6th grade science

Name _____

Date _____ Block _____

Drops on a Penny

Experimental investigations involve the manipulation of variables. Variables are the parts of the experiment that can change. **Independent variables** are the ONE thing that has been chosen to be changed or *manipulated* by the scientist. It is what the investigator is testing; the difference between groups. **Dependent variables** are those things that are observed or measured. **Controlled variables** are those things that are kept the same. They could be changed, but the scientist keeps them the same so that they will not interfere with the investigation.

Problem: "Does *the amount of soap mixed with water affect how well the water will stay on a penny?*"

Scientists use a **HYPOTHESIS** to help guide an experimental investigation. A hypothesis is a special kind of **PREDICTION**. It is an educated guess about the relationship between the independent and dependent variable. A hypothesis is testable; an experimental investigation can be done based on the hypothesis. One way to write a hypothesis is to use an "When… Then…." Statement.. A When, Then statement shows cause and effect. Alternatively, what does the independent variable **cause** the dependent variable to do? Write a When, Then… hypothesis using this format: ***When*** *I change the independent variable* ***THEN*** *the dependent variable will change.*

In this experiment, what will you change? _____

That is your **independent variable**.

In this experiment, what will you measure? _____

This is your **dependent variable**.

Adapted from Penny Drops http://www.science-class.net/Lessons/NOS/penny_drops.pdf

Write a hypothesis for our research question: "Does *the amount of soap mixed with water affect how well the water will stay on a penny?*" Use a When, Then statement.

When_____,

then_____

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

Perform tests with the TESTING LIQUID A

Liquid A is our control group. It is 100% Water.

1. Rinse a penny in tap water and dry completely.
2. Place the penny on paper towel.
3. Use an eyedropper to place drops of WATER on the penny (one at a time) until ANY amount of water runs over the edge of the penny.
4. Record the number of drops for that trial in the table.
5. Repeat Steps 1-4 four more times, and then calculate the mean (average).

Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Average (Mean)

Part B: Perform tests with the TESTING LIQUID B.

Adapted from Penny Drops http://www.science-class.net/Lessons/NOS/penny_drops.pdf

Testing Liquid B is 75% Water & 25% Soap

1. Rinse a penny in tap water and dry completely.
2. Place the penny on paper towel.
3. Use an eyedropper to place drops of TESTING LIQUID B on the penny (one at a time) until ANY amount of water runs over the edge of the penny.
4. Record the number of drops for that trial in the table.
5. Repeat Steps 1-4 four more times, and then calculate the mean (average).
6.

Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Average (Mean)

Part C: Perform tests with the TESTING LIQUID C.

Testing Liquid C is 50% Water & 50% Soap

1. Rinse a penny in tap water and dry completely.
2. Place the penny on paper towel.
3. Use an eyedropper to place drops of TESTING LIQUID C on the penny (one at a time) until ANY amount of water runs over the edge of the penny.
4. Record the number of drops for that trial in the table.
5. Repeat Steps 1-4 four more times, and then calculate the mean (average).

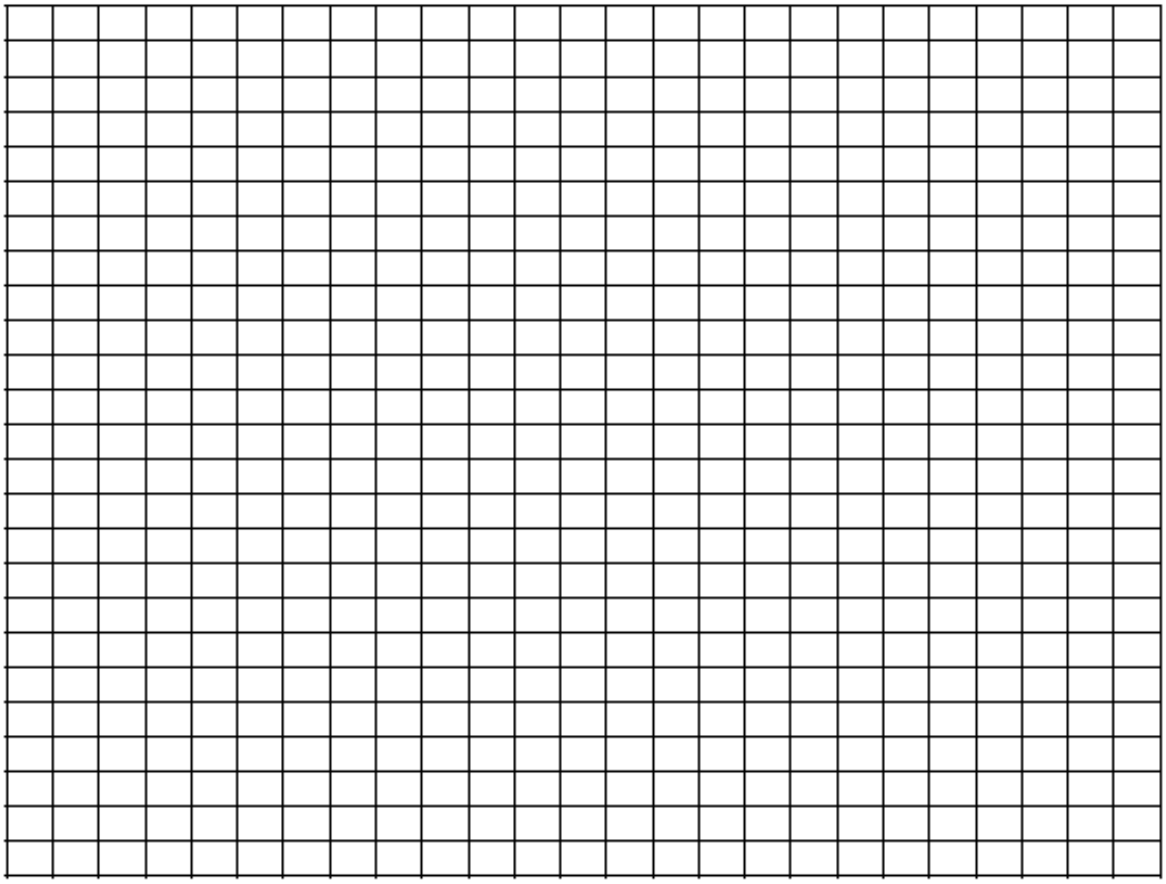
Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Average (Mean)

Adapted from Penny Drops http://www.science-class.net/Lessons/NOS/penny_drops.pdf

Data

Using the average of the three liquids, create a bar graph.

Title: _____



Look for **RELATIONSHIPS** - two variables are related if one of them changes whenever the other one changes. There are two kinds of relationships:

DIRECT RELATIONSHIP: When one variable increases the other variable increases.

INDIRECT RELATIONSHIP: When one variable decreases the other variable increases.

What relationship(s) do you see?

_____

_____

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After the data has been analyzed, a **CONCLUSION** is written. A conclusion is a written answer to the question. Whatever conclusion is drawn it is **always, always** supported by actual data from the experiment. An answer without evidence is meaningless.

Write a conclusion for your experiment below. (Answer the questions in COMPLETE sentences.)

1. Write your question & hypothesis below.

_____

_____

_____

2. Was your hypothesis (prediction) supported by the data or was it rejected by the data?

_____

_____

3. Use the data to explain why you said your hypothesis was supported or rejected.

My hypothesis was _____ because the data showed that

_____

4. What happened during the lab that could have made your results unreliable (not dependable) and if you had to do the lab again, what would you do differently?

_____

_____

Adapted from Penny Drops http://www.science-class.net/Lessons/NOS/penny_drops.pdf