

## STEPS TO A SUCCESSFUL SCIENCE FAIR PROJECT-2010

Dear Students,

The binder you have just received contains much needed information to help you have a successful science fair project. Please put it in a safe place and keep it handy to assist you. If at any point along the way you have questions or concerns, please ask for help. Remember that science fair is at least 1/3 of your grade in science for the quarter it is completed. Also, included in this binder you will find a model for your log book. The formatting should be exactly as laid out here. Again, if you have any questions please ask. Let us know if you have any suggestions for other helpful information that could be included in this binder.

Good luck and God bless you as you begin this year's science fair experience.

### **STEP 1 – Choosing a project**

The first step in the science fair process is to select a topic. The topic is due August 30 for those in grades 7 & 8. Consider the following in choosing your topic:

1. Is this a topic I have an interest in?
2. Is this project suitable for a seventh/eighth grade student? Is it too easy? Is it too hard?
3. What kind of time will this project require to do well?
4. What will be the cost of this project when all materials are gathered?
5. Can my topic be experimented on with a control?
6. Since I have to do a research paper relating to my project, will I be able to find adequate material to put together a five-source, five to seven (or more) page paper?
7. Will I have enough time to complete this project? Do the experiments take too long to see results?
8. Are there any hazards that make my choice too dangerous to do?

## **STEP 2 – Research Paper on topic chosen**

In this section, the research part of the science fair paper will be discussed. These two parts are the REVIEW OF LITERATURE (the paper) & the REFERENCE LIST (works cited list or bibliography).

### **REVIEW OF LITERATURE**

The purpose of this section is for the student to research work in order to form an educated hypothesis for their question.

1. They are to use various forms of literature (Internet, books, magazines, interviews, videos, encyclopedia, etc.).
2. The minimum final standard is 5 resources, which should result in a paper of 5 to 7 pages in length, double-spaced, written in the third person, and giving credit with citations when using material paraphrased or quoted from the various sources. Contractions or abbreviations are not acceptable in a research paper.
3. Because the paper is given a major grade in English, the English teacher will be aiding in the instruction and helping with guidelines and other due dates.
4. There are two major due dates for the paper. **September 10<sup>th</sup>** is the due date for the reference list (name, author, publisher, copyright, etc.) planned for use in their paper. After September 10, other sources may be added or removed if necessary. September 10 gives the students a target date for obtaining the references to begin writing their paper. (Let us know if there are problems in finding enough information on your topic). **November 12<sup>th</sup>** the paper is to be finished and turned in to teachers. Two complete copies of the entire log book are needed; one will be given to the English teacher and one will be turned in to the Science teacher.
5. When the logbook is prepared for the Science Fair in December, all information is to be Times New Roman size 12. Everything should also be double spaced, with the exceptions of the abstract, safety sheet, and title page.

### **REFERENCE LIST**

The REFERENCE LIST is the last page of the overall paper. We used to refer to it as the Bibliography. It is a form listing all sources used when researching for the REVIEW OF LITERATURE. When organizing this section, please follow these guidelines:

1. Your references should come from a variety of sources.
2. Your references should be current (nothing older than 10 years).
3. Your references should be listed alphabetically by last name of author or by topic.
4. Only 1 encyclopedia and 2 true Internet sources, if only 5 references are used. (If an Internet source can be found as “hard copy”, it does not need to be counted as your Internet source.)
5. A good on-line source for this is citationmachine.com
6. Use APA style for formatting.

### **STEP 3 – THE EXPERIMENT & LOGBOOK**

(This phase usually begins once the paper is near completion. Your logbook contains all of the following information plus your edited paper.)

Once the question has been asked and the research has been completed, the student is ready to form a hypothesis and do the experiment. To be successful in experimenting, it is necessary to identify the variables in the experiment. An example of this is as follows:

Question: What relationship is there between the fertilizer used and the growth of bean plants?

Purpose statement: The purpose of my project is to determine which fertilizer will result in the greatest growth in bean plants.

Hypothesis: \_\_\_\_\_ will cause the most growth in bean plants because research indicated that \_\_\_\_\_.

