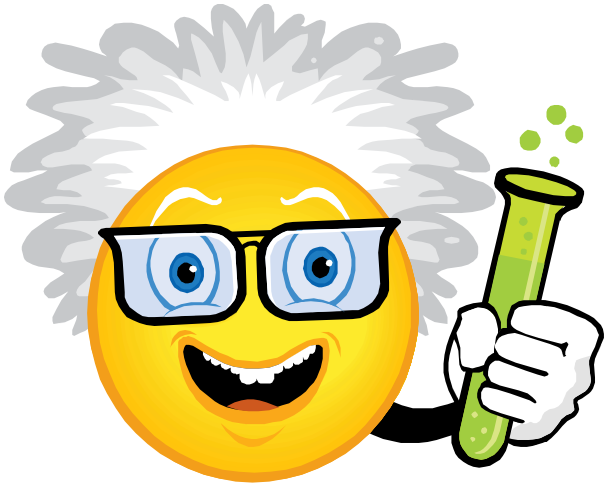
SCIENCE FAIR



STUDENT PACKET

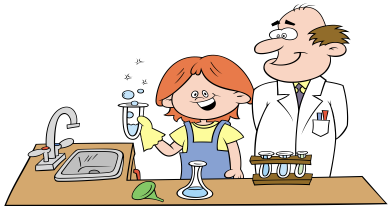
2013-2014

Leewood K-8 Center

Bart Christie
Principal

Carla Rivas
Assistant Principal

LEEWOOD K-8 CENTER SCIENCE FAIR



Dear Parents:

Leewood K-8 Center Science Fair will be held on **December 5, 2013.** Every child is required to participate in this exciting event that encourages students to think like young scientists. A science fair project can be an excellent learning experience and a memorable highlight of your child's elementary school years. During the next few weeks your child will design a science experiment that uses the scientific method to solve a problem. We hope you agree that the educational benefits are numerous, as students develop skills in reading, writing, oral presentation, creative thinking, mathematics, and problem solving.

Each student will be given instruction during class about the various steps of the scientific method. However, the work for your child's specific science fair project will be completed at home. The information enclosed will provide you with a suggested time line as well as an explanation of the project requirements. We encourage our students to choose projects that are original and challenging. Please refer to this time line as you encourage your child to think scientifically.

We urge parents to help guide and monitor their child's progress on the science fair project during the next several weeks. Your support is important to a successful project. However, do not allow your involvement to extend any further than that of a supportive role in order to assure equity and promote student learning. It is important that your child wrestle with problems and try to solve them. Guide your child whenever and wherever you can, but let the final project reflect your child's individual effort and design.

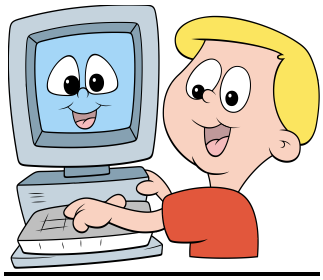
If you have any questions, do not hesitate to contact your child's teacher. We look forward to watching your child enjoy this unique opportunity for scientific discovery!

INDIVIDUAL PROJECTS ARE DUE ON NOVEMBER 25, 2013.
NO PROJECTS WILL BE ACCEPTED AFTER THIS DATE.

Thank you for your cooperation.

Sincerely,

Leewood K-8 Teachers



GRADE LEVEL PARTICIPATION:

GRADE	PARTICIPATION TYPE
Pre-Kindergarten	Class Project
Kindergarten	Class Project
First Grade	Class Project
Second Grade	In-Class Group Project
Third Grade	In-Class Group Project
Fourth Grade	Individual Project
Fifth Grade	Individual Project

