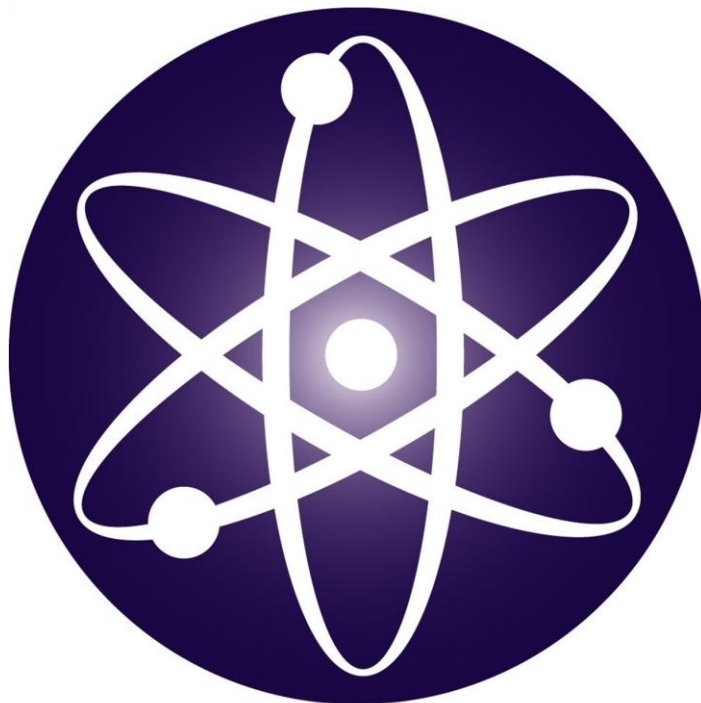


# **Dr. Gilbert L. Porter Elementary School Science Fair Packet / Information**



# **Science Fair**

# Assignment 1

(Problem Statement and Variables)

## Problem Statement (Topic)

*Select a topic that can be answered only by experimenting. Write your topic as a question to be investigated.*

*Example: "Which brand of paper towels is the most absorbent?"*

### Good Topics:

1. Do different colored mints dissolve at the same rate?

*This is a good topic because it required experimentation that you can do yourself. You must use the scientific method in completing this project.*

2. What surface do mealworms prefer?

*This topic suggests the use of an experimental method. Asking a question is good approach toward developing your topic.*

3. Do all brands of paper towels absorb water at the same rate?

*This is an investigation where only one variable is being manipulated.*

### Poor Topics:

1. How volcanoes erupt.

*This topic will not allow experimentation without visiting real volcanoes. Making a model that erupts is a demonstration not an experiment.*

2. Microscopes.

*This topic is too general. Telling how one works is not experimentation.*

3. Do different brands of paper towels soak up different temperatures of water at the same rate?

*This topic needs to be narrowed down to one investigation. Only one variable should be manipulated in an investigation.*

# Variables

Variables are all the factors that affect your investigation. There are three types of variables.

**Manipulated Variable** - What you change on purpose in an investigation.

*(Example)* Brands of paper towels

**Responding Variable** - What changes by itself because you manipulated (changed) something in your investigation.

*(Example)* Amount of water that is absorbed by each towel

**Variables Held Constant** -

Everything else in your investigation must be held constant (kept the same).

*(Example)* Size of paper towels  
Amount of water poured on each towel  
Temperature of the water used  
Container towels are placed in  
Method of pouring



# Assignment 2

(Includes two paragraphs of background information and the bibliography)

## Background Information

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 your problem. This will be valuable to you as you plan your project.

Follow these guidelines for conducting your research.

1. Read books and articles on your subject. Make sure this information is up-to-date (usually not older than 5-10 years, depending on the subject).
2. Interview and talk with people who are knowledgeable about your subject.
3. After reading books or interviewing people about your topic, write two paragraphs **in your own words** that include all the information that you gathered. **Do not copy any information directly from any source.**
4. List your sources in alphabetical order.

## Bibliography

Make a list of all the books, magazines, interviews, or other sources that were used. You must use a minimum of 3 sources, two of which can be from the same type of source. For example, you may use 2 internet and 1 book.

