Science Fair Handbook

Due Date: October 27, 2014
Project Components and Descriptions

The components and descriptions below are all of the required parts of the science fair project.

1. **TITLE**: Every project needs a title. It lets people know what you have worked on. The title MUST be in the form of a statement “The effects of _______ on _______. Once you know your variables (see below), the title is easy. It will be: The effects of independent variable on dependent variable.

   Example: The Effects of Laundry Detergent on Ketchup Stains
   NOT: The Cleaning Power of Laundry Detergent

2. **PROBLEM STATEMENT**: The problem statement is always written in the form of a question. The question tells people what you are trying to find out.

   Example: Which laundry detergent will clean a ketchup stain off of a Hanes t-shirt the best: Tide, Gain, or Cheer?

3. **BACKGROUND INFORMATION**: This is where you will research your problem statement. You must have a minimum of three resources (bibliography instructions are attached) of information. Your three resources can ONLY include ONE internet website. You should research other experiments that have been completed that are similar to yours. If you can’t find anything or can only find limited information on that, you can research information about your particular topic. We will go to the school’s media center for one day, but that will not be enough. You will need to conduct more research on your own. The research portion is one of the most important parts. Your research must be written in your own words, or you will not get ANY CREDIT for this portion.

   Important: **Your research is what helps you to form your hypothesis.**

4. **HYPOTHESIS**: After gathering information about your topic, you should make an educated guess about what you think the answer to your question may be. The hypothesis should be a statement that predicts what you believe will be the outcome of your experiment and your reasoning why.

   Example: I believe that Tide will remove ketchup stains better than the other detergents because it contains bleach and the others don’t.

   *Once you have stated your hypothesis, you can carry out an experiment, or build your prototype and collect data.*
5. **EXPERIMENT:**

**Experimental Design Project**

**MATERIALS:** What did you use? List all of the items you used to complete the experiment. Tell how many and how much. Remember to use metrics. Example:

1. 4 mL of each brand of detergent
2. 12 mL (4 portions of 3 mL) of ketchup

**PICTURES:** Pictures are NOT required, but do look nice when placed on your board. When used appropriately, they can help your audience understand your project better. NO FACES should be showing in any picture.

**PROCEDURE:** List all of the steps of your experiment in the order you will perform them. You must number the steps. Be specific, but try not to make it complicated. The experiment should be repeated at least 3 times. The more the tests are repeated the more accurate your results will be. Example:

1. Place 4 Hanes, cotton, white t-shirts on the table.
2. Place 3 mL of ketchup on each t-shirt.

**VARIABLES:** Any item or factor in your experiment that is changed in order to solve your problem statement is a variable.

a. Independent variable – (manipulated variable) the one you decided to change
   Ex: The different types of laundry detergent.

b. Dependent variable – (responding variable) the one that responded to the change you made. Ex: How well the stain has been removed.

c. Constants – everything you kept the same on purpose
   Ex: Amount of ketchup, amount of detergent, same cycle on the washing machine, same type of t-shirt

d. Control- the experiment without the variable.
   Ex: Washing the stained t-shirt without detergent.

6. **ABSTRACT:** Instructions for completing the abstract are attached - FOLLOW THEM EXACTLY.

7. **RECORD DATA:** Record the data of your experiment in a table or chart. Graph your chart and/or table data.

8. **RESULTS:** State the findings of the experiment based upon the data you observed and recorded. Describe your results including quantitative and qualitative observations. Use key words to prove your hypothesis correct or incorrect such as average, percent, and total. Directly refer to your data when you explain it.

9. **CONCLUSION:** Must contain the seven elements of a good conclusion, written as a paragraph.

   a. What was investigated?
   b. Was the hypothesis supported or not supported by the data?
   c. What were the major results?
   d. How did your results compare with other researchers?
   e. What possible explanations can you offer for your results?
   f. What recommendations do you have for further study and for improving the experiment?
   g. What are some possible applications of the experiment?
10. **APPLICATIONS**: This is where you explain how your research can be applied to an everyday life situation. For example, if your project was related to the effects of fertilizer, then it could be applied to the use of a particular fertilizer in the agriculture industry. You must explain the application and give details.