DO and DON'T List

1. **DO** use the standard science project display board.
2. **DO** follow the board display format (see sample on page 12).
3. **DO** place the problem statement followed by the hypothesis, abstract and references on the left wing of the board.
4. **DO** place the project title, materials, procedure, variables, data (graphs and pictures) in the middle of the board.
5. **DO** place the results, conclusion, application, and report on the right wing of the display board.
6. **DO** use graphs, photographs, drawings and charts to prove your findings.
7. **DON'T** display animals, vertebrate, invertebrate, living or dead.
8. **DON'T** display specimens; **NO** taxidermy specimens or parts, and no preserved animals, including embryos.
9. **DON'T** display sensitive photographs; **NO** visual presentations of surgical techniques, dissections, necropsies, and/or other lab techniques.
10. **DON'T** display living or dead organisms or organism parts.
11. **DON'T** display waste materials.
12. **DON'T** display chemicals or drugs.
13. **DON'T** display liquids; no containers of water or liquids may be used.
14. **DON'T** display sharp items; no syringes, needles or glass.
15. **DON'T** display fire, flames or flammable materials.
16. **DON'T** use staples to attached components of your display.

SCIENCE FAIR PROJECT RULES

ALL INDIVIDUAL SCIENCE FAIR PROJECTS ARE DUE ON NOVEMBER 25, 2013. NO PROJECTS WILL BE ACCEPTED AFTER THIS DATE.

1. All projects must be in the form of an experiment. All others will be disqualified. The use of animals or humans in the experiment is prohibited.

2. All students are expected to take part in the Science Fair. Entries must follow all Science Fair rules.

3. Each student must submit an individual project.

4. Work on individual projects will be done at home.

5. An **entry label** must be affixed to each project. The teacher is responsible for securing labels.

6. Dangerous chemicals, drugs, open flames, and electrical equipment may not be displayed. The school reserves the right to reject projects which are unsafe or unsuitable for display.

7. Judging will take place after DECEMBER 2, 2013.

8. No one may be in attendance during the judging except the judges.

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

10. All decisions of the judges will be final.

Types of Projects

1. **SCIENTIFIC INVESTIGATION**: In this type of experimental project you ask a question, construct a hypothesis, **test your hypothesis using an experiment** and draw conclusions from your experiment. It involves using the scientific method. It must follow an experimental design.

   A. **Experiment:** In this kind of investigation, your purpose is to change something (test or independent/manipulated variable) and record the outcome of this change (outcome or dependent/responding variable). EXAMPLE: Which material, aluminum foil or plastic wrap, will insulate cold water better?

   B. **Experiment with a Control Group**: This kind of investigation involves a more complex investigation that is designed to test the effects of a single condition or factor on a system. For example, you might have a group of plants as an experimental group and another group of the same type of plants as a control group. The test or independent variable in this experiment is the amount of chemical fertilizer added only to the experimental plant group. No fertilizer would be added to the control group. Both the control group and the experimental group would have the same constants (the normal conditions) such as amount of water and sunlight. The outcome or dependent variable is the difference observed in the growth of the plants.

EXPLANATION OF EXPERIMENT STEPS

Choosing a Topic and Problem Statement

Begin by exploring a scientific concept that you are interested in. This can be something that you read about or something that was introduced in the classroom.

A good topic has a problem that can be answered by experimenting. If a topic is very broad or general, too many factors (**variables**) **will exist that cannot be controlled,** and you will find it difficult to produce **reliable results.** When selecting an experiment, it is important to have a clear understanding of variables. Please refer to variables in this packet in order to understand how variables may affect the process of choosing an experiment.

Title

A project needs a title. It informs the reader on what you have worked on. The title should be creative so that it grabs the attention of your audience.

Poor title:
Soap Powder (does not say enough)

Better General Title:
Cleaning Power of Soap Powder

Problem Statement

The problem statement is always written in the form of a question, even if it is used as the title. The question tells people what you are trying to find out.

Poor Problem Statement:
How does soap work?

Better Problem Statement:
Which soap powder works best in removing ketchup stains?

