

Scientific Method Laboratory Activity – Teacher Edition

Applying the Scientific Method

Background Information:

The scientific method is a procedure used to provide scientific explanations for questions about the world. It outlines the way a scientist can perform an experiment to collect empirical data which can be used to answer a question. The scientist plans their experiment based on background research that allows them to form a hypothesis predicting what may happen. When the experiment is complete, they will use their data to form a conclusion. The key difference between the scientific method and other ways of acquiring knowledge are forming a hypothesis and then testing it with an experiment.

In this laboratory activity, you will apply what you know about the scientific method by following its steps in conducting a simple scientific investigation.

Learning Objectives:

At the end of this laboratory activity, students are expected to:

- enumerate the steps in the scientific method.
- follow the different steps in scientific method in conducting a simple scientific investigation.

Pre-lab Activity:

Define the following terms.

a. Problem

b. Hypothesis

c. Experiment

d. Variables

e. Conclusion

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Laboratory Proper:

Materials

For each group of 4 students:

- 4 pieces of same kind of hard candy
- 4 250 mL beakers
- water
- ruler
- scalpel or blade
- timer/stopwatch

Procedure:

1. The problem that you have to answer in this science investigation is: ***How does surface area of a candy affect how quickly it dissolves in water?***

2. Based on the problem, write a hypothesis in If and then format.

If _____, then _____.

3. Before you test your hypothesis, list down the variables in the experiment you are planning to conduct. Make sure to have only one independent variable.

Constant Variable(s)	Independent Variable	Dependent Variable

4. Now that you have listed your variables, list down your procedure for testing your hypothesis. Take note of the given materials that you can use for your experiment.

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5. Do the experiment based on the procedure you have created. Make sure to gather the results and present it in a table form. Write your table below.

6. Based on the results you obtained, formulate a conclusion.

Post-Lab Questions:

1. What was your basis in formulating your hypothesis?

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2. Which part of doing the scientific method did you find challenging? Why?

3. Did your conclusion support or reject your hypothesis?

4. How does writing a detailed procedure help you in conducting this science investigation?

5. What recommendations would you make to those who want to redo your experiment?

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Answers:

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Background Information:

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Learning Objectives:

At the end of this laboratory activity, students are expected to:

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- follow the different steps in scientific method in conducting a simple scientific investigation.

Pre-lab Activity:

Define the following terms.

a. Problem

A question stating what the researcher or scientist wants to find out

b. Hypothesis

A tentative statement that provides answer to the problem; testable and falsifiable

c. Experiment

A series of steps with controlled variables that is used to test the hypothesis

d. Variables

Factors that affect the experiment

e. Conclusion

A statement that summarizes the results of the experiment; may reject or support the hypothesis

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- timer/stopwatch

Procedure:

1. The problem that you have to answer in this science investigation is: ***How does surface area of a candy affect how quickly it dissolves in water?***
2. Based on the problem, write a hypothesis in If and then format. **Possible answer**
If **the surface area of the candy is small**, then **it will dissolve faster in water**.
3. Before you test your hypothesis, list down the variables in the experiment you are planning to conduct. Make sure to have only one independent variable. **Possible answers**

Constant Variable(s)	Independent Variable	Dependent Variable
type of candy kind of water temperature of water amount of water	surface area of candy	time the candy would dissolve in water

4. Now that you have listed your variables, list down your procedure for testing your hypothesis. Take note of the given materials that you can use for your experiment. **Possible answers**
 - a. **Get one candy and measure its surface area using the ruler. This candy will be the control group.**
 - b. **Get the three candies and cut each into different sizes. Measure the surface area of each candy and record them.**

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- c. Pour 150 mL of water in each beaker. Label beakers as A, B, C, and D. Beaker A will hold the control group.
 - d. Put one candy in each beaker at the same time. Turn on the timer and record the time on how long each candy would dissolve completely in water.
 - e. Record data and observations.
5. Do the experiment based on the procedure you have created. Make sure to gather the results and present it in a table form. Write your table below. ***(Answers here would vary depending on how students conducted the experiment, but data should show the time each candy dissolved in water as well as the surface area of each candy.)***

6. Based on the results you obtained, formulate a conclusion. ***Possible answer***
The smaller the surface area of the candy, the faster it dissolves in water.

Post-Lab Questions:

1. What was your basis in formulating your hypothesis?

Answers may vary but possible answers are it could be based on experience like smaller substance usually dissolves faster or it could be based on a research prior to doing this experiment.

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2. Which part of doing the scientific method did you find challenging? Why?

Answers may vary but possible answers are formulating a hypothesis could be a challenge because you have to predict relationships between variables or creating a procedure can be a challenge because you have to ensure that you list things in order to ensure accurate results

3. Did your conclusion support or reject your hypothesis?

Answer here may vary

4. How does writing a detailed procedure help you in conducting this science investigation?

It provides a clear guidance in doing the experiment, preventing you from making a mistake or being unable to control the variables.

5. What recommendations would you make to those who want to redo your experiment?

Answers may vary but possible answers is use a different kind of candy or probably use tablet medicine instead to make it more practical.

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