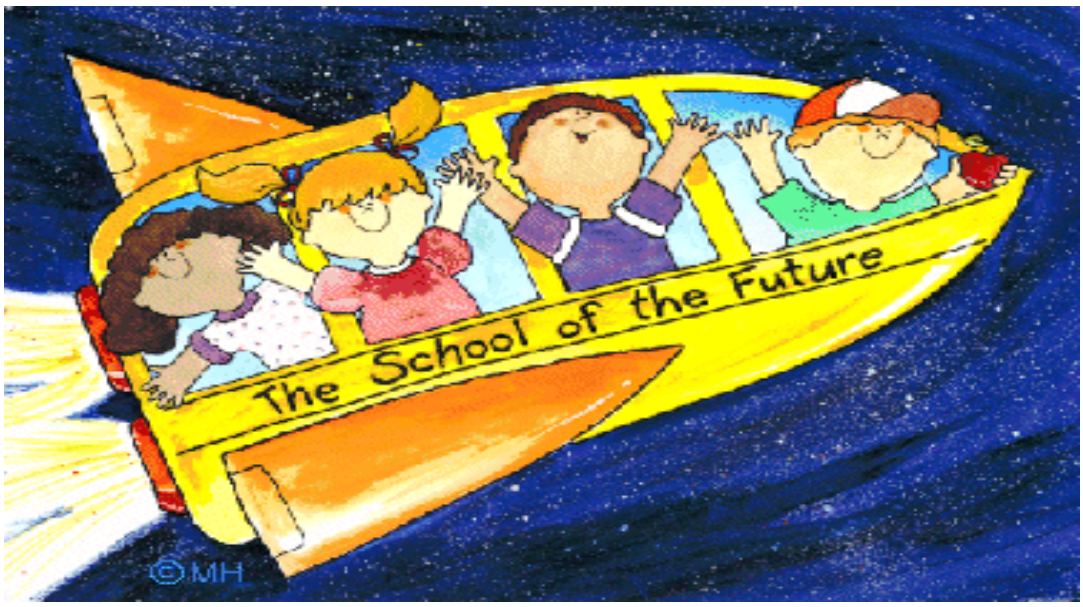
Polk County Schools Elementary Science Fair Rules and Guidelines



A Guide to the Elementary Science Fair

Revised January 2007

SCHOOL BOARD OF POLK COUNTY

SCHOOL BOARD MEMBERS

Frank J. O'Reilly
Lori Cunningham
Hazel Sellers
Brenda Reddout
Kay Fields
Margaret Lofton
Tim Harris

SUPERINTENDENT OF SCHOOLS

Dr. Gail McKinzie

Dr. Sherrie Nickell
Associate Superintendent for Learning

Debra Edmiston, Diana Myrick,
Katheryn Curtis and Charlene Brinson
Senior Directors for Elementary Education

Linda Vendur
Senior Curriculum Coordinator
Elementary Science

CONTENTS

GENERAL INFORMATION

Philosophy

The Science Fair concept has been established to:

1. provide a medium for students to apply learned knowledge and skills in order to solve problems and answer real world questions.

2. strengthen student motivation and interest in science.

3. promote teacher and public recognition of outstanding student effort.

Why participate?

Doing a science project is an integrated learning experience with a worthwhile educational payoff. Successful completion of a project requires application of language skills (writing, expressing thoughts orally), and mathematical skills (quantifying data, interpreting data, problem solving). Students must also exhibit self-discipline and study habits necessary to complete a long-range study, search out resource material, and carry out the investigation.

Who can enter the Fair?

Public, charter and private elementary schools may enter the Fair. Each entering school will be assigned a set number of project spaces for grades housed within the designated facility. **Students must participate in a school fair before they are eligible to enter the Polk County Elementary Fair.**

How many projects may a school enter?

The school quotas are:

Fourth Grade - 3 individual projects

Fifth Grade - 3 individual projects

A SCHOOL MAY NOT ENTER MORE THAN THE QUOTA FOR EACH GRADE LEVEL.

How are the projects judged on the county level?

Judging is probably the most important aspect of the Fair. It establishes standards by which all students can improve the quality of their work. The role of judging is not to distinguish winners and losers, but to recognize students who achieve standards of excellence. By encouraging students to strive for their best effort, all participants are winners and grow from the experience.

