

Glades Middle School
Science Fair Packet
Project Guide

Introduction:

Science fairs and science classes are the time when you know you are thinking about and doing science. However, when you look closer you have been doing science your whole life. Have you ever been shocked by electricity? Perhaps when you were younger, you watched a lightbulb being change, and thought it was interesting that the bulb lit up in the socket and not in her hand. Without even realizing it you may have even thought of a hypothesis and a way to conduct the experiment. So you are already an expert at science experiments already.

Also you might think that you re doing a science fair project because it is required, but there is much more to it. The science that you do in science class usually involves doing what someone else tells you to do. Science fairs let you actually do science on your own: you pick a topic, which sounds interesting, you decide how you want to study it, and you decide how hard your project will be and how much time you want to spend on it. As you your topic, you will experience science in a whole new way. The experience you gain through your science fair project may solve problems in the future or enrich people's lives. SO, the main purpose of the science fir is for you to ask your won question a search for your own solution.

Project Steps

Phases 1: Topic Search

- Begin you science journal. A composition notebook works great
- Science solves problems. Think of as many problems as you can that are encountered in your everyday life. As you go around look for problems that you are interested in solving. Examples could be that if you are trying to learn how to use inline skate and you know that you fall down a lot, can you find a wheel size that is best for beginners. Or how can you make sure your dog has cool water even when you are away at school. Or you notice that the grass used in the lawns of homes needs to be watered everyday. In an effort to safe water you experiment to find the exact number of days lawns need to be watered to look healthy. Or you have had an unusual experience that could be turned into an investigation.
- **The Problem:** While all scientific works starts with observations, it is important to focus those on a particular area of interest. Once an area of interest is decided on, more observations and more research is done until a particular problem is chosen. The problem then becomes driving force for the remainder of the project steps.

Answer the following in your journal

Once you have your topic. Evaluate it using the following questions. Show it to your teacher for approval.

1. The topic is : _____

2. The Question I asked is:

3. In short, this is how I want to study my topic:

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4. Draw a check mark in the box if the sentence is true for your project.
- My question cannot be answered with “yes” or no”
 - I will be interested in this topic for the long haul.
 - I will be able to complete this experiment at least two weeks before the due date.
 - I will be able to get the permission I need to do this.
 - I have talked to my parents about my project and discuss expense issues.
 - I will be able to get the equipment and resources necessary to complete my project.
 - My school does not have any rules that will stop me from doing this project.
 - I do not already know the answer to my question
 - I have specified the exact type of subjects for my experiment (the species of plant or animal, the breed of dog etc.)
 - I will be able to use more than one subject.
 - I will be able to locate the subjects I need to use.

Phase Two: Research

Gather information from different sources to help you know more about your science fair topic. For example, if you experiment with plants, you will want to research all about the plants you use, including their needs and their scientific names. If you work with chemicals, you may need to know the formulas of the chemicals, the amount you are using, and the brand names if applicable. If you do a product comparison, you will want to know the differences between the various products you are testing, and you should know about any research why the product were created as they were.

Create a list of questions that you want answered, by the research, for your topic. Use these to guide your research.

Document all of your sources. Your English teacher will tell you how many you will need.

Phase Three: Your Experimental Plan

Important Considerations

Hypothesis: is a solution to the problem of your topic. The statement is important because it will be used to guide the entire experiment. The hypothesis is state as an “if ---then” statement. The hypothesis also gives the relationship between two variables (the independent and dependent variable) in your experiment.

Variables: is anything that affects your topic and can change in your experiment.

Independent Variable: The independent variable is the one thing that you change in your experiment to figure out the impact it has on the topic you are studying. It is the one that you deliberately change.

Dependent Variable: When you change one factor, the independent variable, you will watch what happens to the rest of your experiment. What happens is called the dependent variable. The dependent variable is the factor of your experiment that changes as a result of the independent variable.

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Control Group:

As you plan your variables, you need to try to include a group of test subjects that will demonstrate how the experiment will work when the independent variable is not applied.

Experimental Group:

The group of test subjects that you use to show what happens when the independent variable is applied is called the experimental group. You should plan to measure both results in your data if possible. Then it is clear what changes are caused by the independent variable.