Background Information

Books, encyclopedias, magazines, the Internet or experts in a field can give you background information to help you understand your topic. Write a brief summary of the background information you gather for your science fair topic. Keep a record of where you get the background information. This information will be listed in your bibliography. That information **will not** answer your question. It will only give you ideas about your topic. For example, you may read about soap and what it is made of, and include it in your project report, but you will still have to do the experiment to get the answer to your question. Begin collecting information for your bibliography.

Hypothesis

After getting information about your topic, you should make a **reasonable guess** about what you think the answer to your question may be. The hypothesis should be written as an "If…/then…"statement. For example, you might say, "If soap X and soap Y are used to wash a 5 cm x 5 cm square piece of white cloth with a ketchup stain, then soap X will work faster at removing the ketchup stain."

Acknowledgments

You should make a list of anyone who may have helped you with your project, including your parents. Do not forget to state what each person did to assist you in completing your project.

Abstract

Be sure to include the following in the abstract of a project:

1. The purpose of the project: Why did you choose to do this project or how did you get the idea to do it?

2. State briefly what you thought would happen. Also, describe how you conducted your project.

3. What happened? Tell the results of your experiment.

4. What was the conclusion? Was your hypothesis correct?

5. What are the applications of your project? How can the information you learned be used?

6. How could your project be improved if you were to repeat it? If you were to continue your project, what would you do?

Investigation Project Abstract

SAMPLE

Student's Name: Jordan Web

Project Title: Wrap It Up!

Abstract

The purpose of this project is to determine if increasing the number of wraps around an electromagnet will increase the magnet's strength. It is hypothesized that increasing the number of wraps around the nail will increase the strength of the electromagnet.
Wire, a nail, a D battery, and a battery holder were the materials used to build an electromagnet. The wire was cut 90 cm long so that 10, 20, and 30 wraps could be wrapped around the nail. An electromagnet with 10 wraps was used to pick up paper clips three times. Then using the same steps the electromagnet was built using 20 wraps of wire, tested three times, and then tested with 30 wraps. The number of paper clips collected was recorded in a data table for all the trials. Results showed that in all three trials, the average number of paper clips picked up the electromagnet increased as the number of wraps increased from 10 wraps to 20 wraps to 30 wraps. The hypothesis was correct.
This experiment shows that the number of wraps of wire on an electromagnet affects its strength, so that in real life if a stronger electromagnet is needed to separate metal from nonmetal objects, its strength can increased by increasing the number of wraps.
The project may have been improved and had better data if a new battery was used for each trial.

Procedure:

Describe in paragraph form what materials were used and how the experiment was carried out. This should NOT be a list.

Results:

Briefly summarize data from charts and graphs in narrative form. State what may have affected the results.

Conclusions:

Was the hypothesis confirmed or denied? Include improvements and suggestions for future studies.

Example: The purpose of this project is to find out which soap works best in removing ketchup stains. It is hypothesized that soap X will work best in removing ketchup stains. Ketchup stains of the same size were placed on pieces of cotton. Soap X and soap Y were used to wash the stained cotton several times. In each case, soap X cleaned the pieces of cotton twice as fast as soap Y. The hardness of the water may have affected the results. It would be interesting to find out if the results would be the same with different types of stains from other substances. The hypothesis was confirmed. In the future, other soaps will be tested against soap X to see if soap X continues to work best in removing ketchup stains.

Materials

What did you use? Include everything you will need for the *experiment* itself. Do **NOT** include materials you will need for the display board or written report. Also, include **specific amounts** needed for each item listed. Finally, the materials should be written in a vertical list and should **NOT** be numbered.

Procedure

What did you do? This is a step-by-step listing of the instructions that must be done in order to carry out the experiment. The procedure is always written as a numbered list. Make sure your ***directions*** include ***repeating the experiment at least three times.*** It is important that the procedure be written so that someone else can perform the experiment exactly as you did. The procedure should be written so that you are giving someone else directions that should be followed. Do not state what you did to carry out the experiment.

Incorrect: I poured 5 ml of water into each of my bowls.
Correct: Pour 5 ml of water into each of the bowls.