A team of judges is assigned to each grade level. Students remain with their projects during judging to explain their study. **All others (sponsors, teachers, parents and other students) are not permitted in the project area while judging is in progress. Any violations of this policy can result in the disqualification of the project.**

Guidelines for Awarding Ribbons

Two independent judges will judge each project. If there is a large disparity between scores, a third judge will review the project.
Scores from the two judges will be added together to arrive at the total score. Of the possible 200 points (100 pts. per judge), 56 points (28 pts. per judge) are determined by the student's responses to specific questions. If a student is not present during the judging, he/she will receive a zero for all questions that specifically require a student response.
Judging sheets and students' scores will not be released.

Ribbons will be awarded based on the following point scale.

180 - 200	**(90%)**	**Superior (Blue Ribbon)**
150 - 179	**(75%)**	**Excellent (Red Ribbon)**
125 - 149	**(63%)**	**Outstanding (Yellow Ribbon)**
0 – 124	**(less than 63%)**	**Merit (White Ribbon)**

Elementary Science Fair
Judging Form

Judge # __

Grade _____ Project #_____

Purpose/Hypothesis		
1. How well is the purpose question stated?	**0 1 2 3 4**	
2. How creative is the approach used to answer the questions?	**0 1 2 3 4**	
3. How well does the hypothesis relate to the purpose?	**0 1 2 3 4**	
4. Student Response Question (TBA)	**0 1 2 3 4**	
5. Student Response Question (TBA)	**0 1 2 3 4**	
Subtotal		_____
Variable/Constant/Control		
6. How thorough was the materials list? (using metric units)	**0 1 2 3 4**	
7. Did student identify the <u>one variable</u> changed in the experiment?	**0 1 2 3 4**	
8. Did student identify **<u>all</u>** factors held constant in the experiment?	**0 1 2 3 4**	
9. Did student identify the control or state "No Control"?	**0 1 2 3 4**	
10. Student Response Question (TBA)	**0 1 2 3 4**	
Subtotal		_____
Procedure		
11. Are step-by-step directions sequenced and clear so that anyone can set up the experiment?	**0 1 2 3 4**	
12. Do procedures include specific directions including metric units?	**0 1 2 3 4**	
13. How detailed was the log or notebook kept?	**0 1 2 3 4**	
14. How well do the displayed procedures and log indicate the amount of trials completed (minimum of 3)?	**0 1 2 3 4**	
15. Student Response Question (TBA)	**0 1 2 3 4**	
Subtotal		_____
Graph/Data		
16. Were data measurements done precisely and related directly to the hypothesis?	**0 1 2 3 4**	
17. Was the data collected in **<u>quantitative, metric units?</u>**	**0 1 2 3 4**	
18. Does the graph show evidence of three trials and an overall average of those trials?	**0 1 2 3 4**	
19. Does the graph have a title and correctly labeled axes?	**0 1 2 3 4**	
20. Student Response Question (TBA)	**0 1 2 3 4**	
Subtotal		_____
Conclusion		
21. Is there a clear statement that shows support or non-support of the hypothesis?	**0 1 2 3 4**	
22. Is there evidence stated in the abstract/log of student research?	**0 1 2 3 4**	
23. Is a complete and organized abstract included?	**0 1 2 3 4**	
24. Student Response Question (TBA)	**0 1 2 3 4**	
25. Student Response Question (TBA)	**0 1 2 3 4**	
Subtotal		_____
Total Score:		__/100

Scoring Rubrics

Judges use the scoring rubrics below when evaluating projects. All questions assessing the project itself are scored using the Project Display Rubric. All questions requiring a student response are scored using the Student Response Rubric.

	Project Display Rubric	Student Response Rubric
0	No evidence or incorrect	Student has no understanding or is unable to respond.
1	A weak attempt made/ many errors or major flaws	Student has little knowledge or flawed understanding.
2	Partial evidence/ some flaws or omissions	Student has some knowledge but lacks complete understanding.
3	Clear evidence/minor flaws or omissions	Student is able to articulate an adequate understanding.
4	Clear evidence/no flaws	Student able to articulate a clear understanding.

Awards

All students who participate in the Polk County Elementary Science Fair receive a certificate of participation and a ribbon. Four levels of ribbons will be awarded: Superior, Excellent, Outstanding, Merit. Recipients of Superior ribbons will also be awarded a medallion at a reception for parents, teachers, and students.

Parent Involvement

Since components of the science project may be completed at home, parents need to be informed as to how they can help their children. They need to provide guidance, encouragement, praise and necessary materials.

