Science Fair Project Packet

Hammocks Middle School
Science Department

Dear Students and Parents,

It is the time of the year to start work on Science Fair Projects. The Science Fair is a school- sponsored activity that supplements the regular curriculum of classroom instruction. The purpose of this activity is to encourage students' interest in science, to develop their inquiry and investigation skills while completing research projects. This packet will serve as a guide for a successful project. We will have a Science Fair night in December to showcase some of the best projects in the school.

SCIENCE FAIR PROJECT
ASSIGNMENTS AND DUE DATES

ASSIGNMENT		DUE DATE
1	TOPIC PROBLEM	September 6
2	HYPOTHESIS VARIABLES • Manipulated (independent) • Responding (dependent) • Constants • Control	September 13
3	MATERIALS PROCEDURES	September 20
4	BACKGROUND INFORMATION/BIBLIOGRAPHY	September 27
5	DATA TABLES AND GRAPHS	October 4
6	CONCLUSION	October 11
7	PRACTICAL APPLICATION and ABSTRACT	October 18

Completed Science Fair Project is due on:

OCTOBER 29TH, 2013

Selecting a Topic

The most important part of any science fair project is determining what the project will be about. The first step is coming up with your project idea. Just remember, you'll have a lot more fun (and probably learn more) if you start with a topic that interests you. Make sure there is a purpose to your experiment. Before you proceed, be sure to have your teacher approve the topic. The experiment must be a controlled experiment. Here are a few hints for coming up with a project idea.

- Botany
- Chemistry
- Physics

You could develop hundreds of projects with the selected topics, so you need to narrow it down, focus on one aspect of the topic.

- Botany: How can different types of soils affect plant growth?
- Chemistry: How can concentration affect the rate of a chemical reaction?
- Physics: Does the material of the ramp affect how far an object will travel?

What would you really like to figure out or show? Think of the most exact information you can discover and be very specific. Write your topic in the following format, it will make it easier for you.

The effect of _____ on

(Manipulated/independent *variable)*

_____.

(*Dependent/responding variable*)

Writing a Problem

The problem is the same as the topic, but in a question form. Remember not to include personal pronouns.

What is the effect of _____ on

(Manipulated/independent *variable)*

_____?

(*Dependent/responding variable*)

Background Information – Conducting Research

You should learn more about your topic. Use various resources to help you understand your topic better. Be sure to keep a record of what you research and read and where you get it. This information will be used to create your bibliography.

- 6th Grade Gifted (3 pages)
- 7th Grade Gifted (4 pages)
- Honors Physical Science (4 pages)
- Honors Physical Science Gifted (5 pages)

- Must
  - be typed (front only)
  - be doubled spaced (computer setting)
  - use font 12 pt (Arial or Times New Roman **only**)
  - have 1 inch margins all around
  - include bibliography (use www.easybib.com)
  - use different resources (books, journals, encyclopedias, internet
  - have at least 3 sources for reference, 1 must be a book
  - follow correct grammar and punctuation

PLAGIARISM: to use and pass off (the ideas or writings of another) as one's own. **Do not do this, it is illegal and you will receive a zero on your project.**

Forming a Hypothesis

Now that you have completed your background information you are ready to write a hypothesis. A hypothesis is an educated guess based on previous knowledge. It is a statement based on your research that you will attempt to prove or disapprove. Your hypothesis is a prediction of what you think the outcome of the investigation will be.

A hypothesis must be in the ***If and then format***. (If = the CAUSE -> then = the EFFECT) A **hypothesis** is an estimate or "educated guess" for solving a problem based on facts, observations, and available data.

Example Scenario: A student wants to see if the amount of sunlight affects the growth cycle of a pansy. The student places one pansy on a window-sill (natural light) and another in the living room (only artificial light).
Hypothesis: *If* a pansy is placed in natural light ***then*** it will grow two inches higher than a pansy grown in the artificial light.