Variables

Manipulated (or Independent) Variable: This is the variable that you are **changing on purpose** in your experiment to observe what will happen. For example, if you wanted to know which of the three fertilizers make a particular plant grows taller, the **type fertilizer** applied is the only variable that you would change. A good experiment will test more than one type of fertilizer (usually three) and compare the growth among all groups.

Responding (or Dependent) Variable: This is the variable that changes as a result of the changes in the manipulated variable. In our fertilizer example, the responding variable would be the **height of the plants**. This is what you are observing and/or measuring in order to answer your problem statement.

Constants or (Controlled Variables): These are **all the things** that you will **keep the same** in your experiment so that any change that occurs is attributed to the change in the manipulated variable. Controlled variables in our example on the fertilizer would include the origin of the seeds (they must all come from the same package and should be randomly selected), the amounts of light and water each plant receives, the type of soil used (same type, brand, etc.), the size of the pot, and the temperature.

How Variables May Affect the Experiment You Select:

The most common difficulties you may have in designing your experiment are identifying and controlling variables accurately, and selecting the variable that should be measured in order to answer the problem statement. Students tend to have the most difficulty in identifying the responding variable. In our fertilizer example, it is easy to decide that it is the height of the plants that should be measured, using a ruler as the measurement instrument. However, in other experiments this task is not as simple; especially when the measurement instrument that should be employed is not one that is commonly used. For example, it may not be easy for a student to identify that the responding variable in an experiment that investigates what kind of citric fruit produces the most electricity is the ***amount*** of electricity produced by each fruit. Furthermore, the student may not know ***what*** instrument should be used to measure the amount of electricity produced. Finally, even when properly identifying these items, the measurement instrument needed may not be easily available or too expensive to purchase. These are all very important points to consider when selecting an experiment.

Control

A good project should always be a control with which results can be compared. A control is the part of the experiment that is kept the same. In other words, the control is the part of the experiment that is subject to all conditions of the experiment ***except*** for the manipulated variable. It has what is considered normal conditions, ie. room temperature, normal amount of water, or normal amount of sunlight. In our soap example, the control group would be a piece of cotton with ketchup that is only cleaned in water. In our fertilizer example, the control group of plants would be grown under the same conditions as the test plants except that no fertilizer would be added.

Data

What did you see? Record all your observations in a **log**. For example, if you were doing the soap experiment, you should tell how long it took for different soaps to work, or which soap worked best at removing the stain. When using **quantitative data**, be exact with your numbers. You should use **metric units** because these are the units mostly used by scientists. When using qualitative data describe what you observed in words like hot and cold, bright and dim, or fast and slow. Make **graphs, tables, charts**, or a survey to display your data, or take pictures. Use data tables to organize data as it is collected.

Although measurements will usually be of time, distance, height, and so on, other valid results might be more observational (e.g., changes in color). In our plant example, the responding variable (plant height) would be measured in centimeters, but differences in color would also be important to observe and document. Plant X may be taller than plant Y, but the leaves on plant Y may have a richer, deeper shade of green, indicating healthier plant. Measurable results are referred to as ***quantitative*** observations and observable results are referred to as ***qualitative*** observations.

If you are creating a graph, remember that a graph consists of an X axis (horizontal line) and a Y axis (vertical line). When graphing, remember that the manipulated variable goes on the horizontal or X-axis while the responding variable goes on the vertical or Y-axis. Be sure to include a title as well as a label for the X and Y axes.