Do the following in your journal

1. List all the variables you will need to consider in your experiment.
2. What is the independent variable in your experiment? (What are you going to test?)
3. What is the dependent variable? (What will change as a result of the independent variable?)
4. Write some If-Then statements (cause and effect). Think about the variable you have listed above and which ones you should test.
 - a. If: _____
 - b. Then: _____
 - c. The hypothesis of my experiment if that _____ will cause _____.
 - d. I hypothesis that if I _____ then _____ result.
 - e. In my experiment, I hypothesized that there would be a direct relationship between _____ and _____.
 - f. If I _____ then _____

Phase Four: Planning the Procedure

In your journal do the following

1. List all your materials that you will need. Include safety equipment also.
2. Plan how you will measure your results.
3. Create the data table you will use to record the collected data.
4. List each step of your procedure. Remember someone two years younger than you should be able to do exactly as you did for this investigation.
5. Plan on repeating your experiment at least twice and/or to collect enough sample responses

Phase Five: The Results and Conclusion

After you have conducted your experiment (preferable twice), you will know what happened in your experiments. These are your results, and you can communicate them to other people through the data you show in a graph and or table. In the results section, you should only present a simple, factual summary of what happened in the experiments. You can elaborate on what happened in the conclusion section.

Answer the following questions in your journal:

1. When you applied your independent variable, what happened to the dependent variable?
2. Write a brief summary of the results.

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What happened? What went right? What went wrong? What would you do differently, and what did you learn? This is not the same as the results or the data. It is your opinion and some observations about those two elements. The conclusion is stated at the end of your report.

Use the following questions to figure out how to write your conclusion. Write your responses in your journal.

1. Were your results consistent? (Did it always happen that way?)
2. Is there anything else that could have caused the change in the dependent variable?
3. Explain any problems and how you would correct them in the future?
4. Explain what you would do differently if you did this experiment again.
5. Discuss how your results were different from what you expected.
6. Discuss other questions you have now that your experiment is finished.
7. Explain how the knowledge gained from the investigation helps improve our culture and way of life?
8. Discuss how the results can serve others.

Phase Six: The Written Report

See *Written Report Overview*

Phase Seven: The Display

The display has three parts: the written report, the formal journal and the back board. The backboard is used to tell the story of your entire experiment. See BBSF Display rules.

Special Suggestions for Eye-Catching Display

- Use computer, stencils, or stick-on letters. Use a dark color for the title so it will stand out more.
- Make the letters for the title the largest letters on your board.
- Paste the letters on construction paper on your board. You will be able to take the construction paper off and re-do a section
- Do not use more than three different colors. Use colors that go well together. Your display should look attractive.
- Place your written report and formal journal in front of your backboard.

Science Fair Packet: Student 10-Week Timetable

Date of Glades Middle School Science Fair: **December 4**

Classroom Presentation and Judging: **Week of Dec. 4 to Dec.8**

Science Fair School wide Judging: **December 11-12,2006**

Science Fair Awards: **December 14, 2006 6:00 PM**

Date of Broward County Science Fair: **February 2007**

Scheduled Completion Date

Actual Completion Date

September 18, 2006

Week 1

- Choose a topic or problem to investigate.
- Make a list of resources that you can use. (For example books from the school library, places to write, people to interview)
- Start a notebook for keeping record of **all** your work and ideas

September 22, 2006

Week 2

- Get your problem proposal approved by your teacher.
- Begin initial research by selecting appropriate Web sites **(the number of pages will be determined by your English teacher)**
- Write for additional information from business firms, government agencies, and so on.

Make sure you record all information in your notebook

Week 3

- Complete your initial research
- Develop a possible solution to the problem
- Create your hypothesis and get it approved by your teacher.
Make sure you use the cause and effect format of *If.....then.....*
- Interview experts for more information
- Decide how to set up your investigation or experiment.
 - Follow the guidelines given on the following pages.
- Design your experiment (including procedures and data tables you will use)
- Get the procedures and data tables approved by the teacher.
- Decide on how you are going to document your results. (Ideas are photographs and/or drawings).

October 13, 2006

Week 4

- Start your experiment
- Begin organizing and reading the materials sent in response to your letters
- Decide whether you need additional material from outside sources
- Decide what materials you will use in the display
- Begin collecting or buy materials for your display..
- Make a list. (use this again in Week 12)
- Add all of your information to the project notebook as you receive it.

Make sure you record all information in your notebook.

Science Fair Packet: Student
10-Week Timetable

October 23, 2006

Week 5

- Learn how to use any apparatus you need.
- Continue recording notes and observations in your notebook.
- Set up outline for written report. (Your English teacher will work with you on this)
- Gather initial information in notebook.
- Work on first draft of the written report.
- Start assembling display unit

Make sure you record all information in your notebook.

October 30, 2006

Week 6

- Continue recording notes.
- Check books, pamphlets, magazines, and Web sites for additional ideas.
- Verify information with experts (teachers and parents are a good source.)
- Begin designing charts, graphs, or other visual aids for the display.
- Take any photographs you may need.

Make sure you record all information in your notebook.

