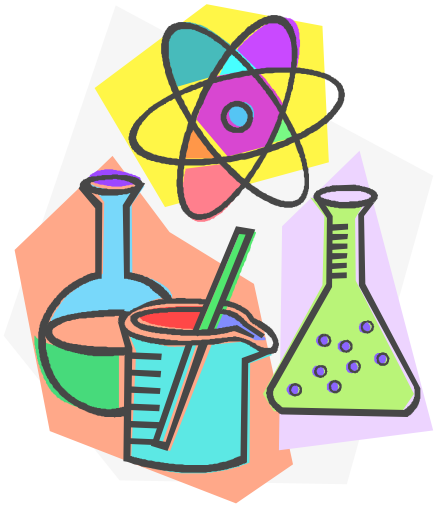


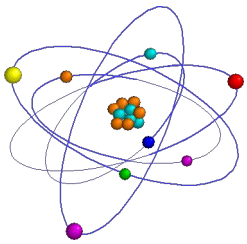
Concord Community Schools

Science Fair Guide

Do it! Pursue it!

Author Judy Wells

The goal of the Concord Science Fair is to take students through the process of completing a long-term project and instill in them an interest in science.



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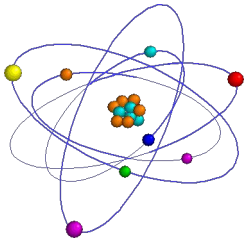


Introduction

This booklet is designed to help a student plan and work through a project as he/she prepares for the final presentation at the Concord Science Fair. As you read through this booklet, use it to organize your thoughts and plans for your science fair project.

Included in this booklet is a list of many acceptable projects. The public library and the school libraries have books that contain other ideas. Also, many projects are explained on-line. Projects that turn out best are those that compare and contrast two or more things using simple testing and data collecting techniques. Cost of projects varies depending on how involved the student becomes. Projects need to be ones within the student's capabilities. Keep this in mind when making a choice.

The science fair is a wonderful activity for students. It teaches so many important skills in the science area as well as planning, research, and thinking skills. Parent cooperation is encouraged. A parent or other adult can serve as an advisor, assistant, and encourager. But, if the student is to learn from this project, the student must accomplish the majority of the work.

Basic Information

WHY DO THE PROJECT?

Students have a natural curiosity. Science is a perfect vehicle to expand this curiosity. The science fair is a time for students to spend time exploring a topic of interest. Completing a project worked on for six or more weeks develops a sense of pride and commitment.

SCIENCE FAIR PROJECT IDEAS

The following is a list of acceptable project titles. This is not intended to be an all-inclusive list. Rather it is presented as a way to jump-start your brain as you think of a project you would enjoy doing. Maybe one on the list will be right for you or help you think of a better one.

Which type of soil is best for plant growth?
Which laundry detergent cleans the best?
Which liquid provides the best nutrition for a plant?
Does temperature affect plant growth? (or water, plant food, color of light, light, size of pot, talking to the plant, different types of music, etc.)
What additives best preserve cut flowers?
Does the color of an apple effect the growth of mold?
What kind of container (or packing material) will protect an egg when dropped?
Which paper towel is the strongest?
Which brand of microwave popcorn has less waste?
Which brand of peanut butter do people prefer?
Which kind of food do fish like best? (or dogs, cats, gerbils, etc.)
Can optical illusions trick you?
Which brand of battery holds energy the longest?
How can conditions (water, air, paper) effect magnetic attraction?
What materials are good insulators or conductors?
Which type of sandwiches grow mold the fastest?
Does temperature affect mold growth?
Which mouthwash kills the most bacteria?
Does the angle of inclination affect the distance a model car will travel?

Will the weight of a model car (or style or type of surface) affect the distance of travel?
Which metal rusts most quickly?
Does the amount of pulleys affect the load you can lift?
Which diaper holds the most liquid?
Which brand of potato chip has the most grease?
Which design of airplane will fly the farthest?
What kind of juice cleans pennies best?
Do roots of a plant always grow downward?
Do bigger seeds produce bigger plants?
What materials dissolve in water?
Does a ball roll farther on grass or dirt?
What type of plants can grow from leaves?
Can things be identified by just their smell?
Do different types of apples have the same number of seeds?
What materials provide the best insulation?
Does heart rate increase with increasing sound volume?
Does the color of a material affect its absorption of heat?
Will more air inside a basketball make it bounce higher?

