

**West Jefferson  
Elementary  
PTA<sup>®</sup>**

***Science Fair***

Tuesday, February 7<sup>th</sup> through  
Wednesday, February 8<sup>th</sup>, 2012

Grades K - 5

**REGISTRATION AND  
INFORMATION PACKET**



# Our Science Fair Categories (11 Total):

## ***Physical Science:***

Aerodynamics and Fluid Mechanics: solid bodies moving through air or liquids

Chemistry: elements, crystals, expansion of materials, acids, bases and reactivity

Electronics, electricity and magnetism: electricity, solar power, batteries, magnets, crystal radio, radar, lasers

Material Science: properties of materials, for example absorption in diapers or comparing strength in paper towels

Physics: light, machines, motion (kinetic energy), heat combustion

Structures: bridge strength, earthquake damage, arches, ship designs

## ***Life Science:***

Human Body, Health and Human Behavior: heart rate, nutrition, disease prevention, exercise, learning, color perception

Microbiology: molds, yeast, bacteria, algae

Zoology: pet studies, nutrition, behaviors, life cycles

## ***Earth Science:***

Botany: plant growth, effects of pollution, climatic changes, lack of nutrients, insects and plants, biodiversity

Earth and Environmental Science: weather, fossils, volcanoes, earth quakes, erosion, earth currents, air pollution, recycling, water ecology, ecosystems

Many projects fall into more than one category; just try to choose the best fit. The coordinator may need to make a final decision as to how it will be placed.

## Some Frequently Asked Questions:

### ***“I don’t know anything about science. Is it still okay to enter a project?”***

Yes. The Science Fair is for everyone. Look at your project as an adventure. There are no right or wrong answers, so have fun. Don’t be afraid to research something new. It is important, however, that the project you chose will have observable results so others can understand. If you get stuck, call me. I am delighted to help.

### ***“I am an adult. How involved should I be?”***

You should help with obtaining materials, observing safety and doing tasks the student simply cannot do. Generally, if it can be done by the student, it should be. Don’t let the project be delegated to you. Also, part of science is solving the problems that arise; don’t rush in to answer tough questions or solve problems. Ask your student what he/she thinks. Have the student write about the problem in their notebook. Encourage research and ask what alternate approaches might be taken. For younger children, often the amount of handwriting involved in this process can be a frustration. Your child may type if they prefer and then paste this information into their notebook. If you type for them, be sure to use their word choice.

### ***“What if my student can’t think of a topic?”***

Science is all around us and in every part of our lives. Help your student find a topic that he/she is curious about. He or she will have a lot of questions that could be investigated and developed into great projects for the Science Fair. There are so many good project ideas available at the library or online but your child should discover the question on his/her own and use the published project only as a guideline, making the project their own.

### ***A few last notes:***

Grades K - 3 (Division I) are not required to do an experiment with their project but they may do so. Therefore, suppose your child wants to understand rainbows, this grade division can complete a research project without performing an experiment. However, they should still use a hypothesis and explain what they learned in a conclusion.

Grades 4 - 5 (Division II) are required to be present for oral interviews the night of judging on Tuesday, February 1<sup>st</sup> at WJE. Also, some teachers encourage participation in the Science Fair by offering a grade incentive in Science. Check with your teacher to see if this applies to your student.

# What Project Will I Choose?

Listed below are some topics in science. This list can help you get focused and think about some topics you might overlook. Once you narrow your idea down, visit the library or check the Internet to see what might be available in that general category.