November 6, 2006

Week 7

- Have photographs developed and enlarged.
- Talk with the experts again to make sure your work is accurate on schedule.
- Begin writing second draft of your report.
- Continue recording observations in notebook

Make sure you record all information in your notebook.

November 13, 2006

Week 8

- Write text for background of display and plan its layout.
- Complete graphs, charts, and visual aids.
- Finish constructing your display.
- Work on final draft of written report.

Make sure you record all information in your notebook.

November 27, 2006

Week 9

- Complete your experiment or collection
- Write and type your final copy of written report
- Do lettering of explanation and mount them on your display.
- Mount graphs, charts, charts, drawings, and photographs.
- Assemble apparatus or collection items; check them against your original list.

Make sure you record all information in your notebook.

December 4, 2006

Week 10

- Proofread written report.
- Place it a presentation folder.
- Set up display at home and check for any flaws. (Hint: leave it up for at least 2 days).
- Carefully take display apart and transport to school.
- Set it up display.
- Check and double check everything.
- *Congratulate yourself!*

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Written Report Overview

Once the experimental part of the project is finished, it is time to take the information in your science project journal, including the results and data, and create a typed, neat and thorough report.

The written portion of the Science Fair project has three final products:

- ▲ a report which detailing your work in writing
- ▲ A display board which has visual details of your work and samples of the work done.
- ▲ Presentation

Part	Contains
Title Page	The project title: <i>this is the first thing most people will see, so make your title sound interesting. It must be in the form of a question.</i> Your name The School name The School address Your grade in school
Abstract	This is the very last part of the written report done. It is a summary of the entire investigation. It contains between 150 to 250 words. It starts with the statement <i>the purpose of the project was....</i> It states the hypothesis. It summarizes the purpose of your project. <i>What was the research trying to do?</i> It generalizes the data collected <i>What actually happened?</i> It states what was learned. <i>Of what significance are the actual findings?</i>
Table of Contents	List all parts of the report along with the page numbers All sections need to be listed in their correct order
Statement of Purpose	This two-or three sentence statement that explains what the student expected to discover by investigating the chosen topic. It also gives the reason why the student chose to learn about the subject
Hypothesis	State your hypothesis. It is written in the cause and effect format, in "If...then... format. It tells what the investigator believes will happen in the experiment, or what the investigator is trying to prove.
Research	This contains all of the background information that you have collected about the topic. It should be at least 2 – 3 pages long.
Materials	This is list of all the materials and supplies used in the project. Quantities and amounts of each item used is also included <i>Things to remember</i> <i>It must be written as a list Do not number</i> <i>Use the correct units for each quantity</i>

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Written Report Overview

<p>Procedures</p>	<p>Write exactly what you did and how you did it. This part should be so detailed that a child two years younger than you could get the same results.</p> <p>Explain what equipment you used and include size, brand and type</p> <p>Avoid using first person pronouns such as I or me and the statement “Gather all the material”.</p> <p><i>Things to remember:</i></p> <ul style="list-style-type: none"> ▪ <i>Begin each step with a verb</i> ▪ <i>Each verb is capitalized</i> ▪ <i>Number each step</i> ▪ <i>List all steps taken to complete the project</i> ▪ <i>Keep the steps simple and direct.</i>
<p>Data and Observations</p>	<p>Explain everything that was observed</p> <ul style="list-style-type: none"> ▪ Choose the best form possible. ▪ May be written in a paragraph form or diary entries. ▪ Must be clearly labeled. ▪ Must be sequential <p>Use drawings or photographs (through you may not appear in any of the photos) so people see what you saw.</p> <p>Include any graphs, charts or visual data that was collected. Make sure they are all labeled correctly and clearly.</p> <p>All graphs and tables require an explanation in paragraph form</p>
<p>Analysis of results</p>	<p>Provide information on what happened during the experiment. You are just reporting information.</p> <p>Summarize the results of your experiment</p> <p>Ask yourself the following questions:</p> <p><i>What are the data telling me?</i></p> <p><i>What trends do I see in the graphs?</i></p> <p><i>Are the data in the control group different than the data for the experimental group?</i></p> <p>DO NOT MAKE ANY CONCLUSIONS</p>
<p>Conclusions</p>	<p>The main question you should ask is “Do my results agree with hypothesis?” If they do, why do you think they do? If they don’t, how are they different? And, why do you think they differ?</p> <p>Remember it is not important for the hypothesis to be correct. It is important, however that you explain why you got the results that you did.</p> <p>Make sure you mention what factors you believe contributed to your results. Then, briefly explain possibilities for new experiments that would control these factors.</p> <p>Also, mention any investigative questions that came up during the experiment. These questions will guide other researchers who find your results interesting and want to study the topic more.</p> <p>Make sure you also mention how your investigation, the collected data and results, can be applied to another situation. Some things to consider are: what is the practical value of the investigation; how can the knowledge gained from this experiment help</p>