A parent meeting early in the year that explains the components of a project and outlines limits of parental involvement can be very helpful to a smooth running fair. If parents understand what a project consists of, they can help monitor their child's progress through to the end.

RULES AND GUIDELINES

Entries

1. Each student who enters the Polk County Elementary Science Fair must be selected by his/her school. It is the school's responsibility to verify that the project is the work of the student and satisfied all science fair guidelines.

2. Students in grades 4-5 enter as individuals.

3. All projects must be registered, signed in and set up in accordance with all deadlines to be eligible for judging.

4. It is the teacher's responsibility to inform and provide copies of these rules and guidelines to the entrants. It is the student's responsibility to be knowledgeable of these rules and guidelines. There will be **no excuse for violation of rules and guidelines by students or their parents.**

Projects

1. An investigation should clearly demonstrate the components of a science experiment as outlined in this Handbook.

2. Students in grades 4-5 should complete a scientific experiment, maintain a log/journal on the progress of the experiment and construct a display. **A research paper is not required.** However, an abstract is required for all projects.

Display

1. Display must be self-standing of reinforced cardboard, plywood, or other materials. The project cannot lean on the table, wall, or other projects. Nail, glue or tape cannot be placed onto tables.

2. Maximum area for display is 40cm deep, 122cm wide, and 100cm high.

3. The display board and log book are the only items to be displayed at the fair. The display board **must not display actual materials** used in the project; i.e., foodstuffs, seeds, crystals, etc.

4. **IMPORTANT**: Only paper and pictures should be on the display board. There should not be any other items attached to the board, such as 3-dimensional objects, vines, foam board backing, aluminum foil, fabric, lights, etc. Items other than paper and pictures will be removed. Corrugated border or paper border is acceptable. Please, no headers that attach to the top of the display board.

5. Students will remain with their display during the judging to answer questions.

6. Student and school names should be placed in the center on the backside of the display board. Students should place their name on inside back cover of their logbook.

7. The Polk County Elementary Science Fair Directors will not take responsibility for any loss of materials from the project displays.

8. The Polk County Elementary Science Fair Directors reserve the right to reject projects they deem inappropriate and remove items not in compliance.

Important!!

While it is expected that projects be neat and legible, a Science Fair project is not an art project. Rather than spending time on the appearance of the display, students should be encouraged to improve their project by conducting more research for their abstract, performing more trials, adding more details to their procedures, etc. The emphasis should be on understanding and applying the scientific process.

Please note that no items should be attached to the display board except for paper and photographs. Please do not attach any 3-dimensional items, lights, aluminum foil, fabric, etc. to the display board. School science contacts are required to screen all display boards for such items before they come to the District Science Fair. If in doubt, please remove it.

COMPONENTS OF A PROJECT

I. TOPICS

Good science projects are based on topics. These topics should be grade appropriate so that students can investigate on their own. A good way for students to start developing topics is by asking themselves questions that can be answered through measurable experimentation.

- Brainstorm for topic ideas as a class. Don't discard any ideas for now. List topics or questions just the way that the students suggest them.

- Discuss the qualities that make a topic good or poor. **Product comparisons (which brand of batteries last longest) are not eligible to compete at the district level. It is the school's decision whether or not to allow product comparisons at the school level.**

- Use a bulletin board to motivate students to select their science project topics. As students turn in a written copy of their ideas, write their topic titles and names on a strip of construction paper and display on the board. Caption the board "Our Science Project Topics." The ideas displayed on the board may spark ideas in other students.

- Have students list all the science projects that they have seen or done in the past. Encourage them to come up with a new "twist" on an old idea and not to do a project for which they know the outcome - regardless of whether they have seen or done it before. They should be learning something new.

II. PURPOSE

This component of a science investigation explains in one statement why you are doing the experiment. The purpose can best be stated in the form of wonderment or a cause and effect statement.

III. HYPOTHESIS

The hypothesis is a statement that explains what you think might happen based on general understanding of the topic. It is not a wild guess or theory.

IV. PROCEDURE

The procedure includes a quantitative list of the materials used in the investigation, a numbered step-by-step description of the investigative method used, and the identification of the experimental variable, the control, and factors that are held constant. If the experiment does not have a control (See p. 30), it should be noted in the procedure. The student should understand what a control is and why it was not appropriate for his / her project.