NOTE: If you will be taking pictures, make sure you are taking photographs of the experiment results and NOT the procedure or steps you took in performing the experiment. In addition, anonymity is crucial when judging projects. If using pictures, be sure to keep the identity of the student completing the project OUT of the picture. ***Projects that include pictures of the student will not be accepted in the science fair.***

Results

Interpret the data. Think about what you are learning from the data. State the findings of the experiment based upon the data you observed and analyzed. This part of the scientific method is a paragraph form of your tables, graphs, charts, etc. You should NOT answer the problem statement or state whether your hypothesis was right or wrong (that is done in the conclusion). **Simply, state the findings of the experiment based upon the data you observed and analyzed.** You should write comparative statements about your data rather than simply stating what is on the data table. Use words and/or phrases like more than, less than, twice as much, less than half, etc. Be sure to include a statement about some interesting or unexpected results in one or more of the trials.

Conclusions

Your conclusion should begin with a statement of whether or not the results supported your hypothesis. Your conclusion should also answer the problem statement. Report the major findings of your experiment. Include a sentence that describes what could have affected the results, or possible reasons for the results. Do not blame anyone for the errors; just describe the error. For example, do not write, "The results could have been affected by my little brother opening the freezer many times." Instead, you should write, "The results could have been affected by temperature changes occurring because the freezer door was opened several times." Add any new ideas you have to improve *this* experiment. Finally, include a sentence that may lead to new experiments. The following is a suggested framed paragraph you can use when writing a conclusion.

My Hypothesis was_____
(supported or not supported)

_____
(answer to the problem statement)

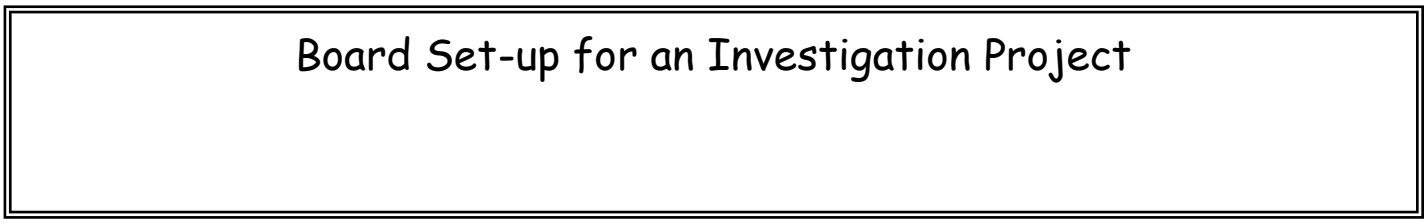
The results could have been affected by _____. In the future, I will _____. It would be interesting to see if _____.
(improvements) ***(new experiment idea)***