Independent variable: Fertilizer (The independent variable is the one thing the experimenter is changing.)

Dependent variable: The height of each bean plant (The dependent variable is what the experimenter is measuring or trying to find out.)

Constant variables: The bean plants, soil (type & amount), containers (size & type), location of plants, water (amount & frequency of watering), amount of fertilizer applied and method of measuring growth. (The constant variables MUST be the same for each plant so that we can look at the growth and know it was a result of the fertilizer used.)  
You may think of others for this project.

Control: Your source of comparison (some experiments do not have one). For plants, your control would be a plant without any fertilizer.

Now that you have completed your research, your purpose and hypothesis statements, and your variables, it is time to put together your materials list and procedure. When writing this, consider yourself to be a cook writing a recipe. The cook needs to list ALL materials used in the CORRECT amounts and give an exact, step-by-step procedure. This should be written so that another person could duplicate your experiment.

**REMEMBER: ALL measurements that can be should be listed in Metric form, not in English standard form.** (Time and number of subjects tested etc. are the same in both forms.) See the Science teacher for conversion tables if your containers are not metric.

**Sample Materials List:**

- 8 clay pots, 200ML each
- 250g organic potting soil for each pot
- Liquid form of fertilizers: Miracle Grow, K-Gro, Scotts
- Metric measuring spoons
- Balance
- 500mL beaker
- Goggles

Write your materials in a list form. **Do not put it in a paragraph.** It is too hard to read.

**PROCEDURE:**

Your procedure should be an accurate, exact, step-by-step process that is easy to understand and to follow. Some advice to share from past science fair participants is listed below.

1. Your procedure must include a minimum of ten tests or trials for accuracy. (Those in grades 7 & 8 who are entering Regional competition need a **minimum** of ten trials. Fewer than ten separate tests will lessen the validity of your test results. List enough materials for all of your tests. If you are growing plants, make sure you have at least two months of growing time. Plants take time. If you are testing humans, a minimum of 50 subjects are needed.
2. Document (write down) any safety materials or procedures you used during the testing process. All projects have at least one safety procedure that must be followed. These will be listed later on the Safety Sheet.
3. The use of drawings and illustrations may be used to make your project easier to understand. This is important if you are constructing something that will be used in the procedure. (Be sure that whatever materials may be used for this are listed in the original Material list.) Take pictures, but be sure you are not in them for our science fair.

## DATA, RESULTS AND CONCLUSION:

These sections are for the placement of your individual experiment readings, charts and observations (DATA), average your data and put charts into graphs (RESULTS), and compare the results of the experiments against your original hypothesis (CONCLUSION).

### DATA:

Here is an example of how a data chart might look. Data charts vary in structure, depending on your experiment. Please ask if you are not sure how to plot your data for your particular project. Data is usually placed in a chart.

BEAN PLANT	Test 1	Test 2	Test 3	Test 4
1. Mir. Grow	15 mm	13 mm	21 mm	19 mm
2. K-gro	9 mm	24 mm	21 mm	0 mm (died)
3. Scotts	21 mm	22 mm	23 mm	18 mm
4. Control	16 mm	19 mm	20 mm	15 mm

Notice how DATA listed the individual recordings.

This is a chart produced on Microsoft Word. When putting a chart into Excel, always leave off the letters after numbers and put in only numbers (22, not 22 mm).

### RESULTS:

For results, graph the individual trials, find the averages of the collected data and graph them for easy comparison. To find the average, you would add up the measurements, and divide by the number of tests.

Bean Plant	Avg. Growth in mm	BEAN GROWTH	Test 1	Test 2	Test 3	Test 4
Mir. Grow	17 mm	Mir. Grow	15	13	21	19
K-Gro	13.5 mm	K-Gro	9	24	21	0
Scotts	21 mm	Scotts	21	22	23	18
Control	17.5 mm	Control	16	19	20	15

## CONCLUSION:

In the CONCLUSION section, you need to cover the following points and write it in paragraph form. This is separate from the conclusion at the end of your Review of Literature paper. Your paper will have its own conclusion. The English teacher will assist you in writing your conclusion for your Review of Literature.