Identifying Variables

Identify the **independent** (manipulated) variable, this is the one that you control, or are changing in the experiment. (MIX)

Identify the **dependent** (responding) variable, this is the one that reacts or changes in response to the independent variable. This is the variable that will be observed and measured. (DRY)

A **control** group is the group that does not receive the experimental variable. A control group helps you to be sure that what you are testing for is really happening because of what YOU DO in the experiment.

Constants are all of the factors or conditions that will be kept identical for all the trials

Listing Materials/Equipment

Now that you have planned your experiment, gathered all your materials, you will need to do the experiment. You will need to prepare a complete list of materials. This list must include everything you will use. Include amounts, size of all items (remember everything has to be in metric units). If you need to borrow equipment to conduct your experiment, see your science teacher.

1. 50 mL of room temperature water
2. 30 cm metric ruler
3. 2-250 mL beakers
4. 15 grams of table salt

Writing Procedures

Write a detailed description of how to conduct the experiment. The procedure should be a step-by-step list that anyone could follow to duplicate your experiment. Be very specific and detailed. Don't make assumptions that people already know what to do

- It is easier to use a numbered list
- Start each sentence with an action verb
- Include quantities or amounts that you will measure

Conducting the Experiment

Record observations using a measuring tool
Record measurements in metric units, i.e., centimeters (cm); grams (g); degrees Celsius (°C)
Do NOT use inches, ounces, degrees Fahrenheit
Design a data table to keep track of the results
Repeat the experiment at least 2 more times

Constructing Data Tables/Graphs

Title of Table

MIX **M:** Manipulated **I:** Independent **X:** X-axis	**DRY** **D:** Dependent **R:** Responding **Y:** Y-axis			**Mean = average** "type dependent variable here" "enter units here"
	Trial 1	Trial 2	Trial 3	
"Type control here"				

Graphs are a useful tool in science. The visual characteristics of a graph make trends in data easy to see. One of the most valuable uses for graphs is to "predict" data that is not measured on the graph.

Step	What To Do	How To Do It
1	**Identify the variables**	a. Independent Variable - (controlled by the experimenter) • Goes on the X axis (horizontal) • Should be on the left side of a data table. b. Dependent Variable - (changes with the independent variable) • Goes on the Y axis (vertical) • Should be on the right side of a data table.
2	**Determine the variable range.**	a. Subtract the lowest data value from the highest data value. b. Do each variable separately.
3	**Determine the scale of the graph.**	a. Determine a scale, (the numerical value for each square), that best fits the range of each variable. b. Spread the graph to use MOST of the available space.
4	**Number and label each axis.**	• This tells what data the lines on your graph represent.
5	**Plot the data points.**	a. Plot each data value on the graph with a dot. b. You can put the data number by the dot, if it does not clutter your graph.
6	**Draw the graph.**	a. Draw a curve or a line that best fits the data points. b. Most graphs of experimental data are not drawn as "connect-the-dots".
7	**Title the graph.**	a. Your title should clearly tell what the graph is about. b. If your graph has more than one set of data, provide a "key" to identify the different lines.

Results

After you have all of your observations organized in the data table(s), analyze your data by using the correct graph (line, bar, or pie graph)
Find the average (mean) of the three trials
Display all your results and measurements, even if it doesn't match what you thought was going to happen.
Once data tables and graphs have been created, it is necessary to write in paragraph form all the data gathered and any other observations made.

Writing a Conclusion

A summary of what your experiment shows and how your work can be used for more research. Remember the conclusion must be written in the past tense because you have already finished the experimentation. The following questions need to be answered:

1. What was investigated?
2. Was the hypothesis supported or not supported by the data?
3. What were the major findings?
4. How did your findings compare with other researchers?
5. What possible explanations can you offer for any errors in your findings?
6. What recommendations do you have for further study and improving the experiment?
7. What are some possible applications of this experiment?

