

A PARENT'S RESOURCE GUIDE FOR SCIENCE PROJECTS



Written by parents, for parents



Hillsborough County
PUBLIC SCHOOLS
Excellence in Education

2008 - 2009

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INTRODUCTION

The participation in elementary science fairs has expanded each year since 1980. As more students do science investigations, it is understandable that parents need clearer directions for their role. Parents need to know how they can help their children with this challenging and difficult experience. By giving appropriate support at home and school, this annual assignment need not be difficult.

The science project is a natural outgrowth of classroom instruction. As students do weekly investigations in class, they are developing the skills to complete a project independently. Of course, participating in a class project in the primary grades K-2, helps give students confidence to do an individual project beginning in third grade. Even with the intermediate grades, it is helpful for the students to complete a class project prior to an individual project.

This guide has been written by parents to help clarify the roles of the teacher, the parent, and the student with science projects. It is intended to answer parent questions and concerns that have arisen in the past. It represents the positive results of school and home working together to help improve education.

As you use the guide this year, I hope you will give feedback to your school and PTA. We will review these suggestions at the end of the year to make further improvements in the Science Fair. I would welcome any comments or suggestions that you have regarding Science Projects.

Shana Tirado

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Science Fair Web Site:

<http://www.sdhc.k12.fl.us/~science.elementary/programs.html>

LETTER FROM THE PARENT'S COMMITTEE

Dear Parents,

As part of the science curriculum this year, your child will be participating in a science project. We feel this project can be a unique learning experience for your child. A good science project is based on a topic that your child can investigate himself, through experimentation. This project requires the students to use their science abilities, their skills in math and their skills in language arts. It also encourages self-discipline in completing a long-term project and promotes interaction among the students, parents, teachers, and school.

As with any new experience, there are many questions that will arise. This resource guide has been prepared by parents who have worked through a science project with their children. We hope that it will eliminate some of the problems we experienced and will make the science project a positive and rewarding experience for all concerned. We are deeply grateful to the outstanding teachers and administrators throughout the county who supplied the technical information necessary to make this guide.

We wish you a very positive learning adventure.

Sincerely,

The Parent's Committee

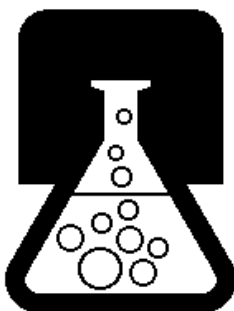


WHAT SHOULD BE EXPECTED FROM THE TEACHER?

The teacher is your single best source of information. At the beginning, you should be provided with the following:

- A list of rules and regulations. This will let you know the safety rules, the general subject categories, animal research rules, the specifications for construction of the displays, the display restrictions, and other important information.
- A student project checklist which is valuable for keeping the child on track throughout the project.
- A timeline of the dates for the various stages of the project. This is of utmost importance for both the student and the parent to insure that the project progresses at an appropriate pace.
- An outline of exactly what the teacher expects the student to do. For example, some teachers may expect a research paper, while others may not.
- An opportunity for a parent-teacher meeting during which the teacher explains the project and answers any questions you may have.
- The name of your school contact person, the phone number of the school and the time(s) you may call this person in the event that problems or questions arise.

During class time, your child will discover many helpful resources for this project. The teacher should strive to help your child maintain a positive attitude through encouragement and guidance. Instructions for the selection of a topic and every other phase of the project should be provided in the classroom.



WHAT SHOULD BE EXPECTED FROM YOUR CHILD?

One of the benefits of completing a science fair project is the development of responsibility in the child. To assist in this, you as a parent should allow your child to assume responsibility. The child should:

- Bring home all information given out by the teacher.
- Make a list of interesting topics. It is critical that the topic of the project be one the child enjoys. Once the list is made, the teacher can help the child select a topic which is appropriate for scientific investigation.
- Do any necessary background reading at the school library or at home.
- Conduct testing at home.
- Design and decorate the display. (Parents may become involved with display board construction.)
- Be responsible for following through on the project and for meeting the necessary deadlines.

This is your child's project. It is a long-term project requiring instruction and guidance from the teacher, along with encouragement and some assistance from you.



WHAT SHOULD BE EXPECTED FROM THE PARENT?