V. DATA

Data refers to the measurable information gathered in an investigation. These may include:

Hand Written Scientific Journal (sloppy copy or log)
Measurements (metric)
Tables, graphs
Drawings
Photographs

Drawings
Photographs

The following items should be thoroughly explained and emphasized:

- Precision in recording data
- Consistent use of uniform intervals of time
- Specific labeling of groups, specimens, subjects, etc.
- An adequate number of trials (3 or more depending on problem)
- Averaging of data where appropriate
- Use of photographs
- Appropriate graphs

VI. GRAPHS

Graphs are an organized way to display the data collected during an investigation. They enable the student to see the relationship between the variable and the results.

VII. CONCLUSIONS

Consider the analysis of the data as it relates to the "purpose" or question when forming the conclusion. The conclusion may include a statement of support or non-support for the hypothesis.

VIII. ABSTRACT

The abstract is a one-page summary to include the purpose, hypothesis, procedure, conclusion and a bibliography. The abstract must be placed in the lower left corner of the board. (A sample abstract follows this page.)

IX. DISPLAYING PROJECT

The manner in which students display their project should neatly and accurately exhibit their work and knowledge. These guidelines and suggestions are intended to give all students an equal starting point.

Maximum size for any display is 40 cm deep, 122 cm open width and 100 cm high. You may wish to indicate these maximums on overhead number 13 as you discuss display dimensions. Only paper and pictures should be on the display board. There should not be any other items attached to the board, such as 3-dimensional objects, vines, foam board backing, aluminum foil, fabric, lights, etc. Items other than paper and pictures will be removed. Corrugated border or paper border is acceptable.

At the school level of competition, it is suggested that students use 2 overlapping legal size folders. Only projects selected by schools for district level competition are required to be displayed on the large display board. No plants or animals can be part of a student's exhibit at the district level.

Important!!

While it is expected that projects be neat and legible, a Science Fair project is not an art project. Rather than spending time on the appearance of the display, students should be encouraged to improve their project by conducting more research for their abstract, performing more trials, adding more details to their procedures, etc. The emphasis should be on understanding and applying the scientific process.

Please note that no items should be attached to the display board except for paper and photographs. Please do not attach any 3-dimensional items, lights, aluminum foil, fabric, etc. to the display board. School science contacts are required to screen all display boards for such items before they come to the District Science Fair. If in doubt, please remove it.

ABSTRACT

TITLE (ALL IN CAPITAL LETTERS)

Student Name

First paragraph includes the purpose and hypothesis.

Second paragraph is the procedure, do not number.

Third paragraph is the conclusion.

Bibliography:

The bibliography should be at least three (3) sources.

Abstract must be placed in the bottom left corner of the display board.

NAME: _____

STUDENT PROJECT CHECKLIST

_____1. This project is <u>not</u> a model, a demonstration, or a product comparison.

____ 2. Can your question be answered through an experimentation process?

____ 3. Do you have a materials list?

____ 4. Can you identify the

Variable? _____

Control? _____

Factors being held constant? _____

____ 5. Could someone else set up and carry out your experiment from your step-by-step directions?

____ 6. Can your investigation be <u>measured</u> in specific metric units?

____ 7. Are you keeping an investigation log/journal?

____ 8. Have you collected data and displayed it on a graph?

____ 9. Is your conclusion a reflection of the data?

____ 10. Is your abstract in the bottom left hand corner?

____ 11. Did you include a bibliography on your abstract?

____ 12. Is your project <u>sturdy and free-standing</u>?

SELECTING A TOPIC

1. **To find a topic:**

   Read science books, magazines, newspapers

   Talk to your teacher, family members, or friends

   Visit professional people and museums

2. **Select a topic that interests you. Selecting something new may arouse your curiosity.**

3. **Select a topic that you know something about, but you want to investigate further.**

4. **Select a topic that would have results that can be measured.**

GOOD TOPICS

1. **What is the effect of the mass of the bob on the period of a pendulum?**

   This is a good topic because it requires experimentation that you can do yourself. You must use the scientific method in completing this project.

2. **How does the pH of the medium affect the reproduction rate of the yeast?**

   This topic suggest the use of an experimental method. Asking a question is a good approach toward developing your topic.

POOR TOPICS

1. **How volcanoes erupt?**

   This topic will not allow experimentation without visiting real volcanoes. Making a model that erupts is a demonstration not an experiment.

2. **Microscopes**

   This topic is too general. Telling how one works is not experimentation.

