Assignment 1

Select Topic; Write Problem Statement

Problem Statement (Question)

Select a topic that can be answered only by conducting an experiment. It is called a "Testable Question." Write the topic as a question to be investigated. This will become your problem statement.

Good Topic Examples:

- *Which brand of paper towels is the most absorbent?*
- *Do different colored mints dissolve at the same rate?*

Poor Topic Examples:

- *How do volcanoes erupt?*
- *Which type of coffee do people like best?*

Websites to help you select an experiment:

Science Buddies http://sciencebuddies.org

The Scientific Method http://www.sciencemadesimple.com/scientificmethod.html

All Science Fair Projects http://all-science-fair-projects.com

Assignment 2

Complete Research/Bibliography

Research

Once you have chosen your problem statement, it is important to research the written materials available on your subject. By finding out as much background information as you can about the subject, you will gain better understanding of the problem.

Follow these guidelines for conducting your research.

- Read books and articles on your subject. Make sure the information is up-to-date (usually not older than 5-10 years, depending on the subject)
- Interview people knowledgeable about the subject
- Write **one to two paragraphs in your own words** that include all the information gathered. **Do NOT copy any information directly from any source.**
- List the sources in alphabetical order

Bibliography (cite two resources)

Make a list of all the books, magazines, web sites, interviews or other sources used. You must use a minimum of 2 sources.

Write the bibliography using the following format:

Book Author's last name, first name, initial., Title of book, City of publication, Publisher, Year, Pages used.

Example *Cured, Mary B., Medical Plants, New York; Moorehouse and Moorehouse Publications, 1988, pp. 84-86.*

Assignment 2 (continued)

Magazine "Title of article." *Title of Magazine*, Volume and number, City of publication: Publisher. Month, Year, Pages of article used.

Example "Problem Solving Processes," *The Science Teacher*, Volume 62 Number 2, Alexandria: National Science Teachers Association, April 1995, pp. 16-19.

Interview Interviewee's last name, first name, initial, Title, Type of interview, Month, date, year of interview, Department of person interviewed, Institution where the person works, Phone number.

Example *Brown, Joseph, T., Ph.D., telephone interview, September 17, 1994, Department of Botany, Somewhere University, (000) 123-4567*

Encyclopedia "Title of article", Title of encyclopedia, Place of publication: Publisher, Date of publication, Volume number, Pages.

Example *"Seeds", World Book Encyclopedia, New York: World Publishers, 1995, Volume S, pages 1120-1121.*

Internet Author's last name, first initial. (year). Title of article. Date posted on web. Full protocol and full address.

Example *Boscher, K. (1988). NetVet and the Electronic Zoo. Posted 7/2/10. http://www.ccs.new.edu/home.*

Assignment 3

Hypothesis/Variables

Hypothesis

A hypothesis states what you think is going to happen when the investigation is conducted. Write down the prediction as to how the independent variable will affect the dependent variable using an "if" - "then" - "because" statement.

Example:

Problem Statement: Does fertilizer improve plant growth?
Hypothesis: If I add fertilizer to soil, then the plant will grow taller because fertilizer provides nutrients and minerals that help the plan increase in size.

Variables

Identify **Independent Variable**
What you change on purpose in an investigation to observe what will happen
...(example) brands of paper towels

Identify **Dependent Variable**
What changes by itself because you manipulated (changed) something in the investigation...(example) amount of water that each paper towel absorbs

Identify **Constant Variables**
Everything else in your investigation must be held constant (kept the same)...(example) size of paper towels, amount of water poured on each paper towel, temperature of the water used (measured in degrees Celsius), container towels are placed in, method of pouring

Assignment 4

Design the Experiment
Title/Procedures/Materials

Choose a Title for Project

Choose a title for the project that tells what the project is about. It should be "catchy" and get the viewer's attention. **The title should NOT be the same as the problem statement.** Must start each word with a capital letter.

Examples: *Bubble Trouble*

Plunging Parachutes

Write Procedures

- List the step-by-step directions like a recipe. Anyone who reads them should be able to duplicate your investigation and get the same results.
- Each step must be numbered.
- Be specific.
- **Each step MUST begin with an action verb (i.e., cut, measure, pour, etc.)**
- Do NOT use personal pronouns (avoid words such as "I" and "me").
- Evidence of three trials minimum.

List and Collect Materials

- List all materials used in the investigation.
- Each item is bulleted.
- Include specific details such as the size and quantity.
- Remember to use ONLY metric units.

Assignment 5

Conduct Experiment

Create & Complete Data Chart

Collect Data

Data includes charts, graphs, data logs, tables and pictures. Student must include two different forms of data. Results must reflect all three trials.

Take pictures

Many projects involve elements that may not be safely exhibited at the fair but are an important part of the project. Photographs should be taken of important parts/phases of the experiment to use in the display. Photographs or other visual images of human test subjects must have informed consent.

Create a Data Collection Table

- The data collected during the course of the investigation must be quantifiable (measurable)
- All measurements must be made using metric units. (i.e., centimeters, grams or degrees Celsius)

Example:

The effect of brand of paper towel on water absorption

Brand of Paper Towel	Trial 1	Trial 2	Trial 3	Average
Viva	15mL	18mL	12mL	15mL
Sparkle	16mL	14mL	12mL	14mL
Bounty	15mL	16mL	17mL	16mL

Create a graph

Title:
The effect of _(IV)_ on _(DV)_

Dependent Variable
(what happened as a result of what you changed)
(Vertical Axis)

Independent Variable (what you changed on purpose)
(Horizontal Axis)

Bar Graphs: Used to compare quantities or amounts of similar things
Line Graphs: Used to show change over a period of time

National Center for Educational Statistics has a great website to help you enter data and automatically create a graph. http://nces.ed.gov/nceskids/createagraph

Assignment 6

Analyze Data
Results/Conclusion

Write Results/Compare Results to Hypothesis

- Write the results based on the data you have collected.
- Write a paragraph (5-6 sentences) describing the results.
- Use an average of the results of the three trails.

Example: A sheet of Viva paper towel absorbed an average of 15 mL of water. A sheet of Sparkle paper towel absorbed an average of 14 mL of water. A sheet of Bounty paper towel absorbed an average of 16 mL of water.

Write Conclusion

The conclusion should be a summary of your experiment. You should refer to your data to provide detailed proof of your conclusion. Write at least one paragraph which includes the following information:

- Was the hypothesis supported or not supported and why?
- What are the possible reasons for the results?
- What were the major findings?
- Was there any problems or unusual events that occurred during the investigation?
- How can you improve the experiment?

Example: Based on the results, the hypothesis was not supported. I predicted that Viva would absorb the most water, but Bounty absorbed one more mL than Viva. During the investigation, some of the water spilled on the table so I had to restart the experiment. To improve this experiment, I would test additional brands of paper towels and compare the results.

Assignment 7

Application

Write Application

State how the results of the experiment may be useful to others in everyday life. Include new questions that may have been generated as you completed the investigation. It should be **at least** one paragraph.

Example: The results of this experiment would be useful to people in the cleaning industry. It would be useful to them because they would be able to choose the most absorbent paper towel to clean up spills. Additionally, it would be useful to anyone who uses paper towels in their daily lives.

Assignment 8

Create Display Board/Report

Board (Regulation size 36"x48", 3-panel board)

The diagram below shows the positions of the various parts required on the science board. PLEASE write your first and last name, science teacher's name and grade level on the BACK, top, right-hand corner!!!