STEPS TO A SUCCESSFUL PROJECT

1. Select a project (topic) that interests you.
2. Do some research to understand your topic. Students in grades 4-12 will write a one-page report.
3. Set up your experiment and run the tests.
4. Accurately document everything you do in your science fair log. Students in grades 1-3 can get someone to help them record their documentation.
5. Record all data important to your results in your log.
6. Set up a display to present your project. This display will include documentation of everything you have done. Refer to the last pages of this booklet for samples.

WHERE TO BEGIN

To begin you need to select a topic that interests you. Be sure it is an interesting one because you will be working on this project for at least six weeks. If you are in grades 4-12, the topic must be one that requires some experimentation. You will write a report and do an experiment to explain the topic. If you are in grades 1-3, your project can be a demonstration or an experiment. You will need to define important terms in your logbook.

Next a title for the project is selected. It must be written as a question. To get the answer to the question you must experiment or set up your demonstration (grades 1-3).

Selecting what to do is probably the hardest part of any science fair project.

- **Jump start your brain by reacting to the following:**
  - I am interested in:
    Plants (botany)
    Motors (physics)
    Cooking (chemistry)
    Animals (zoology)
    Recycling (environmental science)
    Exercise (medicine/health)
  - **OR** … you may remember something you studied in class and want to know more about. _____
  - I would like to find out . . . _____
  - A question I could ask … _____

SCIENCE FAIR TIME TABLE 2008

The Concord Science Fair will take place on Saturday, February 23, at Concord Jr. High School. In order to be ready on time and not save everything to do until the last minute, the following timetable is suggested.

December 2007 – Now is the time to be thinking about the Science Fair. You need to decide on a project. Brainstorm some ideas. Talk to your parents. What can they help you with? What expenses are involved in the project you want to do? Talk to your teacher. What suggestions does your teacher have?

December 3 - January 11, 2008 – School begins after the holidays. By now you should have the topic for your project. You **must** register on-line this week. To register from home, click on the Science Fair icon on Concord Community Schools Website at www.concord.k12.in.us.

January 14 – 5 weeks before the fair

January 21 – 4 weeks before the fair

During this week you should write your title, purpose, and hypothesis. If you plan to involve plants or animals in your project, you must begin now in order to obtain enough data. **Write everything down in your log.**

January 28 – 3 weeks before the fair

Grades 4-12: Research your topic. Be sure to write down all your sources so you can credit the information. Grades 1-3: look up and write down any new words and their definitions. Keep good notes. Begin gathering materials necessary for your experiment. **Write everything down in your log.**

February 4 – 2 weeks before the fair

Finish writing the research section of your project report. Have someone proofread your rough copy.

Grades 4-12: Now is the time to try your experiment. Be sure to record in your log what you did and what happened. If you have an ongoing project, be sure to record all observations and activities in your log.

Grades 1-3: If you are doing a demonstration, you should be planning how you will put together your information.

*** Science fair boards will be available at your school.** If you do not purchase a display board you will need to construct a 3-sided display board for your work.

February 11 – 1 week before the fair

Grades 4-12: Make a good copy of your research report and write your bibliography. NOTE TO PARENTS: you can help your student with this by making sure he/she has at least three sources and all the information is written down.

Do final experiments and stop data collecting. Now you will need to write your procedure and results in a final form for display. If your project involves plants, continue to water your plants but do not record any changes.

All grades: Start constructing your display.

February 18 – Week of the fair

You can now write your conclusion. What is the real answer to your question?

Finish your display. Make an extra copy of the information on your display board to include in your final project book (grades 4-12).

After you have your project and display finished:

Go over your display with someone to make sure all elements are included. Have someone ask you about your project so you can practice what you have learned.

Friday, February 23, 2008 - set-up & registration from 3:30 p.m. – 5:30 p.m. @ Concord Jr. High School.

Saturday, February 23, 2007 – CONCORD SCIENCE FAIR held at Concord Jr. High School

GOOD LUCK!!

LOG BOOK

As you work on your project it is important to write everything down. Sometimes you may want to add a sketch to help explain. This recording begins as soon as you select a topic.