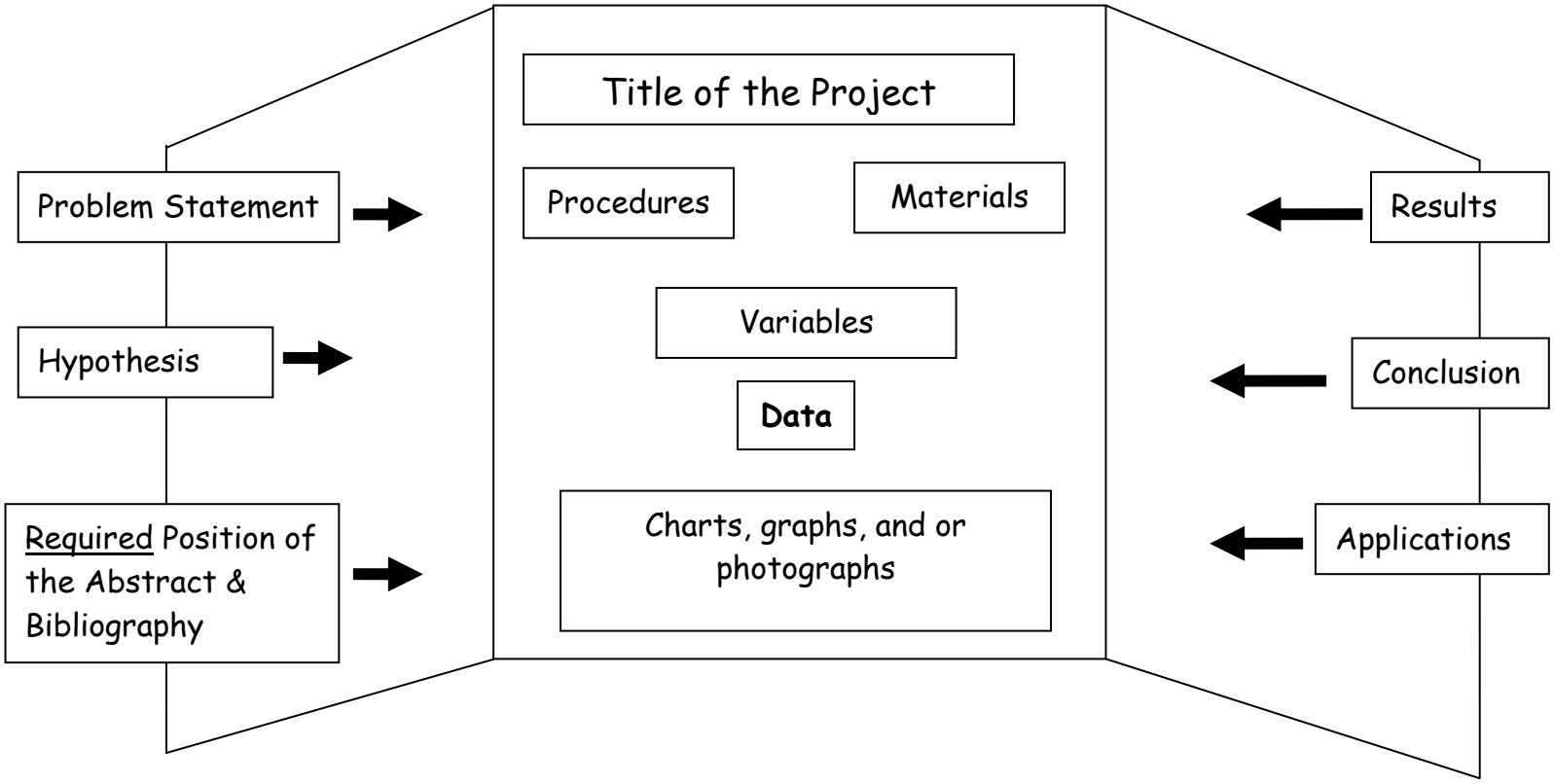
Applications

Tell how this experiment is practical, important, and/or how your findings may be useful to others.

Bibliography

You must make a list of all the books, magazines, Internet websites, interviews, or other sources that you used. There should be at least **four** bibliographic references.





HOW TO WRITE A BIBLIOGRAPHY CORRECTLY
(or use EasyBib http://easybib.com)

1. BOOKS

Author. Title. City of publication: Publisher, Copyright date.

Example:

Madison, Arnold. Drugs and You: The Effect of Drugs on the Human Body. New York: Messner, 1995.

2. ENCYCLOPEDIA ARTICLES

"Article." Encyclopedia name. Last copyright, Volume number, Page (s).

Example:

"Drug Abuse." World Encyclopedia. 1989, Vol. 5, pp. 84-89.

3. MAGAZINE AND NEWSPAPER ARTICLES

Author (if known). "Article." Magazine: Volume number (Date, Pages).

Example:

Wisenberg, Sandi. "The Chemical World of Drugs and its Effects on Society." Miami Herald: October 1999, sec. D.p. 1.

4. INTERVIEW

Last Name, First Name. Occupation. Address: Date Contacted.

Example:

Smith, Bob. Meteorologist. 2801 North 4 ~ Street Miami, Florida 33156: March 20, 2002.

5. INTERNET SITE

Web documents share many of the same elements found in a print document (e.g, authors, titles, dates of publication). Therefore, the citation for an Internet site often follows a format similar to that for print.

Author or Organization (Date). "Title of Article." Retrieval date and Internet address.