As a parent, your role is one of guidance, support and encouragement with minimal intervention. You should:

- Help your child make a list of interesting topics.
- Review the selected topic when it comes home. This topic should have measurable results.
- Consult with your child's teacher when doubtful of the appropriateness of your child's topic.
- Help your child pace work on the project to meet deadlines.
- Talk with your child to determine his understanding of the project and to help him discuss his findings.
- Encourage your child to do his best.
- Praise responsible behavior.
- Help your child overcome minor problems with the project. Contact the child's teacher if necessary.
- Provide transportation and necessary materials.

Parents should remember that a science fair project is basically a child's positive, individual achievement.

DOES THE PROJECT HAVE TO BE A HASSLE?

A hassle-free project is ideal. Realistically, occasional problems may occur. Careful selection of a topic can minimize frustrations and boredom arising from a topic that is not appropriate. With cooperative communication between school, teacher, parent, and child, problems can be identified and solved. **This project does not need to be costly or overly time consuming.**

If difficulties remain, encouragement should come from the knowledge that like all new skills, practice increases ability and enjoyment. Teachers, parents, and students feel that science fair projects become easier with each experience.

COMPONENTS OF A SCIENCE PROJECT

This section is to help you understand the different parts of the science project as your child works on them.

I. TITLE:

Use titles related to the project or print out the question that is being investigated.

II. PURPOSE:

Make a clear, concise statement as to what the investigation is about.

III. HYPOTHESIS:

This statement is made PRIOR to doing the experiment. It is a statement of expected results.

IV. PROCEDURE:

This consists of three parts:

A. Materials – a complete and specific listing of everything used in the experiment. **The Metric System should be used.**

B. Variables - 3 Types

- Manipulated/ Independent– what is being changed in the experiment on purpose.
- Responding / Dependent – the measurable result of what is being changed in the experiment.
- Held Constant – all the things that are kept the same or controlled during the experiment.

Scientists use an experiment to search for **cause and effect** relationships in nature. In other words, they design an experiment so that changes to one item cause something else to vary in a predictable way.

These changing quantities are called **variables**. A variable is any factor, trait, or condition that can exist in differing amounts or types. An experiment usually has three kinds of variables: independent, dependent, and controlled.

The **independent variable** is the one that is changed by the scientist. To insure a fair test, a good experiment has only one independent variable. As the scientist changes the independent variable, he or she **observes** what happens.

The scientist focuses his or her observations on the **dependent variable** to see how it responds to the change made to the independent variable. The new value of the dependent variable is caused by and depends on the value of the independent variable.

For example, if you open a faucet (the independent variable), the quantity of water flowing (dependent variable) changes in response--you observe that the water flow increases. The number of dependent variables in an experiment varies, but there is often more than one.

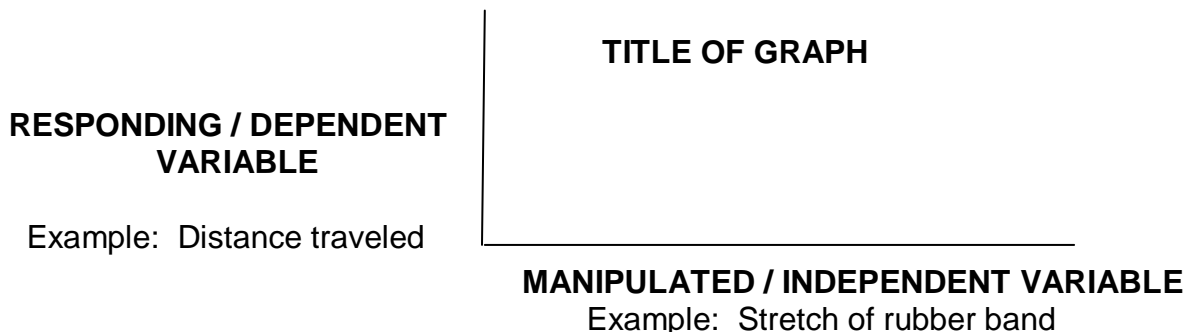
Experiments also have **controlled variables**. Controlled variables are quantities that a scientist wants to remain constant, and he must observe them as carefully as the dependent variables. For example, if we want to measure how much water flow increases when we open a faucet, it is important to make sure that the water pressure (the controlled variable) is held constant. That's because both the water pressure and the opening of a faucet have an impact on how much water flows. If we change both of them at the same time, we can't be sure how much of the change in water flow is because of the faucet opening and how much because of the water pressure. In other words, it would not be a fair test. Most experiments have more than one controlled variable. Some people refer to controlled variables as "constant variables."