TITLES DO NOT HAVE TO BE IN THE FORM OF A QUESTION, BUT CAN BE TWO OR THREE WORDS. TITLES MAY BE GIVEN AFTER THE INVESTIGATION.

PURPOSE

The purpose can be stated:

"I wonder what would happen if _____."

or

"What is the effect of _____ on _____?"

This one sentence should explain why you are doing the experiment.

If your purpose is well worded you will have little difficulty writing a title for your project.

HYPOTHESIS

The hypothesis states what you think might happen based on the general understanding of your topic.

Here is an example:

Purpose: **I wonder what would happen to plants when exposed to different intensities of light?**

Hypothesis: **I hypothesize that bright light will affect the way a plant grows.**

MATERIALS

List all materials used in your experiment. Include what, how much, and what kind of materials you used. Keep in mind quantities are very important. Remember to use metric units.

GOOD LISTING	POOR LISTING
250 ml graduated beaker	measuring cup
750 ml water 20 degrees C	water
1-20 x 20 cm sq cake pan	container
Celsius thermometer	thermometer
clock with a second hand	clock

VARIABLE, CONSTANTS AND THE CONTROL

1. **Variable – The one "thing" you change on purpose in an experiment.**

2. **Constants – Factors that are held constant throughout the experiment.**

3. **Control – The control in an investigation is the trial done without changing the original factors. (See p. 30.) If the experiment does not have a control, it should be noted in the procedure. The student should have an understanding of what a control is and why it was or was not appropriate for his/her project.**

STEP-BY-STEP DIRECTIONS

Directions should be sequenced and clear so that anyone could set up the experiment (like a recipe). Remember to use metric units for measurements.

Examples of Good Directions

1. Add 3 mL magnesium sulfate solution to one test tube.
2. Observe the contents for 5 minutes.
3. Wear safety goggles.

Examples of Poor Directions

1. Put magnesium sulfate solution into a test tube.
2. Observe the contents.
3. Use safety equipment.

DATA/LOG

Data refers to information gathered during your experiment. Writing in a notebook is the most convenient way to keep a log. Remember this is a rough draft so do not go back and change any of your previous thoughts. Turn in your original "sloppy copy" for your log.

Your log should include:

1. **A list of all the materials you use.**

2. **Notes on all the preparations you made prior to starting your experiment.**

3. **Day-by-day notes on the progress of your project.**

4. **Data that you gather from your experiment.**

5. **Be sure that you date each entry in your log.**

QUANTIFICATION OF DATA

The data collected during the course of your experiment needs to be measurable. Scientists use metrics when making their measurements. They do not use standard measurements and then convert them to metrics. Metric measurements are required.

VOLUME	**milliliter (ml)**	**1000ml = 1L**
	liter (L)	
LENGTH	**millimeter (mm)**	**10mm = 1cm**
	centimeter (cm)	**100cm = 1m**
	meter (m)	**1000m = 1km**
	kilometer (km)	
MASS	**milligram (mg)**	**10mg = 1cg**
	centigram (cg)	**100cg = 1g**
	gram (g)	**1000g = 1kg**
	kilogram (kg)	

GRAPHING THE DATA

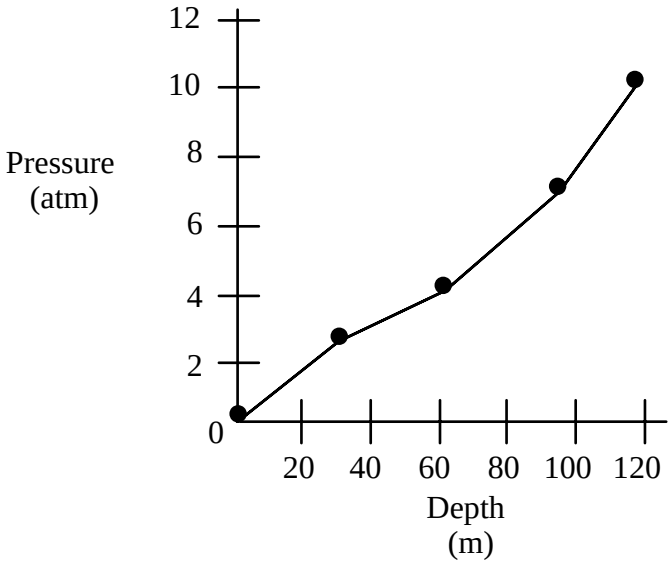
A graph is a display of data to make information easier to read and understand. Graphs are also used to make predictions. A graph should be neat and easy to read.

