow extra liquid to drip off the penny into the container before proceeding to the next step.

Step 3: Place penny on dry spot on a paper towel. Place drops of **WATER** on the penny (one at a time) until ANY amount of water runs over the edge of the penny.

Step 4: Record your observations and the number of drops for that trial in the table.

Repeat Steps 1 - 4 three more times before calculating the average.

Trial 1	Trial 2	Trial 3	Trial 4	Average

*Average: Add all #s and divide by 4
(Round to one decimal place!)*

How do the averages compare?

Group	Control Average	Soap Average
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Class Average		

Part C: Answer each question related to the experiment.

1. Write a definition for each term.

Cohesion - Force of attraction between water molecules

Surface Tension - The tension on the surface of a liquid caused by the attraction of the particles, such as the “skin”

2. Explain your results from both parts of the experiment in terms of cohesion and surface tension.

The soapy water reduced the cohesion and the water was not able to “stick” together as well to form the skin (less surface tension). It would not form as large a bubble as it did with just a clean penny (not dipped in anything.)

Part C (cont'd)

3. How do your results compare to the other groups in your class? Provide at least 2 possible reasons for any similarities and differences you identified.

Example: "I had _____ as many drops as _____, because my drops were smaller."

4. What other liquids could you use? What would happen? Give 2 examples (& a prediction).

Example:

Hair conditioner – it might help the penny hold more drops

3. How do your results compare to the other groups in your class? Provide at least 2 possible reasons for any similarities and differences you identified.

4. What other liquids could you use? What would happen? Give 2 examples.

Assignment: Write the procedure for the substance you will test on the page under the worksheet. DUE Monday!