Any notebook can be used as a logbook. A two-pocket folder (used only for this project) is a good place to keep your logbook and all-important papers. Do not throw away any papers as you work through your project. You may need some of the information you wrote down at a later time.

Be sure to date every entry in your logbook. Be neat but do not worry about correct spelling or punctuation. This is your journal of everything you have planned or completed during this project.

The logbook will be part of your final display.

RESEARCH REPORT

Grades 4 - 12

In order to better understand what you are doing and why your experiment reacted the way it did, you should do some research and write a one-page report of your findings; for example, if your question is what battery lasts the longest? You should know how batteries work. If your question is what liquid will cause the plant to grow the tallest? You need to know about plant growth and the contents of your liquids.

There are many ways to get information about your topic. You can use books, encyclopedias (books, CD-ROM, and on-line), knowledgeable people (an expert in the field of your topic), the companies who manufacture the product you are testing. Be sure you write down the source of all information you are collecting. You will not use all the information but will need to document everything you do use. You should record information about each source in your logbook.

NOTE: Students in grades 1-3 should write down and understand all-important words used in their project. This can be recorded in their logbook.

GETTING DOWN TO WORK

Now that you have decided upon your topic you can get to work. **Be sure to record everything you are doing in your logbook.** Use the following pages as a place to brainstorm and rough copy ideas.

- TITLE: this should be written in the form of a question. Be sure the question tells what it is you plan to find out.

- PURPOSE: In three to four sentences tell why you chose this project and what you plan to do. Do not restate the title question.

- HYPOTHESIS (used in an experiment): In two to three sentences tell what you think will happen; what you think is the answer to your project question.

- Now as you get ready to do your experiment you need to do some planning.

1. List the materials you will need. Talk to your parents about the cost.

2. Plan for construction, planting, or setting up of your project. Draw a sketch if that helps you plan.

3. Decide where you will do your experiments or tests. If you are working with plants, where will you set them? If you need the kitchen or counter space, how can you plan for that without being in the way? If you need a lot of test subjects, when and where at school can you test?

- PROCEDURE: **In your logbook** write down everything you do. This is a day-by-day, step-by-step process. Be sure to date each entry. Explain in detail any materials you have constructed. Be very specific as you explain everything you do and the materials you used. Use sketches if that helps to clarify what you have done.

- RESULTS: The results report the data you collected while running your experiment. This data tells what happened – how tall each plant grew, how much water each paper towel held. You should do all your measuring using the metric system (this is what scientists use). You should organize your results into graphs, charts, or tables. The information needed will be in your logbook, carefully documented.

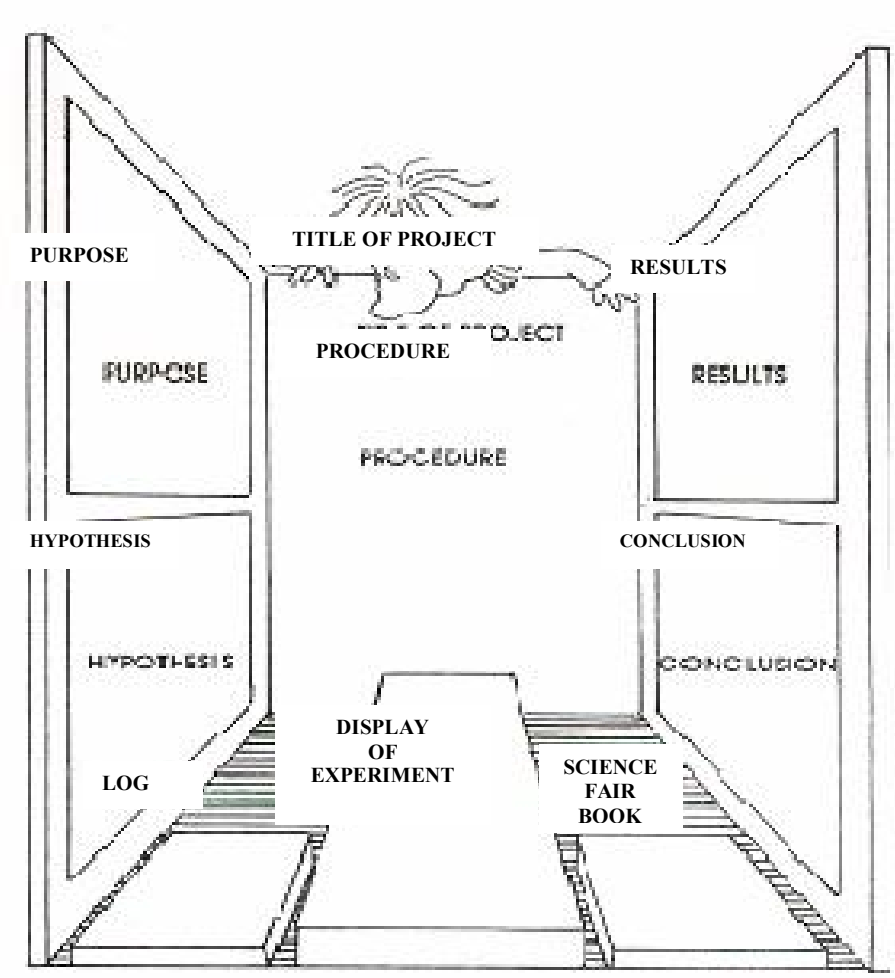
- CONCLUSION: This is the answer to your topic question. In this section you tell what you learned, why your results were what they were. Tell everything you now know about your question. Look over your graphs, charts, tables, or daily log and then write what you think the data shows or seems to indicate. You may include your opinions. Don't be afraid to admit where you might have made mistakes. Negative results are not bad. If you did not prove your hypothesis, then say so.