**Write your 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.

**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.

- 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 one interviewed, institution where the interviewed works, phone number .
- (Example) Brown, Joseph, T., Ph.D., telephone interview, September 17, 1994,  
Department of Botany, Somewhere University, (000) 123-467.
- Encyclopedia** "Title of article", Title of encyclopedia, Place of publication: The publisher, Date of publication, Volume number, pages.
- (Example) "Seeds", World Book, New York: World Publishers, 1995, Volume S, pages 1120-1121.
- Internet** **Author's last name, first initial. (year). Title of article [online] Available <http://www....>**
- (Example) Boscher, K. (1988). NetVet and the Electronic Zoo [online] Available <http://www....>

## BIBLIOGRAPHY



# Assignment 3

(Includes the title, the problem statement, hypothesis, materials, and procedures)

## Title

Choose a title for your project that tells what your project is about. It should be “catchy” and get the viewer’s attention.

*Examples:* Bubble Trouble  
Plunging Parachutes

*The title should not be the same as the problem statement!*

## Hypothesis

A hypothesis states what you think is going to happen when you investigate a question.

*Example:*

**Problem Statement:** Which brand of paper towels is the most absorbent? **Hypothesis:** If Viva, Bounty and Sparkle paper towels are tested for their absorbency, then I predict Viva paper towels will be the most absorbent.

## Materials

List all the materials used in your investigation. Include specific details such as size and quantity.

Remember to use only **METRIC UNITS**.

### Good Example

3 - 15 X 15 cm. sq. each of: Sparkle, Viva, and Bounty paper towels

250 ml graduated beaker

750 ml water 20° C

1 - 20 X 20 cm. sq. cake pan

Celsius Thermometer

Clock with a second hand

### Poor Example

Paper Towels

Measuring cup

Water

Container

Thermometer

Clock

# Metric Units of Measurement

The data collected during the course of your investigation needs to be quantifiable (measurable). All measurements in your investigation must be made using metric units.

<b>Volume:</b>	milliliter (mL) 1000 mL = 1L Liter (L)
<b>Length:</b>	millimeter (mm) 10 mm = 1 cm centimeter (cm) 100 cm = 1 m meter (m) 1000m = 1 km kilometer (km)
<b>Mass:</b>	milligram (mg) 10 mg = 1 cg centigram (cg) 100 cg = 1 g gram (g) 1000g = 1 kg kilogram (kg)

## Procedures

List your step-by-step directions like a recipe. Anyone who reads them will be able to duplicate your investigation and get the same results. Each step must begin with a verb, such as *cut*, *measure*, *pour*, *etc.*

**Do not write what you did (avoid words such as “I” and “me”).**

*Example:* Problem Statement: Do all brands of paper towels absorb the same amount of water?

1. Cut 3 - 15 X 15 cm. sq. from each brand of paper towels
2. Label each cut piece with brand name
3. Pour 50 ml. of 20° C water into 20 X 20 cm. sq. pan
4. Place 1 square of each brand of paper towel into the water and pan
5. Leave for 30 seconds
6. Remove paper towel
7. Measure water remaining in pan and record
8. Dry the cake pan
9. Repeat steps 4-8 for each brand of paper towel
10. Repeat entire process twice more for each brand of paper towel to complete the three trials

## Assignment 4

(Includes the results, conclusions, applications and the first drafts of the data charts and graphs)

### Results

Write the results of the experiment based on the data you have collected. Use the **average** of your results.

*(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

### Conclusion

The conclusion should be a summary of your experiment. Write one paragraph which includes the following information.

- Was the prediction in your original hypothesis correct? If not, state why it was not correct.
- Were there any problems or unusual events that occurred during your investigation?
- How could you improve this experiment?
- If your original hypothesis does not match the results of your experiment, then write a revised hypothesis. **Do not write it as an “If, then” statement.**

*(Example)*

Based on the results, my hypothesis was incorrect. I predicted that Viva would absorb the most water, but Bounty absorbed 1 more mL than Viva. During my investigation, some of the water spilled on the table and I had to restart my experiment. To improve this experiment, I would test additional brands of paper towels and compare the results. My revised hypothesis is that Bounty paper towels will absorb the most amount of water, when compared to other paper towels.



## Applications

State how the results of this experiment may be useful to others in everyday life.

*(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 that would allow them clean up spills. Additionally, it would also be useful to anyone who consumes paper towels in their daily lives.