- C. Step-By-Step Directions** – a listing of the steps used in the experiment. It is suggested to number each step so that it can be followed in sequence, like a recipe. Using photographs or accompany the steps is a very effective way to illustrate them.

COMPONENTS OF A SCIENCE PROJECT (continued)

V. DATA COLLECTION AND GRAPHS:

Projects should be selected where the averaged data can be represented in the form of a graph. This section should include the raw data collected in a table or chart form. Graphs should follow the format as follows.

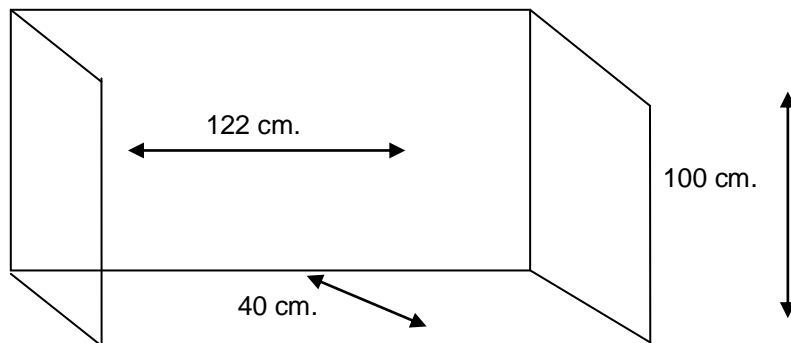


VI. CONCLUSIONS:

First, a statement should be made as to whether the results support the hypothesis. Next, describe what was observed as a result of the experiment. Statements should include things noticed that were not originally looked for and things the experimenter could do differently next time. A thorough analysis of the data should be evident. A revised hypothesis should be stated if the data did not show support for the original hypothesis. Application of results to real world situations should be included.

VII. DISPLAY:

Must be self-supporting and be able to fit within an area 100 centimeters (39 inches) tall, by 122 centimeters (47 inches) wide, by 40 centimeters (15.5 inches) deep.



COMPONENTS OF A SCIENCE PROJECT (continued)

The following items are located in front of the display:

VIII. LOG:

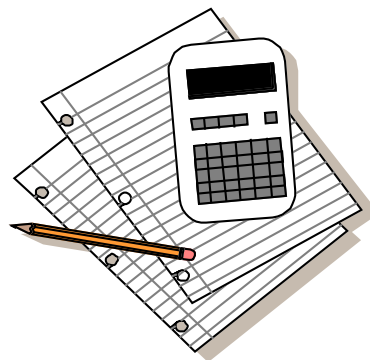
The log should include the purpose, hypothesis, procedure, data, graph(s), and conclusions, as well as notes on all the preparations made prior to starting the investigation. **The log consists of detailed day-by-day notes on the progress of the project.** Each entry in the log should be dated. A spiral notebook may be the most convenient way to keep a log.

IX. EQUIPMENT OR APPARATUS:

It is not advisable to have loose equipment or apparatus on display. Pictures or drawings do just as nicely. The child will not be demonstrating the apparatus; however, a third, fourth, or fifth grader will be expected to describe the project. The child should largely construct any necessary apparatus. **No organisms are allowed to be displayed.**

X. BACKGROUND PAPER

This is **optional** at the elementary level. The background paper includes the purpose, hypothesis, procedure, data, graph(s), conclusions, related research, and bibliography. Related research may consist of general information about topic, descriptions of related experiments conducted by others, or a brief overview of your topic with related materials that helped gain background to set up the procedure. The background paper may be typed, handwritten or computerized.



JUDGING CRITERIA

It should be understood that the questions under each component of the judging criteria are guidelines for evaluating that component. Other related factors may be considered. Third, fourth, and fifth grade students are given an opportunity to elaborate on any of these components during the student/judge interview.