Abstract and Bibliography (1 page maximum)

Paragraph 1 – Describe the purpose of your experiment and your hypothesis.
Paragraph 2 – Briefly describe your procedure.
Paragraph 3 – Describe and explain your results and also state if your hypothesis was supported or not by the results. Suggest a reason why it was or was not supported.
Paragraph 4 – Explain your conclusion and application(s).
Put your bibliography of at least 3 different sources on the same page, remember to use www.easybib.com

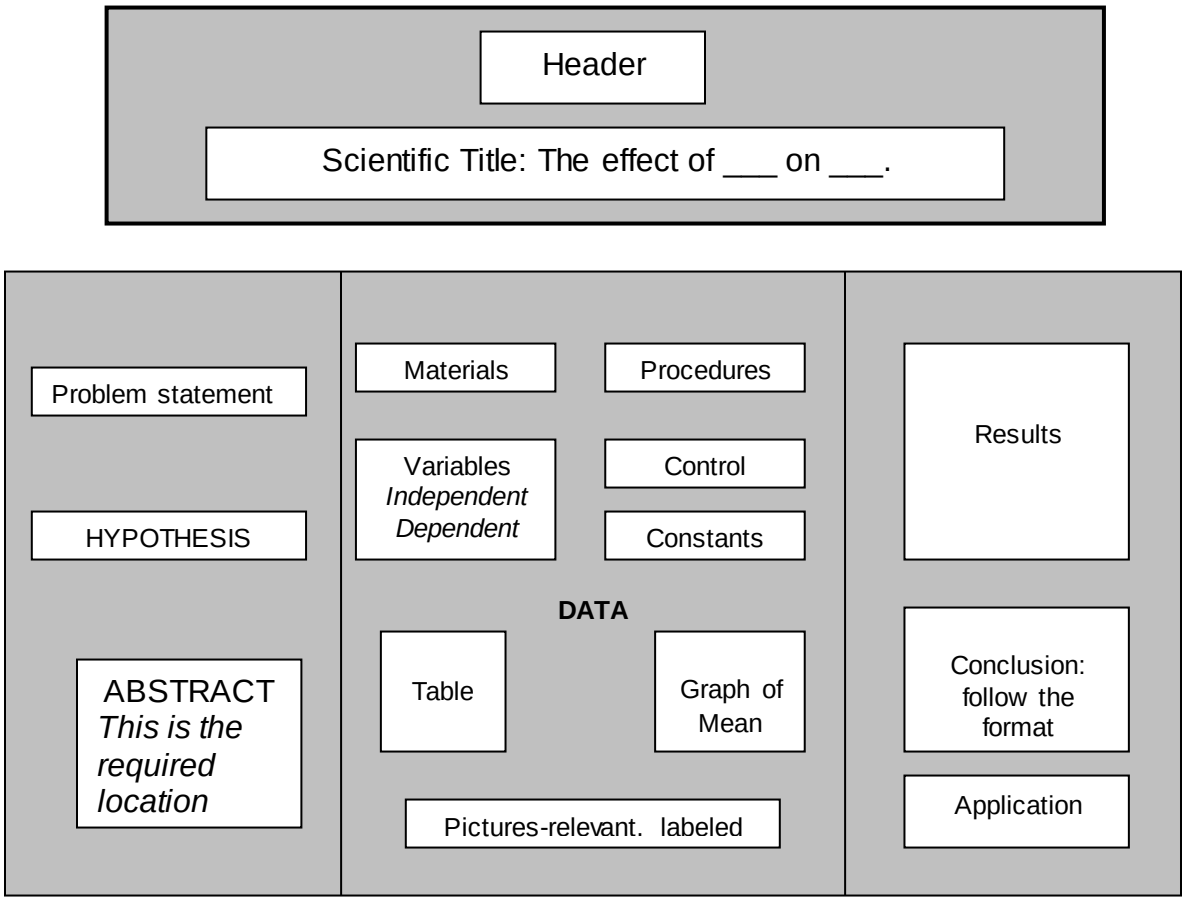
Application

The application should explain why this experiment was important and how can your project be applied in the real world.

Final Display

Helpful Hints:

- ✓ **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.
- ✓ **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.



SCIENCE FAIR PROJECT REPORT CHECK LIST
(Order of Items for Final Report)

Cover page and Heading
Table of contents: list form with page numbers

Abstract: follow the format given to you.