1. I like to study things that are:
  - a. in a lab (go to question 2 - Physical Science)
  - b. outdoors (go to question 3 - Earth Science)
  - c. living (go to question 4 - Life Science)
  
2. In Physical Science, my interests include:
  - a. mixing chemicals
  - b. building electrical things
  - c. rockets, planes, balloons, flight
  - d. magnets, magnetic fields
  - e. thermometers, heating and cooling
  - f. light color, filters, illusions
  - g. sound, pitch and vibrations
  
3. In Earth Science, my interests include:
  - a. rocks, minerals, fossils, soil
  - b. oceans and sea life
  - c. stars, planets and space
  - d. weather, forecasting
  
4. In Life Science, my interests include:
  - a. growing and experimenting with plants
  - b. animals and their characteristics
  - c. the human body and how it works
  - d. microbes, fungi and molds
  - e. ecosystems: forests, mountains, polar regions, plains

Also, don't rule out inventions! You can invent add-on gadgets, recycle things, invent a method, improve on an invention or invent a game.

# Now, that you have your topic, use this project checklist to keep you on task

1. Write a Big Question that you can investigate by yourself.
2. Research your topic using books, encyclopedias, magazines, the Internet and information from professionals such as doctors, nurses, engineers, teachers, librarians and veterinarians.
3. Form a hypothesis, or a good guess about what the outcome of the experiment will be.
4. Write a step-by-step procedure to test your hypothesis. Keep in mind how much time you have until the Science Fair to complete your experiment!
5. Make a list of materials you will need for your investigation.
6. Make a lot of notes in your notebook. Judges really look at this as your scientific journal. You can paste articles in your notebook, draw pictures and charts, etc.
7. Conduct your experiment, being sure to follow science safety rules. Be sure to record all your results in your notebook.
8. Draw a conclusion and organize the results of your experiment using paragraphs, graphs, etc.
9. Construct a display that uses your Big Question, hypothesis, step-by-step explanation of your experiment, results and conclusion. Your display should be a reflection of your notebook.
10. Double check that you followed all the rules of Science Fair enclosed in this packet.
11. Fill out the Student/Parent Involvement Form with your parent(s).
12. Be proud of yourself! You did it!

# Experiment Form

**\*\*THESE STEPS MUST BE DISPLAYED ON YOUR PRESENTATION BOARD AND IN YOUR NOTEBOOK. ALL PROJECTS MUST INCLUDE A NOTEBOOK. This describes in detail how the process was completed.\*\***

Title of Experiment: (This can be the same as your Big Question below.)

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Observation: (What made you choose this topic?)

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Big Question: (What problem do you want to solve?)

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Research: (What did you find out about your subject by investigating, interviewing and gathering facts?) \_\_\_\_\_

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Hypothesis: (What is your best guess or prediction about the answer to your Big Question?)

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Procedure: (What is your step-by-step plan of how you will solve your problem or answer your question?) \_\_\_\_\_

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Materials: (List the items you needed to carry out the above procedure.)

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Results: (What data or information did you collect as measurement and/or observations? Your data can be displayed on your board in charts, graphs, tables, pictures and words.)

Conclusion: (What did you learn?) \_\_\_\_\_

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# Science Fair Rules

Check your project and display board against these rules:

1. You may NOT have names of teachers, grade level or any other identifying marks on your project, including photos of yourself. Each display will be assigned a numbered code during registration to enforce unbiased judging. After judging is complete, your name will be attached to your project for public viewing.
2. Only one entry is allowed per student and the project must be the work on the individual; no group projects will be accepted.
3. An adult may give advice and assistance during development, research and construction of the project. The Student/Adult Involvement Form must be completed, signed and included with your project. The level of adult involvement is one of the factors considered by judges.
4. Limit the size of the project to a base area of 3 feet deep, 4 feet wide and 4 feet high. It may sit on a table or on the floor.
5. Displays may NOT use electrical outlets -- only low voltage batteries are permitted in exhibits. The use of audio/visual accessories is discouraged.
6. Displays may NOT have live animals. Experiments involving the use of live animals must demonstrate and document appropriate humane treatment of these animals.
7. Bacterial cultures must be sealed.
8. Displays may not use toxic or flammable chemicals and may not have open flames.
9. Displays may not pose any physical hazards to the school, judges, other participants or viewers.
10. The school or PTA cannot take any responsibility for damage to displays. They are entered at your own risk.
11. Judges are permitted to disqualify any project that is not based on scientific premises, and no ribbon will be awarded to such a project.
12. Each display will be judged by a panel of judges. Where possible, each judge will have professional expertise in the category of an exhibit.