Please note the weight of each component as it relates to the others so as not to put greatest efforts in a lesser-weighted area. Beauty will not outweigh process!

Scientific Investigation – 40 Points

- Is the purpose/hypothesis stated on the display?
- Has the procedure used in developing and obtaining the solution of the results been explained?
- Is method of data acquisition or analysis explained?
- Does data support conclusion?
- Does conclusion follow logically?

Creative Ability – 15 Points

- Did student design and construct any equipment or was it purchased?
- Does this project display originality or is it one which has been performed many times?
- Does the project rely to a small or great degree upon the research of others?
- Is data originally presented?
- How creative is the display?

Thoroughness – 20 Points

- How many times was the investigation performed?
- Does the display physically demonstrate the operation or results of the project?
- Have variables affecting outcomes been considered?
- Are materials listed specifying accurate amounts?
- How complete is the sample?

Skill – 15 Points

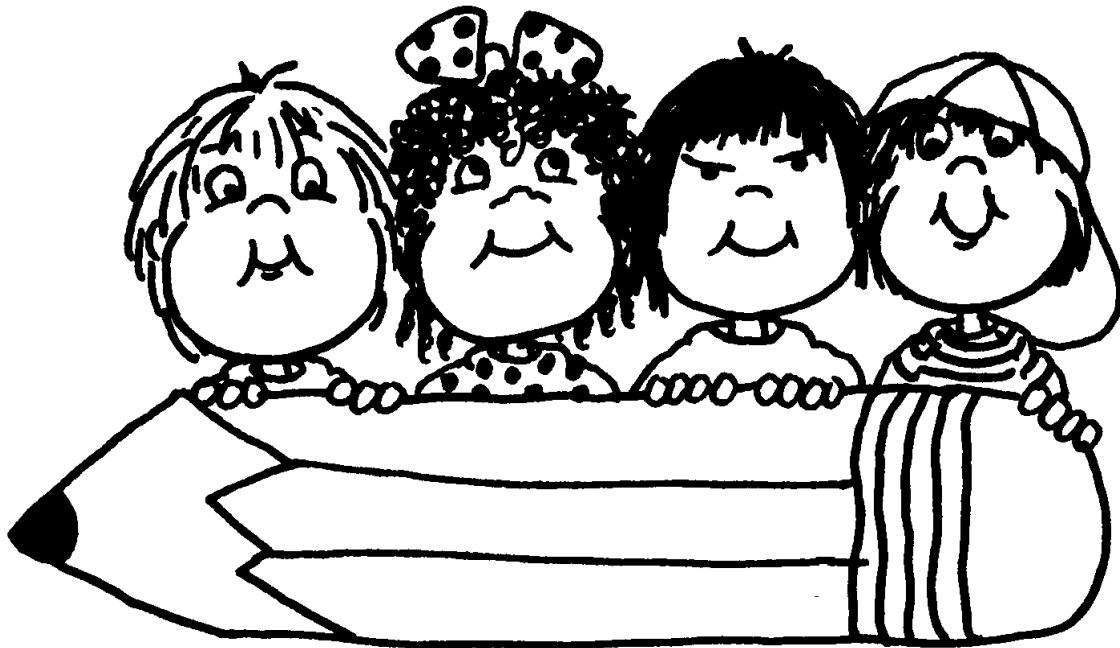
- Is skill commensurate with age and grade level?
- How attractive is the exhibit compared to others?
- Does the project catch the eye?

Clarity/Neatness – 10 Points

- How clearly has the student discussed the project?
- Is written material clearly presented and data easily understood?
- Is display well organized or cluttered?
- Is material readable and logically arranged?
- Is spelling and grammar correct?

FINAL COMMENTS

As parents and educators, we share the goals of providing our children with the best experience to function, survive, and excel in a technical, scientific society. Science Fair projects can be valuable tools to teach children to question, to investigate, to succeed, and to learn, even when results differ from those expected. This committee has attempted to explain the philosophy behind Science Fair projects and to clarify procedures and roles of those involved. Through clarification and communication, we hope Science Fair projects result in less frustration and more positive accomplishments. When we as parents and educators have succeeded in nurturing our children's courage to explore and confidence to preserve, we have accomplished our goals.



NOTES