## Data

(Data includes charts, graphs, and pictures)

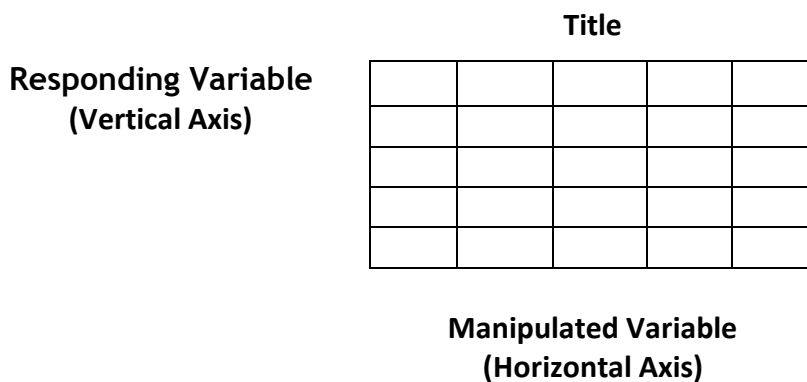
## Chart

Amount of Water Absorbed (in mL)

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

To calculate the average (mean), add the results of each trial and then divide the sum by three.

## Examples of Graphs



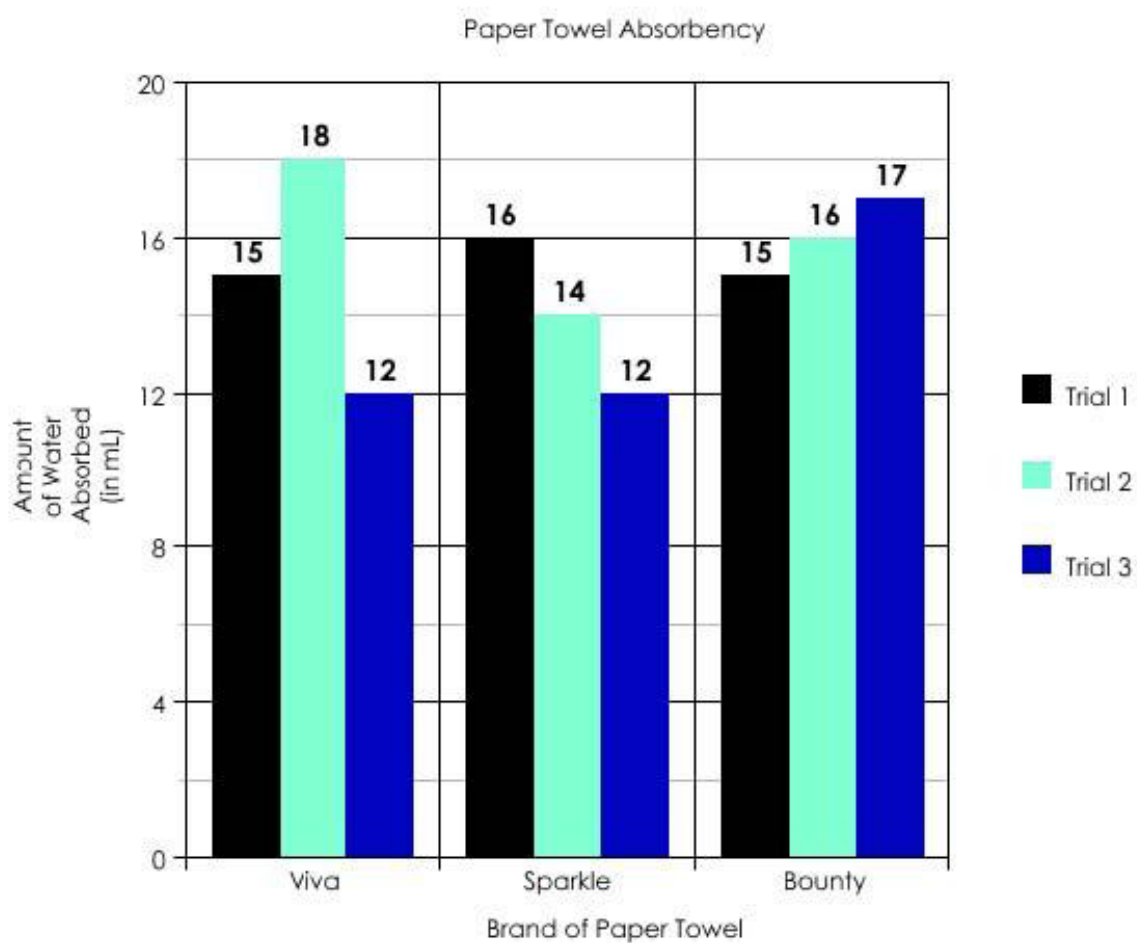
**Title:** The title is a short description of the data being displayed.

**Horizontal Axis:** The manipulated variable (what you changed on purpose) is displayed on the horizontal axis.

**Vertical Axis:** The responding variable (what happened as a result of what you changed) is displayed on the vertical axis.