# The Display

1. Make a display backboard that will stand up by itself. For example, you could use a box with its top and front cut away, plywood, or three foam board or card board sheets hinged with tape. Pre-made trifold display boards are available at our school store, hobby stores and office supply stores.
2. Plan your display so that it tells the story of your project. Each step of what you did should be part of your story. Including what you learned when you researched the background of your topic can add to viewer understanding and interest. A common organizational theme for a science fair display often follows the outline you have made in your notebook and appears as such:

BACKGROUND INFORMATION / OBSERVATIONS / RESEARCH: Explain what you already knew, observed, and then learned new about your topic which caused you to ask your question.

QUESTION / PURPOSE: Explain why you are doing your project as directly and clearly as possible. Usually, this takes 1-3 sentences.

MATERIALS: Make a list of the basic materials you used in the project. This includes books and all the places you got your information.

RESULTS: Report how your research turned out. Give as much information as you can. Charts, graphs, pictures, photos, and other visual aids are very helpful.

CONCLUSION: Explain what you learned based on the results you got. Tell why you think you got these results. Explain how you answered your question, and whether your prediction was right. Remember that it is ok if your prediction is wrong, in fact, sometimes 'unexpected' results are the best kind and lead to new discoveries!

3. Make sure your name cannot be seen by the judges. Photographs should not include you or members of your family.
4. Put your project title on the front of your notebook and place it in front of your display. You can also place samples or equipment with your notebook. Expect that viewers and judges will want to handle the samples and equipment. You cannot display high voltage equipment, dangerous chemicals or live animals. Place a DO NOT TOUCH sign by messy or fragile items.
5. Fill out the STUDENT/ADULT INVOLVEMENT FORM and put it with your display. Be sure your display follows the guidelines on the SCIENCE FAIR RULES page in this packet.
6. The **next page** shows a sketch of what a display board set up on a table at the Science Fair might look like. Notice the notebook and exhibits.
7. The **following page** includes a "mini display board example" taken from actual students' projects from past years.

# EXAMPLE OF A SCIENCE FAIR EXPERIMENT DISPLAY

# THE AMAZING LIGHT BULB


## QUESTION/PURPOSE

The purpose of this project was to explain how a light bulb works. There are 2 parts to the experiment part of the project. First, I wanted to see if there would be a difference in the brightness of our homemade light bulb when we changed the filament. Second, I wanted to see what type of light bulb would burn out the quickest.


## HYPOTHESES

I thought that a 5-stranded braided picture wire would be the brightest burning filament. I thought that the steel wool filament would burn out the quickest.


the squares with the actual filament sealed in a square of plastic wrap



A. Single strand braided wire



B. 5-strand braided wire



C. Steel wool

Filaments

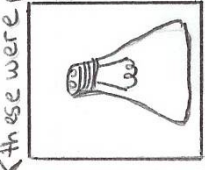
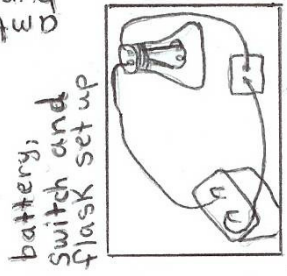
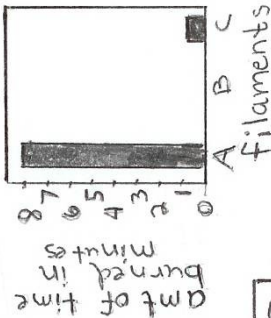
these filaments were my INDEPENDENT VARIABLES

## MATERIALS

- Switch from my "Electrowiz" kit
- 12 volt battery
- 250 ml flask
- rubber stopper with 2 holes
- 3 feet of insulated copper wire
- braided picture hanging wire

## Background Information

A light bulb is a vacuum chamber. Inside of it is a filament (a fine, thin, thread, fiber or wire) which acts as a resistor (see my notebook for definition of a resistor). When electric current passes through the filament, resistance build up until it becomes incandescent (emission of visible light as a result of being heated). All light bulbs that we see around us are vacuums. If they weren't vacuums, the oxygen in the air would combine with the filament and burn it out.