11. **BIBLIOGRAPHY**: List the sources that you used. Remember to use at least 3 different sources. You can only use the Internet as one resource and use it wisely, because anyone can have a web site (and you do not know the validity of the information posted). Follow the example for the working bibliography below:

   a. **Books**
   b. **Encyclopedia**
   c. **CD ROM Encyclopedia**
   d. **Internet**
      To cite files from the internet, give the author’s name, last name first (if known); the full title of the work, in quotation marks; the title of the complete work (if applicable), in italics; any version or file numbers; and the date of the document or last revision (if available). Next, list the protocol (i.e. “http”) and the full URL, followed by the date of access in parentheses.

**SAMPLE SET-UP FOR A SCIENCE FAIR PROJECT**

<table>
<thead>
<tr>
<th>Title</th>
<th>Procedures</th>
<th>Materials</th>
<th>Variables</th>
<th>Constants</th>
<th>Data</th>
<th>Charts and Graphs and/or Photographs</th>
<th>Results</th>
<th>Conclusions</th>
<th>Applications</th>
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The purpose of the display is to attract and inform. Make it easy for interested spectators and judges to assess the study and the results that have been obtained. Make the most of the available
space using clear and concise displays. Make headings standout, and clearly and correctly label graphs, charts and photographs.

HELPFUL HINTS FOR DISPLAY:

- The display reflects the current year’s work only.
- Take Photographs: Many projects involve elements that may not be safely exhibited at the fair, but are an important part of the project. Photographs MUST be taken of important parts/phases of the experiment to use in the display. Photographs or other visual images of human test subjects must not show their faces or other recognizable features.
- Be Organized: Make sure the display is logically presented and easy to read. A glance should permit anyone (particularly the judges) to locate quickly the title, experiments, results, and conclusions.
- 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 the size limitations and safety rules when preparing the display. Be sure to have copies of all required forms. Make sure the display is sturdy, and do not be afraid to ask for advice. NO STAPLES

**On the back of your board (not on the flaps), in permanent marker, you must have the following:

- Last Name, First Name
- Category/ Grade
- Teacher’s Name/ Period
Abstract Form

Parts of an Abstract

Follow this format, but the abstract must be written in paragraph form.

| COMPLETE PROJECT TITLE (all in capital letters, as it appears on the project & board) |
| Student’s name (Last name, First name, Middle initial, if used) |
| H.D. McMillan Middle School, Miami, Florida USA |

The following parts should be included in an abstract:

1. **PURPOSE:** Why is the research being done?
2. **HYPOTHESIS:** What is the expected outcome of the research?
3. **PROCEDURE:** Briefly, in paragraph form, describe the materials used and how the experiment was done. This section should not be a list, but a summary of your methods.
4. **RESULTS:** Briefly summarize the data from charts and graphs in narrative form. Be sure to include measures of central tendency and variation. Include only information collected during the study (DO NOT include previous years’ results).
5. **CONCLUSIONS:** Briefly, in narrative form, cite interpretation of the results. Briefly, compare findings with other research. Include suggestions for procedural improvements and recommendations for future study, as well as applications of the research.

**THE ABSTRACT SHOULD BE APPROXIMATELY 250 WORDS AND FIT IN THIS SPACE. THE BOX IS NOT SUPPOSED TO BE PART OF THE ABSTRACT; IT SERVES ONLY AS A GUIDE.**
THE EFFECTS OF LAUNDRY DETERGENT ON KETCHUP STAINS
Jones, Joseph J.
H.D. McMillan Middle School, Miami, Florida USA

The purpose of this project is to discover if there is any difference in the brand of detergent used on a ketchup stain.

It is hypothesized that if the cleaning power of the laundry detergent is related to the cost, then Tide will remove the ketchup stain the best.

Three laundry detergents were selected: Tide, Gain, and Publix store brand. Four identical Hanes t-shirts had 5 ml of ketchup smeared on them. The ketchup was allowed to dry. Each shirt was washed with 50 ml of detergent in the warm cycle of a GE washing machine, except for the control, which was put through a cycle with no detergent. After the shirts were dried, the stains were examined to see how much of the stain was removed. The trials were repeated twice.

Looking at the pictures taken clearly show that Tide removed the most amount of ketchup stain. Throughout the three trials, the shirts washed with Tide had the least amount of visible stain. The Gain detergent was the second most effective, with the Publix brand being the least effective of the detergents.

The results of this experiment clearly show that of the three brands that were used, Tide would be the best detergent to remove stains. Two other trials were conducted that were similar to this one. In each of the other two trials, one detergent was the clear winner. To conduct this experiment again, one might consider using more detergents and doing more trials. This research can be used to help anyone who would like to pick the detergent that would be most effective. They would know which detergent is the best for stain-removing.