TITLE: The title is a short description of the data being displayed on the graph.

HORIZONTAL AXIS: Is called the X axis; displays independent data (does not depend on other data). Appropriate units displayed on the horizontal axis, i.e., time, days, weeks, distance.

VERTICAL AXIS: Called the Y axis; the measurements that happen as a result of what you changed. Appropriate units displayed on the vertical axis, i.e., growth, weight, height, temperature.

The Effect of Depth on Water Pressure



GRAPHS

BAR GRAPHS

A bar graph is used to display data that does not occur in a continuous manner.

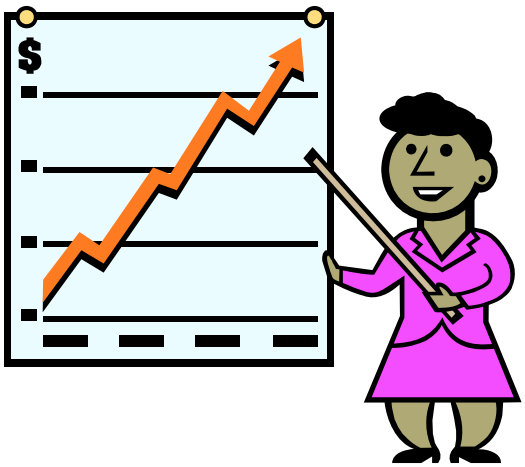
LINE GRAPH

A line graph is used to display data that occurs in a continuous manner.

REMEMBER: ALL GRAPHS MUST HAVE TITLES

Each axis must be labeled.

The graph should show the results of each trial and an overall average of those trails.



CONCLUSION

Your conclusion should include:

1. **Statement of support or non-support of the original hypothesis (not "prove" or "disprove").**

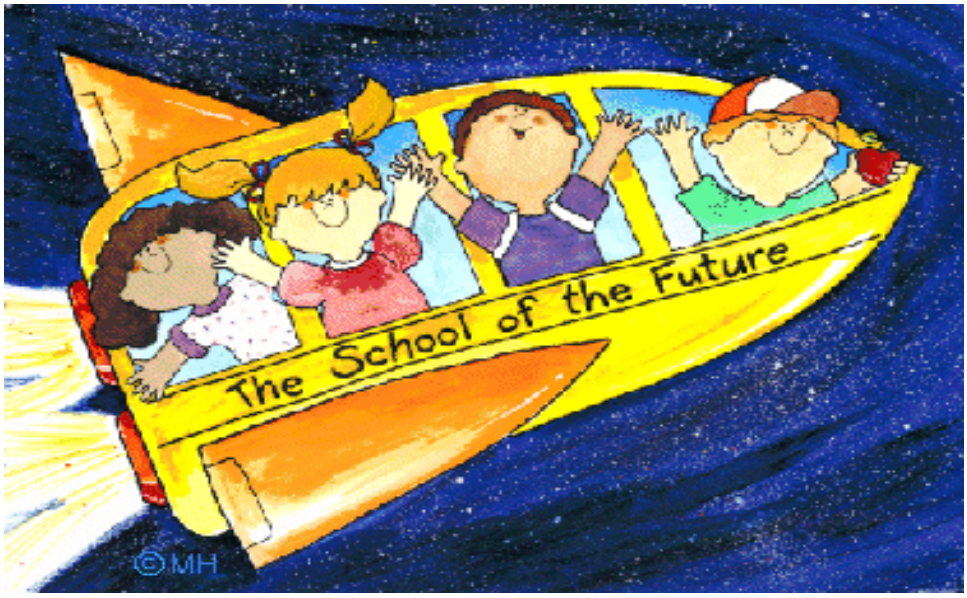
2. **Descriptions of any problems or unusual events that occurred during your investigation.**

3. **What you would do differently next time.**

4. **Additional experiments that can continue from present experiment.**

5. **Who (or what industry) could benefit from your investigation?**

Suggestions for School-level Science Fairs



Suggestions for School-level Science Fair

The goal of a school Science Fair should be to involve as many students as possible in the process of conducting a science investigation. This is a culminating activity to reinforce the skills in Strand H – The Nature of Science. (Remember, Strand H is 25% of the 5th grade FCAT Science Assessment.)

Please Note: Students must participate in a school fair before they are eligible to enter the Polk County Elementary Fair.