All of the above information should be typed or carefully written and displayed on your three-sided display board. It should be large enough to read from a comfortable distance.

SCIENCE FAIR BOOKLET

Grades 4-12

As part of your display you will have a booklet that contains a copy of everything on your display board plus your research paper complete with sources. You should have a short statement of thank yous (called Acknowledgments) to all who helped with your project. You should include those who gave you guidance, materials, and the use of facilities or equipment.



THE DISPLAY

You have worked very hard to research information, experiment, and collect data for this project. The display at the science fair is the way you will communicate this information to the judges. The science fair project must be presented in a clear and complete form or much time and effort has been wasted.

A three-sided, freestanding display board is needed. A board can be purchased or constructed. The display board must be self-supporting and strong, large enough to display all your information, and tall enough to view at eye level. There is no wall space for hanging posters. The science fair booklet, logbook, and models or the experiment are set in front of the board.

Judges must often look at many projects in a short amount of time. The display must show all the vital information of the project so the judge can make a quick assessment.

A neat display is important. Take your time when lettering. Do the lettering in pencil first. Draw a light guideline so letters are straight. Or you may type or use the computer for lettering and information. Add color where appropriate. Use graphs to help explain the data you collected from your experiment. Photographs are a way to show information you cannot bring to the fair or to show different stages of your project.

Display the information on the board as shown in the drawing.

_____ A. Student independently identified a single idea to investigate

Idea – 3 = Good	2 = Satisfactory	1 = Needs Improvement
Identified, with adult help, a question which was interesting to the student and which could be investigated.	Identified, with adult help, a single question, which could be investigated.	Identified a question that could not be tested/investigated or one that did not merit investigation.

_____ B. Student outlined procedures in a manner that can be reproduced

Description of Procedure – 3 = Good	2 = Satisfactory	1 = Needs Improvement
Procedures were outlined in a step-by-step fashion that could be followed by anyone without additional explanations. Some adult help was needed to accomplish this.	Procedures were outlined in a step-by-step fashion, but had 1 or 2 gaps that require explanation even after adult feedback had been given.	Procedures that were outlined were seriously incomplete or not sequential, even after adult feedback had been given.

_____ C. Student collected data or researched project idea

Data Collection – 3 = Good	2 = Satisfactory	1 = Needs Improvement
Data was collected several times or research came from multiple sources. Limited adult assistance was needed to explain discovery.	Data was collected more than one time or research came from more than one source. Adult assistance was needed to clearly summarize what was discovered.	Data was collected only once and adult assistance was needed to clearly summarize what was discovered.

_____ D. Student provided an explanation of the project idea

Conclusion/Summary – 3 = Good	2 = Satisfactory	1 = Needs Improvement
Student provided a conclusion clearly based on the data or research.	Student provided a conclusion using some of the data or research.	No conclusion was apparent OR important details were overlooked.