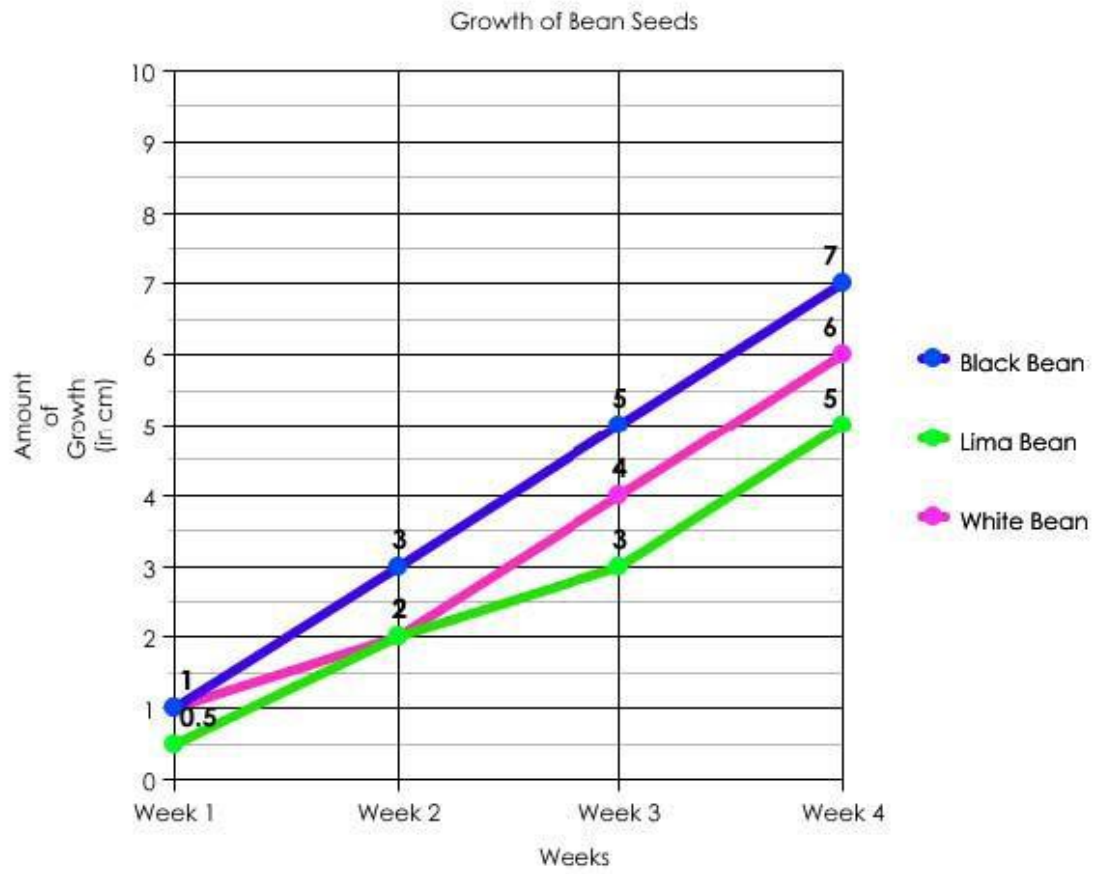
## Bar Graph

(Bar graphs are used to compare quantities or amounts of similar things)



# Line Graph

(Line graphs are used to show change over a period of time)



# Assignment 5

(The abstract includes 4 paragraphs)

## Abstract

The abstract is a summary of the entire project. The first paragraph includes the purpose of the experiment and the hypothesis. The second paragraph includes the procedures. The third paragraph describes and explains your results and also states if your hypothesis was supported or not supported by the results. You should state the reason why it was or was not supported. The fourth paragraph explains your conclusion and applications.

*(Example)*

The purpose of this experiment was to determine which brand of paper towel is the most absorbent. Three different brands of paper towels were tested. These included Bounty, Viva, and Sparkle brand paper towels. It was hypothesized that Viva paper towels would be the most absorbent.

After gathering all materials, the following procedures were completed. First, each brand of paper towel was cut and labeled. Then, water was measured and poured into a 20 X 20 cm. sq. pan. After that, each paper towel brand was tested, one at a time. The paper towel was placed into the pan to absorb the water. Then the water was squeezed into a measuring cup. The amount absorbed was recorded onto a chart. Each paper towel was tested three times.