Participating Grade Levels

The only grades that are eligible to participate at the District Level Science Fair are Grades 4 & 5; however, we encourage schools to move towards including as many grade levels as possible in the school-level Science Fair.

Recommendation:

Grades K – 2	**Class Projects**
Grade 3	**Small Group Projects**
Grades 4 & 5	**Individual Projects**

School-level Guidelines

While projects selected to come to the District Science Fair must comply with the district guidelines, schools can determine their own guidelines for their science fair.

Example: No product comparison projects can be submitted to the District Level. However, schools might want to elect to allow product comparison projects for class projects in grades K-2 and ESE students.

Example: All projects must be displayed on a backboard. However, schools can use file folder displays or notebooks for projects. The projects being submitted to the District level can then be mounted on a backboard.

School-level Science Fair Dates

To assist 5th grade students on the Science FCAT, schools are encouraged to have their students complete projects prior to FCAT. Remember Strand H, The Nature of Science, is 25% of the 5th grade FCAT Science Assessment!!

Science Fair Contacts

Each school participating in the Polk County Science Fair must submit the name of a teacher as their science fair contact. Science Fair contacts receive a supplement at the end of the year if they meet the requirements below.

Supplement Requirements

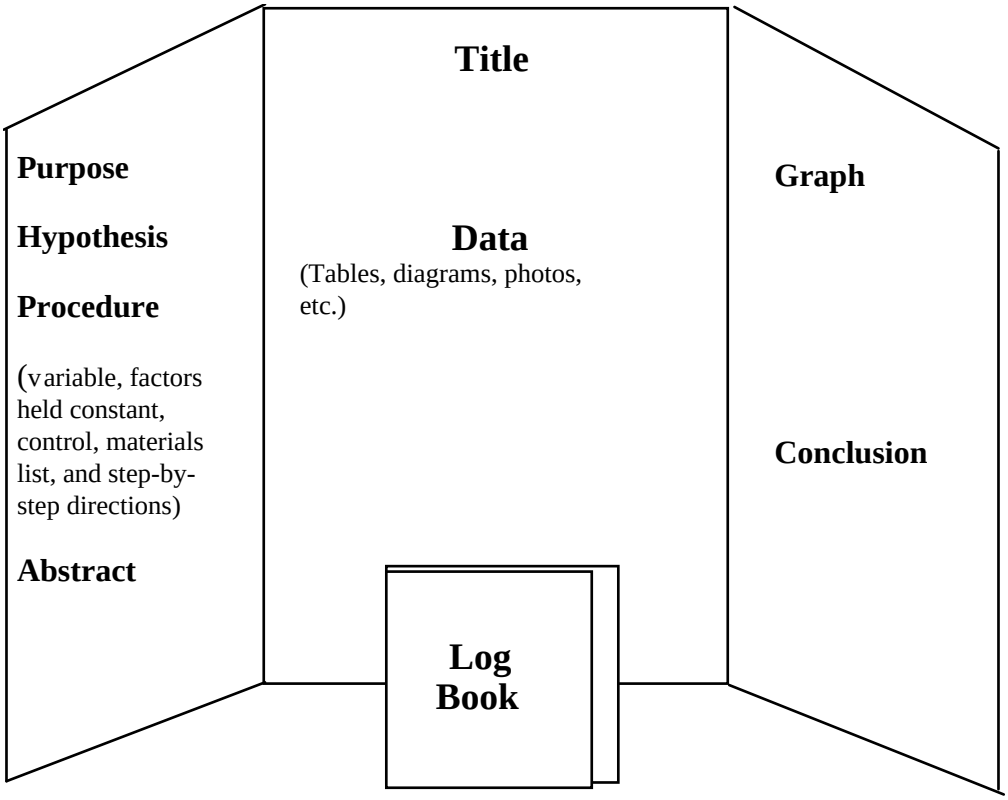
- Teacher for the Polk County Public Schools
- Attend training session (approximately 3 hours)
- Coordinate school level Science Fair
- Coordinate school's participation in the District Science Fair

Role of the Science Fair Contact

- Coordinate the school's Science Fair
- Screen projects submitted to the District Science Fair
- Coordinate school's participation in the District Science Fair
- Disseminate information regarding Science Fair, as appropriate

Originals for Transparencies

PHYSICAL DISPLAY



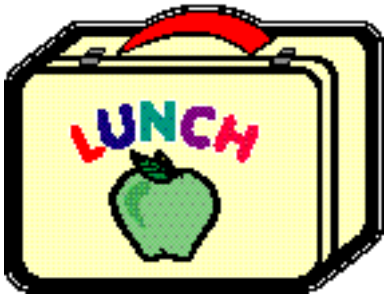
THIS IS A SUGGESTION FOR PLACEMENT OF INFORMATION ON THE DISPLAY.