_____ E. The project is neat, complete and well organized

Display – 3 = Good	2 = Satisfactory	1 = Needs Improvement
Each element had a function and clearly served to illustrate some aspect of the project idea. All items were neat and clearly labeled.	Most elements had a function and were related to project idea. Most items were neat and clearly labeled.	The display seemed incomplete or chaotic with no clear plan. Many labels were missing or incorrect.

_____ A. Student independently identified a single question to investigate

Idea - 4 = Excellent	3 = Good	2 = Satisfactory	1 = Needs Improvement
Independently identified a question which was interesting to the student and which could be investigated.	Identified, with adult help, a question which was interesting to the student and which could be investigated.	Identified, with adult help, a question, which could be investigated.	Identified a question that could not be tested/investigated or one that did not merit investigation.

_____ B. Student developed a well-substantiated hypothesis

Hypothesis - 4 = Excellent	3 = Good	2 = Satisfactory	1 = Needs Improvement
Independently developed a hypothesis well substantiated by a literature review and observation of similar phenomena.	Independently developed a hypothesis somewhat substantiated by a literature review and observation of similar phenomena.	Identified, with adult help, a hypothesis somewhat substantiated by a literature review or observation of similar phenomena.	Needed adult assistance to develop a hypothesis or to do a basic literature review.

_____ C. Student outlined procedures in a manner that can be reproduced

Description of Procedure - 4 = Excellent	3 = Good	2 = Satisfactory	1 = Needs Improvement
Procedures were outlined in a step-by-step fashion that could be followed by anyone without additional explanations. No adult help was needed to accomplish this.	Procedures were outlined in a step-by-step fashion that could be followed by anyone without additional explanations. Some adult help was needed to accomplish this.	Procedures were outlined in a step-by-step fashion, but had 1 or 2 gaps that require explanation even after adult feedback had been given.	Procedures that were outlined were seriously incomplete or not sequential, even after adult feedback had been given.

_____ D. Student identified individual variables to be changed and measured

Variables - 4 = Excellent	3 = Good	2 = Satisfactory	1 = Needs Improvement
Independently identified and clearly defined which variables were going to be changed (independent variables) and which were going to be measured (dependent variables).	Independently identified which variables were going to be changed (independent variables) and which were going to be measured (dependent variables). Some feedback was needed to clearly define the variables.	With adult help, identified and clearly defined which variables were going to be changed (independent variables) and which were going to be measured (dependent variables).	Adult help needed to identify and define almost all the variables.

_____ E. Student collected data in a manner consistent with their hypothesis

Data Collection - 4 = Excellent	3 = Good	2 = Satisfactory	1 = Needs Improvement
Data was collected several times. It was summarized, independently, in a way that clearly describes what was discovered.	Data was collected more than one time. It was summarized, independently, in a way that clearly describes what was discovered.	Data was collected more than one time. Adult assistance was needed to clearly summarize what was discovered.	Data was collected only once and adult assistance was needed to clearly summarize what was discovered.

_____ F. Student provided a detailed conclusion based on hypothesis and data

Conclusion/Summary - 4 = Excellent	3 = Good	2 = Satisfactory	1 = Needs Improvement
Student provided a detailed conclusion clearly based on the data and related to pervious research findings and the hypothesis statement(s).	Student provided a somewhat detailed conclusion clearly based on the data and related the hypothesis statement(s).	Student provided a conclusion with some reference to the data and the hypothesis statement(s).	No conclusion was apparent OR important details were overlooked.

_____ G. The project is neat, complete and well organized

Display - 4 = Excellent	3 = Good	2 = Satisfactory	1 = Needs Improvement
Each element is the display had a function and clearly served to illustrate some aspect of the experiment. All items, diagrams, graphs, etc. were neatly and correctly labeled.	Each element had a function and clearly served to illustrate some aspect of the experiment. Most items, diagrams, graphs, etc. were neatly and correctly labeled.	Each element is the display had a function and clearly served to illustrate some aspect of the experiment. Most items, diagrams, graphs, etc. were correctly labeled.	The display seemed incomplete or chaotic with no clear plan. Many labels were missing or incorrect.