The results showed that Bounty absorbed an average of 16 mL of water, Viva absorbed an average of 15 mL of water, and Sparkle absorbed an average of 14 mL of water. My hypothesis was not correct. I predicted that Viva would absorb the most water, but Bounty absorbed 1 more mL than Viva.

During my investigation, some of the water spilled on the table and I had to restart my experiment. To improve this experiment, I would test additional brands of paper towels and compare the results. 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 that would allow them clean up spills. Additionally, it would also be useful to anyone who consumes paper towels in their daily lives.

# Assignment 6

(The report)

## Report

The report should include a title page and all of the parts listed on the diagram (project board) displayed under assignment 7.

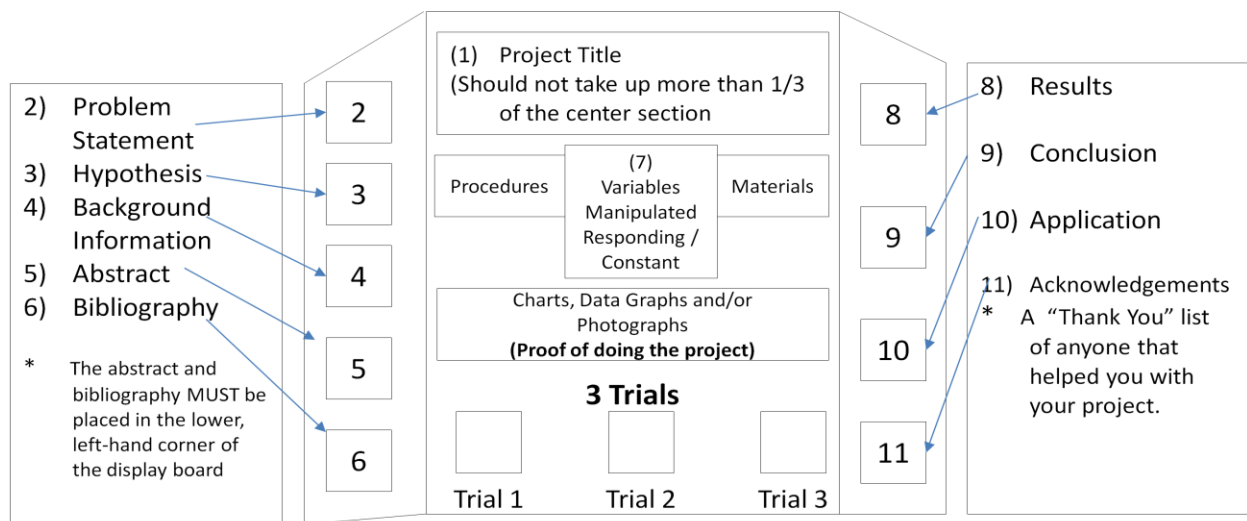
The title page should be creative and must include the project title, your name, and your teacher's name.

The report must be typed.

# Assignment 7

(Project display board)

This diagram shows the positions of the various parts required on a project display board.



### Sample of the experiment

A free-standing part of the experiment showing what you did should be placed in front of your display board. (Optional)

Molds, preserved specimens, diseased-causing organisms, live animals, dangerous and prohibited chemicals, explosives, corrosives, or dangerous objects, such as matches or demonstration volcanoes using ammonium chromate, may **NOT** be displayed

## Helpful hints for displays:

- The display reflects the current year's work ***only***.
- **A good title:** The title is an extremely important attention-grabber. A good title should simply and accurately present research.
- **Take photographs:** 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. (Form 4B)
- **Be organized:** Make sure the display is logically presented and easy to read. A glance should permit anyone (particularly the judges) to quickly locate the title, experiments, results and conclusion.
- **Eye-Catching:** Make the display stand out. Use neat, colorful headings, charts, and graphs to present the project. Pay special attention to labeling graphs, charts, diagrams, and tables. Each item must have a descriptive title. Anyone should be able to understand the visuals without further explanation.
- **Correctly presented and Well-Constructed:** Be sure to adhere to size limitations and safety rules when preparing the display. Be sure to have copies of all required forms.
- **Size of Board:** You **MUST** use a 3-panel display board that is 3 feet tall.

# Assignment 8

(Oral presentation)

- Introduce yourself
- State the title of your project.
- Briefly explain why you choose this project.
- Summarize your procedures and explain your results using your data.
- State your conclusions.
- Tell how you would improve your project.
- Explain your applications.
- Be sure to smile and be polite.
- Stand still and to the side of your display board.
- Maintain eye contact with your audience.
- Speak loud and clear so that everyone can hear you.
- Show enthusiasm!