## RESULTS

The single wire strand burned the longest. After 8 minutes we shut of the switch, so I don't know how long it would have taken to burn out. The five strand braided wire did not glow at all. I knew that the current was

flowing through because I could feel the wires on the switch heat up. The thin steel wool burned out the quickest, but was brighter than either of the thin wires. We rolled a real thick piece of steel wool and this burned brighter than a thin roll of steel wool and part of it burned up like a fire

## PROCEDURE

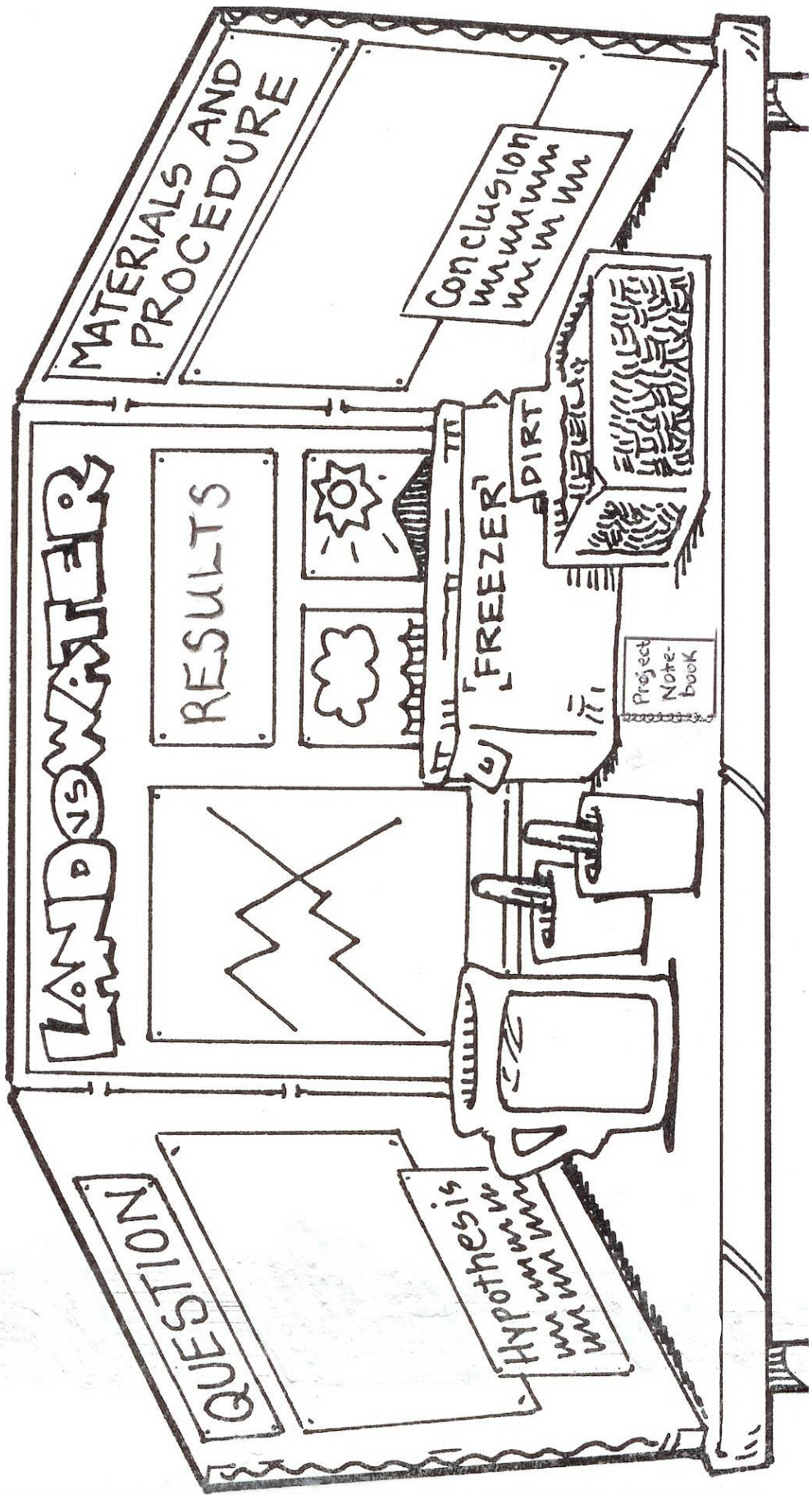
- cut copper wires into 3 sections, 1 foot each
- stripped 2 inches of insulation from one end of 2 of these wires and secured these ends into rubber stopper on flask
- the other ends of the wires and the 3<sup>rd</sup> wire were used to connect the battery and switch to the flask (see picture)
- wrapped the filaments around a nail to form coil shape
- attached filament A, B, and C, in turn, to the 2 inch section of wire hanging from the rubber stopper inside flask
- turned on switch (home made from paper clip and brad) and observed
- just for fun, after seeing how bright the steel wool burned, we experimented with different thicknesses of steel wool (but we did not report on this)