Example:

Wildlife, Suggested Areas for Viewing. *Everglades National Park.* National Parks Service, 26 Sept. 2013. Web. 30 Sept. 2013. <http://www.nps.gov/ever/naturescience/animals.htm>.

An example of a bibliography is given using the examples provided.

Bibliography (Sample)

"Drug Abuse." World Encyclopedia. 1989, Vol. 5, pp. 94-89

Madison, Arnold. Drugs and You: The Effect of Drugs on the Human Body. New York: Messner, 1995.

Smith, Bob. Meteorologist. 1522801 Northwest 167th Street Miami, Florida 33156: March 20, 2002.

Wildlife, Suggested Areas for Viewing. *Everglades National Park.* National Parks Service, 26 Sept. 2013. Web. 30 Sept. 2013. <http://www.nps.gov/ever/naturescience/animals.htm>.

Wisenberg, Sandi. "The Chemical World and its Effects on Society." Miami Herald: October 1999, sec. D. p. 1.

Note that the bibliography is written in alphabetical order according to the first word of each entry.

PROJECT FORMAT

A project consists of the report, a display board, and a sample of the experiment (optional).

WRITTEN REPORT

Title Page
Abstract
Table of Contents
Problem Statement
Hypothesis
Background Information
Materials
Procedures
Variables
Control
Data (graphs, charts, pictures, etc.)
Results
Conclusions
Applications
Acknowledgments
Bibliography

DISPLAY BOARD

Title
Problem Statement
Hypothesis
Abstract
Bibliography
Materials
Procedures
Variables
Control
Data (graphs, charts, pictures, etc.)
Results
Conclusions
Applications

The measurements of the display board should not exceed a maximum of 92 cm (36 in.) height, 92 cm (36 in.) width, and 76 cm (30 in.) depth.

Note: Molds, preserved specimens, disease-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.**

Websites

Here are some websites that can get you started in the right direction with your science experiment.

Bill Nye The Science Guy
http://www.nyelabs.com

Agricultural Ideas for Science Fair Projects
http://www.ars.usda.gov/is/kids/fair/ideasframe.html

Cyber Fair: Idea Generation
http://www.isd77.k12.mn.us/resources/cf/ideas.html

Energy Quest Science Fair Projects
http://www.energyquest.ca.gov/projects/index.html

Exploratorium: The Science Explorer
http://www.exploratorium.edu/science_explorer/index.html

How to Get Started
http://www.twingroves.district96.k12.il.us/ScienceInternet/GetStarted.html

Northern Illinois University: Science Fair Ideas
http://www.neiu.edu/~pjdolan/chemistry.html

Ohio State University: Science Fair Topics
http://www.ag.ohio-state.edu/~breads/sciencefair

Science Fair Central: Project Ideas
http://school.discovery.com/sciencefaircentral/scifairstudio/ideas.html

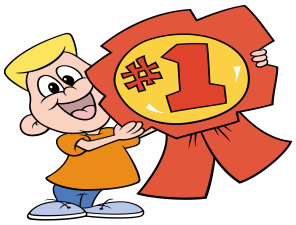
Science Fairs
http://www.stemnet.nf.ca/sciencefairs/

Science Fair Project Ideas
http://members.aol.com/ScienzFair/ideas.html

Science Made Simple
http://www.sciencemadesimple.com/science.html

The Science Club: Kid's Science Projects
http://www.halcyon.com/sciclub/kidproj1.html

U.S.G.S. Science Fair Ideas
http://earthquake.usgs.gov/4kids/sciencefair.html



LEEWOOD K-8 CENTER
SCIENCE FAIR JUDGING CRITERIA

Each student should refer to the following judging criteria as a checklist and guideline to ensure the completion of a quality-made project. Each item below may receive from 0-4 points.

