

Name \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_

## Use of the Scientific Method to Solve Problems

In this activity you will understand the steps of the scientific method and how it is implemented. Each member of your group will have an assigned task. Decide what they will be and write the names in the space provided:

**Leader:** Keep the group on task \_\_\_\_\_

**Reader:** Will read each section out loud so everyone is on the same page \_\_\_\_\_

**Writer:** Neat clear handwriting \_\_\_\_\_

**Reporter:** The spokesperson for the group \_\_\_\_\_

Observe the activity set up by your teacher on the lab table.

1. What is happening? Discuss with your group and write the answer below.

You have just undertaken the first step in the Scientific method – **Observation**.

2. In your words – what is Observation?

3. Why is this happening?

CONGRATULATIONS you are on your way to formulate a HYPOTHESIS for this observation. Discuss this term with your group and try to come to a consensus on the meaning of hypothesis.

4. Definition of Hypothesis:

Writer – please write the definition of hypothesis your group came up with on the paper/white board provided (write large and clear – use markers provided) and tape it to the board. STOP here till your teacher tells you to go ahead.

As a class we will decide which is the best answer. Write the best answer in the space below. How close was your answer to the best answer?

Now formulate a hypothesis for this experiment: A hypothesis can start with the phrase "I think ....." or "If \_\_\_\_\_ then \_\_\_\_\_" statement  
Hypothesis:

3. Now you will have to "test" your hypothesis. You have to come up with the experimental method you will use to figure out why the fleas are behaving in that manner. Use the space below to set up your method.

4. Congratulations! – You have just completed another crucial step of the scientific method.  
CONTROLLED EXPERIMENT: What is a controlled experiment? Write below

**Writer** – Write the definition of controlled experiment your group came up with under hypothesis and tape it to the board. STOP here till your teacher tells you to go ahead.

As a class we will decide which is the best answer. Write the best answer in the space below.

How close were you? \_\_\_\_\_

Please go back to your method and make sure that you have a controlled experiment.

5. In a controlled experiment, there are many variables. What is a variable?

**Writer** – You know what to do.

**Class answer:** What is a variable?

How close were you? \_\_\_\_\_

Now write down all the variables in your experiment.

In a controlled experiment, the following variables are very important. They are

6. Independent variable:

7. Dependent variable:

8. Controlled variables:

After you have written your descriptions of the terms above. **Writer** - go to work!

**Class answer to:**

9. Independent variable:

10. Dependent variable:

11. Controlled variables:

12. List the following variables of your experiment

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

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

Controlled variables \_\_\_\_\_

Your teacher will now provide you with the materials for you to test your hypothesis. Any information gathered during an experiment is called DATA. There are two types of data that you can collect:

Descriptive data or Qualitative data (may or may not be in a data table)

Numerical data or Quantitative data (usually in a data table)

How will you gather your data in this experiment?

Now set up your experiment and gather your data – you will be given 10 minutes for this –  
**Leader** - keep everyone on task.

Your Data

**Analysis:** In this section you will try to make sense of the data and compare it with your control. It is your job to select and include pertinent data to support your answer. Scientists love numbers! Calculations and graphs are also considered part of your analysis.

Use your data to answer the following questions.

1. Which substance showed the highest movement of fleas?
2. Which was the least?

**Conclusion:** Determine if your hypothesis was supported or not. An unsupported hypothesis is okay.

**Writer** – put your hypothesis, data table, analysis and conclusion (up to this point) on the board.

In a “real” experiment you will have to research similar works and compare with yours. In this lab, each lab group worked independently so they can be considered different research groups. Check with the other groups’ data and compare it with yours.

If other group’s data were not available to you, how would you perform this step?

Determine if your experiment needs to be repeated and/or modified and write your suggestions in the space below.

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### Teacher Notes

In this activity, I dropped some raisins in a 250ml beaker containing ~150 ml of Mountain Dew. The raisins accumulate the air/CO<sub>2</sub> bubbles on their surface from the carbonation of the soda and float to the top. The bubbles then burst and the raisins sink to the bottom. The raisins resemble living things! This activity will need least two class periods or 120 minutes.

**Hook:** I explain to the students that these were given to me by someone who said that these were Amazon River Fleas that remain dormant till they are submerged in monkey urine. Their task is to use the scientific method to investigate this phenomenon.

**Prep:** Have the raisin and Mountain Dew setup on each lab table and ask the students to follow the worksheet to understand the process behind the scientific method.

To test their hypothesis, the students will carry out an experiment. You can either direct the students to use raisins and Mountain Dew or have them bring their own materials to experiment. I have had success with both. Many students actually figure out that they should do the experiment with regular versus flat Mountain Dew or regular raisins versus smooth raisins (they want to smooth it out themselves).

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You have just undertaken the first step in the Scientific method – **Observation**.

2. In your words – what is Observation?

3. Can you explain what is happening?

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