## CONCLUSION

My first hypothesis was incorrect. The thicker wire did not even burn at all. My research taught me that electric current is like the flow of water. When water is squeezed through a tighter hose, it comes out with more force. A tight hose is like higher resistance in electricity. This is why the real thin "hairs" of the steel wool burned so brightly. I was right for the second part of my hypothesis: the steel wool burned out the quickest. I think this was because it was so light (in weight).

AN IDEA FOR ANOTHER EXPERIMENT WOULD BE TO CHANGE THE BATTERY AND SEE WHAT THE FILAMENT WOULD DO!!

TABLE DISPLAY EXAMPLE



# Research/Demonstration Category Judging Sheet

PROJECT # \_\_\_\_\_ CATEGORY \_\_\_\_\_

TITLE \_\_\_\_\_

The following are the criteria by which ALL research projects are to be judged.

- |   |             |
|---|-------------|
| 1. Appearance: Neat, clean, attractive overall  | 0 1 2 3     |
| 2. Communication: The display clearly shows student's understanding of the topic researched   | 0 1 2 3 4 5 |
| 3. Creativity/Originality: In thinking and communication  | 0 1 2 3 4 5 |
| 4. Student Involvement: The more, the better  | 0 1 2 3 4 5 |
| 5. Lab Notebook: Careful record keeping that follows the student's project from start to finish. This should include all research data collected. | 0 1 2 3 4 5 |
| 6. Research Question: Purpose/problem clearly defined   | 0 1 2 3 4 5 |
| 7. Background Research: Relevant information gathered and presented in display or notebook  | 0 1 2 3 4   |
| 8. Analysis: Topic was researched thoroughly and question was answered  | 0 1 2 3 4   |
| 9. Conclusions: Clear, understandable, objective; prompted new questions  | 0 1 2 3 4   |

PROJECT SCORE (40 max points) \_\_\_\_\_

COMMENTS:

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# Science Fair Project Judging Sheet

PROJECT # \_\_\_\_\_ CATEGORY \_\_\_\_\_

TITLE \_\_\_\_\_

The following are the criteria by which ALL Mountain Area Science Fair projects are to be judged.