ITEM	**CRITERIA**	**POINTS EARNED**
Problem Statement	To what degree is the problem new and/or different to the student? How well is the problem statement written?	
Hypothesis	To what degree is this testable prediction?	
Abstract	To what degree does the abstract describe the entire project?	
Experimental Procedures	To what degree does the sequential experimental process connect the hypothesis, data, and results? Is the format for the procedures written correctly and in a manner easy to understand and follow?	
Variables and Controls	How well are the control and manipulated, responding, and controlled variables identified?	
Materials and/or Equipment	How were the items utilized in appropriate and/or new ways? Is the format for the materials written correctly?	
Data Collection	To what degree are the number of trials and quantity of data appropriate? Does the amount of data collected support the conclusion?	
Data Presentation	How well do the graphs, tables, logs, pictures, charts, etc. present the data? Is the format for the graphs, tables, etc. presented correctly?	
Data Analysis	How well are the results interpreted?	
Conclusions	Was the hypothesis confirmed or negated? Is the problem statement answered? To what degree are possible errors, new ideas, and/or additional investigations identified?	
Applications	To what degree are the applications practical and/or useful to others?	
Visual Display	How well is the project constructed and organized? Are spelling and sentence structure correct? Is the display creative?	
Report	Is the report present? To what degree does the content and format of the report indicate proficiency in writing reports?	
Background Information	To what degree does the background information presented reflect the student's knowledge of the subject matter?	
Bibliography	To what degree is the number of references cited appropriate? Is the format of the bibliography correct?	

Science Fair School Contract

I, _____, will submit an entry for the Elementary Science Fair due _____. I understand that this requirement must be fulfilled based on the criteria outlined in this guide.

I further understand that failure to comply with the rules set forth in this guide will affect my final project grade.

Date _____ Homeroom Teacher _____

Student's Name _____

Student's Signature _____

Science Project Proposal Form

Name _____

Problem Statement (The question I plan to investigate in my experiment.)

Science Fair Project Question Checklist	
1. Is the topic interesting enough to read about and work on for the next few weeks?	Yes / No
2. Can you find at least 3 sources of written information on the subject?	Yes / No
3. Can you design a "fair test" to answer your question (problem statement)? In other words can you change only one variable (manipulated/independent) at a time, and control other factors that might influence your experiment, so that they do not interfere?	Yes / No
4. Can you measure the dependent/responding variable, the changes in response to the independent/responding variable using a number that represents a quantity such as a count, length, width, weight, percentage, time, etc.?	Yes / No
5. Is your experiment safe to perform?	Yes / No
6. Will you be able to obtain all the materials and equipment you need for your science fair project quickly and at a very low cost?	Yes / No
7. Do you have enough time to do your experiment and repeat it at least 2 times more times before the school science fair?	Yes / No

I have discussed the project problem statement and the checklist with my parent(s) and I am willing to commit to following through on this project.

_____

Student Signature **Date**

]

I have discussed the project idea and the checklist with my child and I believe he or she can follow through with this project.

_____

Parent Signature **Date**

Science Fair Student Checklist – Keep in Log Notebook

Student _____ Class _____ Date _____

Working Plan	**Time Line Due Date**	**Parent's Signature & Date**	**Teacher's Signature & Date**
1. Share letter & packet with parents. Set up a Lab Notebook.	**10/2/13**		
2. Return contract signed.	**10/4/13**		
3. Select Topic / Problem Statement. • Identify Manipulated Variable • Identify Responding Variable	**10/11/13**		
4. Complete topic research. Cite three or more resources. Form a Hypothesis.	**10/18/13**		
5. Design an Experiment: • Identify Variables/Control • Write Procedures. • List and collect materials. • Create a Data Collection Table.	**10/28/13**		
6. Perform Experiment: • Collect Data • Take pictures • Create a graph	**11/8/13**		
7. Analyze Data • Write Results • Compare Results to Hypothesis. • Write Conclusion & Application.	**11/15/13**		
8. Write the Abstract & Bibliography.	**11/15/13**		
9. Set up Display Board.	**11/18/13**		**XXXXXXX**
10. Turn in Science Fair Project	**11/25/13**		