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Written Report Overview

	<p>improve our culture and way of life; and how can the results serve others?</p> <p><i>Things to include</i></p> <p><i>Summarize the purpose of the investigation</i></p> <p><i>Summarize the patterns and trends found in your data</i></p> <p><i>Explain how the investigation's results agree with the hypothesis or do not agree. And why they do or do not.</i></p> <p><i>Explain any problems and how you would correct them in the future.</i></p> <p><i>Explain what you would do differently if you did this experiment again.</i></p> <p><i>Discuss how your results were different from what you expected.</i></p> <p><i>Discuss other questions you have now that you did this experiment.</i></p> <p><i>Discuss how the experiment value.</i></p> <p><i>Explain how the knowledge gained from the investigation helps improve our culture and way of life?</i></p> <p><i>Discuss how the results can serve others.</i></p>
Bibliography	<p>List all of the printed material that you consulted in carrying out the project.</p> <p>Items should be listed in alphabetical order.</p>
Acknowledgements	<p>Here is where you thank all the individuals who assisted in the research and development of the project (including Mom and Dad). Everyone that you have interviewed, including teachers, scientists, and other experts in the field, should be mentioned here.</p>

Final Details:

Make sure the final product is securely bound in a presentation folder.

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Useful Internet Sites

Good Starting Point Sites:

www.sciencebuddies.com

<http://askeric.org/Projects/Newton>

Educational Information

<http://school.discovery.com/sciencefaircentral>

Helpful Websites

<http://ipl.org./youth/projectguide>

<http://youth.net/nsrc/sci/sci.index.html>

<http://www.chem4kids.com>

<http://isd77.k12.mn.us/resources/cf/steps.html>

<http://www.sciserv.org/isef>

Successful Science Fair Projects

<http://faculty.washington.edu/chudler/fair/html>

Project Resources

<http://ww.ipl.org/youth/projectguide>

Science Fair resource guide

<http://www.madsci.org/libs/area/reagents.html>

Finding scientific reagents

<http://ww.scifair.org>

The ultimate science fair resource

<http://www.lib.lsu.edu/sci/chem/internt/sciencefair.html>

<http://ww.usc.edu/cssf/resources>

<http://www.educationplanet.com/sciencefair.html>

<http://www.chipublib.org/008subject/009scitech/scifair.html>

<http://teams.lacoe.edu/documentatoin/places/science/sciencefair.html>

<http://www.exploratorium.edu/ls/pathfinders/scifairs/>

<http://www.us.net/mccpts/science.html>

<http://cusef.byu.edu/Science%20Fair%20Resources/resources.html>

<http://www.hamiltonschools.org/davies/sciencefairrefs.html>

<http://saluda.lib.sc.us/science/html>

<http://sciencepage.org/scifair.html>

<http://www.wheaton.lib.il.us/library/scifair.html>

Project Ideas

<http://users.massed.net/~tedrowan/primer.html>

Helps students develop science fair projects

<http://sciencefairproject.virtualave.net>

<http://ww.cmstr.uregina.ca/scifair.html>

<http://www.sciencebob.com/lab/sciencefait/resources.html>

<http://www.yahooligans.com/Science and Nature/ Experiments and Activities/Science Fair/>

http://dir.yahoo.com/Science/Education/K_12/ Fairs and Competitions/Projects and Ideas/

Science Fairs

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<http://sciencefairproject.virtualave.net>

Science Fair Home Page

<http://istf.ucf.edu>

Internet Science and Technology Fair

<http://stemnet.nf.ca/sciencefairs>.

Another Science Fair Home page

<http://www.drexel.edu./dvsf/>

<http://www4.umdj.edu./camlbweb/scifair.html>

<http://www.west.net/~vcsf/index/html>

<http://www.gnef.or/resources.html>

Presentation and Evaluation Sites

<http://school.discovery.com/sciencefaircentral/scifairstudio/handbook/presandeval.html>

Science fair studio

Science Fair Judging Sheet

<http://sciencefairproject/virtualave.net/judgingsheet.html>

Other Useful Sites

<http://www.sciencedaily.com>

<http://www.enn.com>

<http://www.newscientist.com>

<http://www.familyeducation.com/article/0,1220,1-3600,00.html>

<http://www.panloss.ca/mentor/sciencefairs.html>

<http://www.ontariosciencecenter.ca/kids/coolstuff/fairlinks.asp>

<http://homeworkspot.com/sciencefair/>