- |  |             |
|--|-------------|
| 1. Appearance: Neat, clean, attractive overall   | 0 1 2 3     |
| 2. Communication: The display clearly shows student's understanding of project's purpose, methods and findings   | 0 1 2 3 4 5 |
| 3. Creativity/Originality: In thinking and communication   | 0 1 2 3 4 5 |
| 4. Student Involvement: The more, the better   | 0 1 2 3 4 5 |
| 5. Lab Notebook: Careful recordkeeping that follows the student's project from start to finish: dated entries with experimental design, predictions, data collection and relevant material | 0 1 2 3 4 5 |
| 6. Research Question & Hypothesis: Purpose/problem clearly defined; hypothesis testable  | 0 1 2 3 4 5 |
| 7. Background Research: Relevant information gathered and presented in display or notebook   | 0 1 2 3 4   |
| 8. Experimental Design: Hypothesis adequately tested, dependent, independent variables properly used   | 0 1 2 3 4   |
| 9. Sample: Repeated measures of dependent variables<br>Control: Controls defined and used properly   | 0 1 2       |
| 10. Analysis: Data appropriately used  | 0 1 2 3 4   |
| 11. Conclusions: Clear, understandable, objective that follows the original research question  | 0 1 2 3     |

PROJECT SCORE (45 max points) \_\_\_\_\_

COMMENTS:

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CATEGORY RANK (1<sup>st</sup>, 2<sup>nd</sup>, or 3<sup>rd</sup> only) \_\_\_\_\_  
(Project score must total  $\geq 30$  points to place)

# Science Fair Registration Form

Return this form by **Friday, January 27<sup>th</sup>, 2012** to your teacher

Name: \_\_\_\_\_

Phone: \_\_\_\_\_

Grade: \_\_\_\_\_ Teacher: \_\_\_\_\_

Division I (Grade: K, 1, 2, 3) \_\_\_\_\_ Division II (Grade: 4 or 5) \_\_\_\_\_

My Science Fair Project will be entered in the following category (choose one):

\_\_\_\_\_ Aerodynamics and Fluid Mechanics

\_\_\_\_\_ Botany

\_\_\_\_\_ Chemistry

\_\_\_\_\_ Earth and Environmental Science

\_\_\_\_\_ Electronics, Electricity and Magnetism

\_\_\_\_\_ Human Body, Health, and Human Behavior

\_\_\_\_\_ Material Science

\_\_\_\_\_ Microbiology

\_\_\_\_\_ Physics

\_\_\_\_\_ Structures

\_\_\_\_\_ Zoology

\_\_\_\_\_ \*\*Research/Demonstration (K, 1, 2, 3 only)

\*\*This category is for any K-3 student whose proposed project involves investigation or demonstration of their topic, but does not include an experiment. Projects in this category will be critically judged at the Science Fair and given ribbons and feedback.

The topic of my science project is:

\_\_\_\_\_

The question I will answer is:

\_\_\_\_\_

\_\_\_\_\_

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Cut along dotted line and turn in top part (fill out and save this portion to remember your project!)

The topic of my science project is:

\_\_\_\_\_

The question I will answer is:

\_\_\_\_\_

\_\_\_\_\_

# STUDENT INVOLVEMENT FORM

**This form MUST accompany your display and notebook.**

**Instructions:** For each stage of the project, mark the appropriate percentage that indicates how much work was done by the student. Examples: if all the work was done by the student, mark 100%. If most of the work was done by the student, mark 80%. If there was a more equal sharing of the effort between adult and child, mark 60% or 40%. If most of the work was done by an adult, mark 20%. If all the work was done by an adult, mark 0%. If something was not done at all, mark 'Not Done'. No names please.

<b>Stages of the Project</b>	<b>Percent of Student Involvement</b>						Not Done
	100%	80%	60%	40%	20%	0%	
Thought of a Problem							
Formed a Question							
Conducted Background Research							
Talked with Experts							
Kept Lab Notebook During Project							
Designed an Experiment							
Performed the Experiment							
Wrote About Results							
Made Graphs or Tables							
Designed the Display							
Made the Display							
Used the Computer During the Project							
Learned to use Applicable Software							
Used the Computer to Make the Display							
Learned Something							
Had Fun (Remember Science is FUN!)							

Adult/parental comments on level of involvement:

How did the student pick the topic for this project? (interest, book, expert, parent, etc.)

Student Initials Only \_\_\_\_\_ Date \_\_\_\_\_

Parent Initials Only \_\_\_\_\_ Date \_\_\_\_\_