THE DISPLAY SHOULD BE CLEAR AND EASY TO FOLLOW.

Only paper and pictures should be on the display board. There should not be any other items attached to the board, such as 3-dimensional objects, vines, foam board backing, aluminum foil, fabric, lights, etc. Items other than paper and pictures will be removed. Corrugated border or paper border is acceptable.

STUDENT RECORD OF SCIENCE PROJECT

Activity	Due	Done
Begin Log		
Brainstorm ideas for project		
Select topic		
Write the purpose		
Obtain teacher's approval		
Research topic		
Formulate hypothesis		
Plan your investigation		
Identify your variable		
Identify your control		
Identify factors held constant		
List and collect materials		
List step-by-step directions		
Begin investigation		
Collect data		
Analyze data		
Graph data		
Write conclusion		
Write abstract		
Begin display board		
Science project due		
Science fair		



Step-by-Step Directions

Explain how to make a peanut butter and jelly sandwich. Your directions should be clear and exact so that someone else can follow them and make a sandwich just like yours. You may want to number the steps.

Log Book

You should begin your journal or log when you are assigned this project. Everything you do or think of concerning your project should be entered, by date, into your journal or log.

Date:

Today:

RESEARCH YOUR TOPIC

You should find out as much as you can about your topic. You may use several sources that include teachers, professionals, librarians, books, encyclopedias, magazines, newspapers, videos, etc. Take notes by writing down the most important facts.

Source of Information:

_____

_____

_____

Important Facts:

_____

_____

_____

_____

_____

_____

_____

_____

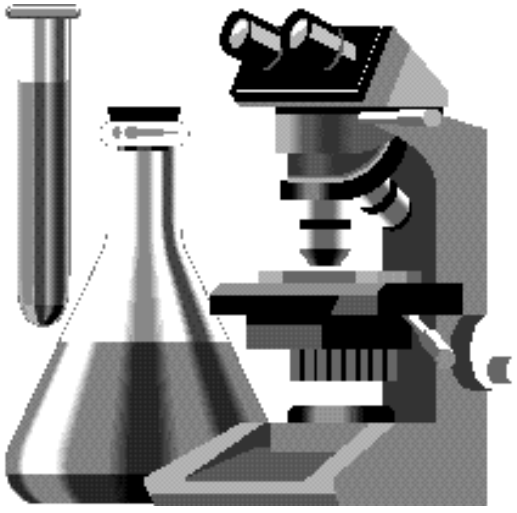
_____

_____

Materials List

List all materials need for your investigation. Your list should be exact, including how much and what size.

Poor Listing	Good Listing
measuring cup	250 mL graduated beaker
water	750 mL water
container	20 cm x 20 cm cake pan
thermometer	Celsius thermometer
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____



Variables and Factors Held Constant

When testing your hypothesis, your test must be valid. There are many variables, things that you can change or have some control over, in an experiment. You must **change only one variable** when testing your hypothesis.

Below are examples of possible science projects. The purpose is written for you. Write a hypothesis for the experiments. Then list the variable you will use when testing your hypothesis and the factors held constant.

Purpose: To find out if the number of propeller winds on a rubber band powered plane has an effect on the distance traveled by plane.

Hypothesis: _____

_____

Variable: _____

Factors Held Constant: _____

_____

_____

Purpose: To find out if, when released on an inclined plane, the circumference of the wheels on a race car will have an effect on the distance the car travels.

Hypothesis: _____

_____

Variable: _____

Factors Held Constant: _____

_____

THE CONTROL

The control in an investigation is the trial done without changing the original factors. For example, if you are investigating whether fertilizer affects the growth of plants, then the trials done without fertilizer would be your control. If you are investigating whether salt has an effect on the freezing rate of tap water, then the control would be the trials done using plain tap water, no salt. There could be investigations without a control, for example, in the fields of engineering, physics and mathematics. If you are investigating whether the number of propeller winds on a rubber band powered plane has an effect on the distance the plane travels, there will be no control. You are not going to have any trials with zero winds (this would be the absence of the variable.)

You are investigating whether soap has an effect on the number of water drops that will fit on a penny. Should there be a control? If so, what will it be?