Scientific title: The effect of _____ on _____.

Problem: Question form, what is the effect of _____ on _____?

Background Information: 1 - 5 pages depending on the grade level

Bibliography: minimum 3 references (1 must be from books)

Hypothesis: It is hypothesized that if_____ then _____.

Materials: be very specific

Procedures: be very specific, include taking pictures, and include trials

Variables
- Independent
- Dependent
- Control
- Constants

Data

Table: Title, units, include three trials, mean.

Graphs: Title, axis labeled, units, either 4 graphs (one for each trial and one for the mean or one graph with 3 trials and mean).

Results: Discuss the findings, what numbers did you obtain? Discuss the data obtained for the mean.

Conclusion: follow the format given to you.

Practical Application: what real application does your project have in real life? Who would be interested in knowing about your findings, and why?

Name: _____ **Per:** _____

SCIENCE FAIR PROJECT REPORT GRADE SHEET

Cover sheet and heading (**1**)	_____
Table of Contents (**2**): list form with page numbers	_____
Abstract (**10)**: follow format given	_____
Scientific Title (**2**): The effect of___ on ___ format	_____
Problem (**2**): What is the effect of ___ on ___? Format	_____
Background Information (**10)**: follow format given	_____
Bibliography (**3**): follow format given.	_____
Hypothesis(**5**): followed format given	_____
Materials (**3**): specific with measurements	_____
Procedures (**3**): specific, steps for trials and pictures included.	_____
Independent variable (**4**) follow format given	_____
Dependent variable (**4**) follow format given	_____
Control (**4**) follow format given	_____
Constants (**4**) follow format given	_____
Table (**10**): title, units, trials, mean	_____
Graphs (**10**): title, axis labeled, units, trials and mean.	_____
Results (**10**): discuss findings, discuss numbers obtained.	_____
Conclusion (**10**): follow format given	_____
Practical Application (**3**): *what use does this project have in real life? Who would be interested in your findings?*	_____
Total points:	_____
Grade:	_____

Comments:

_____

_____

_____

Name: _____ **Per:** _____

SCIENCE FAIR PROJECT BACKBOARD GRADE SHEET

Scientific Title (**2**): The effect of___ on ___ format _____

Problem (**2**): What is the effect of ___ on ___? format _____

Hypothesis(**4**): followed format given; it is hypothesized that if ___ then ___ _____

Abstract (**10**): followed format given. _____

Materials (**3**): specific with measurements _____

Procedures (**3**): specific, steps for trials and pictures included. _____

Independent variable (**2**) _____

Dependent variable (**2**) _____

Control (**2**) _____

Constants (**2**) _____

Table (**10**): title, units, trials, mean _____

Graphs (**10**): title, axis labeled, units, trials and mean. _____

Pictures (**10**): relevant to project, labeled. _____

Results (**10**): discuss findings, discuss numbers obtained. _____

Conclusion (**10**): follow format given _____

Practical Application (**3**): *what use does this project have in real life? Who would be interested in your findings?* _____

Neatness (**15**): creative, clean, nice effort shown on set up. _____

Total out 100 points: _____

Grade: _____

Comments:

_____

_____

_____

Name: _____ **Per:** _____

SCIENCE FAIR PROJECT ORAL PRESENTATION GRADE SHEET

Vocal Quality (volume, articulation, tone)

1 2 3 4 5 6 7 8 9 10

Use of science content (concepts, vocabulary, questions)

1 2 3 4 5 6 7 8 9 10

Body Language (eye contact, posture, body movements)

1 2 3 4 5 6 7 8 9 10

Use of visuals (graphs, tables, and pictures)

1 2 3 4 5 6 7 8 9 10

Organization (clear beginning, organized body, clear closure)

1 2 3 4 5 6 7 8 9 10

Time (presentation must be between three and five minutes in length)

1 2 3 4 5 6 7 8 9 10

Total out of 60 points: _____

Grade: _____

Comments:

_____

_____

_____