1. Restate your hypothesis and indicate whether your hypothesis was correct or incorrect.
2. If you were incorrect, how would you change your hypothesis?
3. Give a summary of why you were correct or incorrect. How did you cover experimental error? (Did you conduct enough trials to make your results valid?)
4. Give some extended testing ideas that could help you test other aspects of your project.
5. Why should anyone know this information? Who would be interested?

Example: (Remember this is double spaced in your logbook.)

The hypothesis the experimenter formed was that Miracle Grow would cause the greatest growth in plants. Her research indicated that Miracle Grow is a natural form of fertilizer that would help plant growth. After testing each plant in the chosen fertilizers (four plants for each type of fertilizer) for two months, she found that her hypothesis was correct. The experimenter thought that the bean plants would grow the tallest using Miracle Grow because \_\_\_\_\_ . Her tests showed that the bean plants with Miracle Grow fertilizer did grow the tallest. This could be because the processed fertilizer has nutrient components that are even in amounts. To address experimental error, I had four of the same kind of plants for each fertilizer and grew them for two months. Each plant received the same amount of sunlight, water, soil and fertilizer. Other factors that could be tested would be soil types, liquid versus solid fertilizers or different types of plants. The information learned from doing this project would be of interest to home gardeners.

## 2010

### Grades Seven and Eight - SCIENCE FAIR RESEARCH PAPER DUE DATES

Binders given out to students	Monday, August 23
Topics (question for project) are to be approved by (leave time in case your first topic is not approved)	Monday, August 30
Rough Reference List (Have 7 sources initially: list may be added to or deleted from - 5 sources needed for final copy)	Friday, September 10
Minimum 25 note cards (This first set must be from at least 2 sources)	Friday, September 17
Minimum 35 note cards	Friday, September 24
Remaining note cards due (The total number of note cards at this point must be at least 100)	Friday, October 1
Rough outline & current reference list	Friday, October 8
Title page due	Friday, October 15
First page of paper	Friday, October 22
Rough Draft of paper (EC if early) (returned by Nov. 5)	Friday, November 1
FINAL PAPER DUE (EC if early)	Friday, November 12
<b>SCIENCE FAIR</b> (Logbooks, with edited papers, and Backboard are due)	Friday, December 3

Open Labs for students to work on experiment can be scheduled with Mr. Biggs.

Final paper includes: Title page, phrase outline, five to seven pages of body of paper, and reference list (in alphabetical order by last name of author or first word of topic). Two copies are required. Students must turn in the note cards they used, in order of use, in paper.

## **SOME PROJECT IDEAS – Grades 7 & 8**

- Does odor sensitivity vary with age or gender?
- What effect does age or gender have on perception of optical illusions?
- Will the reaction time of boys versus girls of the same age be similar?
- What relationship is there on the type or age of citrus fruit & its acidity?
- How will water temperature affect the reaction of yeast?
- What effect does pH, colored lights, gravity or soil type have on plant growth?
- How does type or amount of fertilizer affect the growth of plants?
- How much salt can a plant tolerate and still grow?
- Will natural dyes be as effective at dyeing fabrics as synthetic dyes?
- What fabrics are most readily damaged by pollutants?
- What effect does the angle of the sun have on solar collection?
- Which material is more effective at storing solar energy?
- What effect do window tints have on energy transmission?
- Compare cleaning ability of different brands of laundry detergents, bleaches, stain removers, or dishwashing liquids.
- Which substance is the best home insulator?
- Which bridge design holds the most weight?
- How does the grain of a board affect its strength?
- How do different running surfaces affect the speed of a runner?
- How much water must be taken from fruit to make it dried fruit? (% of water in fruit)
- Which metals are the best heat conductors?
- What is the relationship between the number of times a gerbil attempts to go through a maze and its success rate?
- What effect does gender or age have on short-term memory?
- How does stress affect your memory?
- Will lakes, streams and rivers around our city have comparable pH levels?

If none of the above seems to fit your interest, please check for ideas in books found in the science room or check the internet.