Part One	**Part Two**	**Part Three**
Daily Log	Experimental Procedure	Scientific Journal
Topic	Material and Equipment List	Display
Research	Experimental Data	Oral Presentation
Bibliography	Analysis of Results	
Experimental Question	Conclusion	
Hypothesis		

CHECK THE WASHINGTON STATE SCIENCE FAIR GUIDELINES AND FORMS

http://wssef.home.donobi.net//

CHECK OUT OTHER SITES FOR IDEAS

http://pbskids.org/dragonflytv/sciencefair.html

http://www.super-science-fair-projects.com/

http://www.all-science-fair-projects.com/

SCIENCE FAIR PROJECT PART ONE

Due January 31

DAILY LOG

The daily log contains the notes scientists keep as they do their investigation. It begins with their ideas and background research notes, continues through the listing of their observations and results, and ends with their reflections on their work.

Your daily log is like a diary. It is your chance to record the amount of thought and effort you put into your project. Since it is rough draft quality work, it may be printed in pencil, it may have spelling and grammar errors, and it may end up looking messy. Make sure the information you include is accurate. Remember you must never change or delete experimental data.

You can start your daily log at the beginning of January. Tell about what we are talking about in class. Write down what you are thinking of doing and how you feel as you get started.

Look at each step of the process for what you should be including in your daily log.

The daily log is not due until the day of the fair. You should continue making entries right up until the day you present your project.

TOP

TOPIC

Scientists look at subjects from the natural world that they are curious about. Some common subject areas include physical science, life science, health, computer science, and product

comparisons.

Your topic should be interesting to you. Talk to your friends, parents, teachers, librarians. Look at books and articles and listed topics from past science fairs. In your daily log keep track of who you talk to, what you read, and how long you spend thinking about possible topics.

I have a list of possible topics. There are books full of ideas in the classroom and in the library.

Some topics are not appropriate:

- You are not allowed to do projects that might harm humans or animals.
- You are not allowed to do projects that use dangerous chemicals.

Some topics will require that you take pictures and bring them in to share instead of bringing in the materials you used in your experiment:

- Don't bring acid, dry ice, or flammable materials to school.
- If you grew molds, don't bring them to school unless they are in sealed containers..
- If something in your project smells bad, don't bring it to school.
- If something in your project might spill and ruin someone else's project, don't bring it to school.

Write in your daily log about ideas or topics that you are considering and why they interest you.

TOP

RESEARCH

Scientists examine multiple resources—books, a variety of media and Internet sources, interviews —to find general information about their broad subject area. They summarize their findings in a written report.

You need to find at least ten current resources (interviews count double). Read your materials and take notes without copying. Put all your notes in your daily log. Also record the information for each source that you will need to complete your bibliography. If you photocopy or print out articles for your research, include those pages in your daily log, too. Don't forget to keep track of the time you spend on research, taking notes, and writing your paper.

Organize your information and write an original background research paper of 500 to 700 words. Your rough draft version belongs in your daily log. The final draft version must be double-spaced

typed on a computer at home or at school using Times New Roman 12.

Make a complete final-draft bibliography. At the top of the page write **Bibliography** centered in bold (no quotation marks and don't underline). Put your entries in alphabetical order. Do *not* number entries. Do not indent any part of the entries. Single-space entries. Double-space between entries. For each entry follow the format directions you are given exactly. You will not earn any points on your entries until they are done according to the directions.

Background research points possible __20__ **points earned** _____

Bibliography format points possible __10__ **points earned** _____

TOP

EXPERIMENTAL QUESTION

Scientists ask a specific question and do an experiment to find the answer. An experiment involves the testing of an object or theory in which one thing is changed while everything else is kept the same. Scientists measure what happens as a result of that one change.

Within your general topic, focus on a problem or question you can answer by performing a single-variable experiment.

1. Write your topic question in a single sentence that includes:
2. the object being tested
3. the variable being changed
4. what conditions will be observed (the changes you will look for)
5. how changes will be measured (time, distance, height, weight, temperature)

For example:

How does changing the storage temperature of a battery affect the length of time it will continuously operate a flashlight?

Do bean plants grow taller over time under red, blue, or green light bulbs, or under direct sunlight?

Out of wood, wool, or Styrofoam, which material insulates ice better, keeping it from melting for the longest time?

Make sure to ask yourself the following questions:

- Can I answer this question by conducting an experiment using the scientific method?
- What is the single behavior or variable I will change?
- What are the other conditions that will be kept constant?
- Will my results be easy to observe and measure?
- Do I have enough time to complete the experiment before the due date?
- Is my experiment interesting and challenging?

Record your thinking process in your daily log as you choose and refine a question for your experiment.

TOP

HYPOTHESIS

Based on background knowledge and research, scientists make an educated guess about what the answer to their question will be. This best guess is called the hypothesis.

6. From what you have learned in your research, make your best guess about what the results of your experiment will be
7. and tell why.
8. Write your hypothesis in a single sentence.

For example:

I think the warmer the battery, the longer it will last because it doesn't have to use energy to get warm.

Bean plants will grow more slowly under blue, green, and red light than under direct sunlight because plants need lots of sunlight.

I think Styrofoam is the best insulator because my mother uses it to keep her coffee warm.

Remember that a hypothesis does not have to be correct! At the end of the experiment, it's OK to find out that your best guess was wrong.

Record your thinking process in your daily log as you refine the hypothesis for your experiment.

9. The final draft versions of your question and hypothesis must be double-spaced typed on a

computer at home or at school using Times New Roman 12.

10. At the top of one page type **Question** centered in bold. Underneath write your single-sentence experimental question.

11. At the top of the next page write **Hypothesis** centered in bold. Underneath write your single-sentence hypothesis.

Question/hypothesis points possible __11__ **points earned** _____

TOP

SCIENCE FAIR PROJECT PART TWO

Due February 28

EXPERIMENTAL PROCEDURE

Scientists design their experiment and write a detailed, step-by-step description of the process of their investigation. At least five trials of the experiment are required to get valid results for the experiment.

In your daily log plan out your experimental procedure. You might want to start by drawing a series

of pictures.

Think of the object being tested as being inside the box.

(The box is the set of conditions that stay unchanged.)

which you observe and record.

1. The final directions should be a “recipe” that anyone else could read and follow to do the same experiment (3 points).

2. Explain how you will do five repetitions of your experiment (2 points):

   Simultaneous—Grow five beans at the same time under each type of light.

   Chronological—Repeat the experiment for insulation five separate times.

<u>Important notice!</u>

- You will not be allowed to do projects that cause harm to humans or animals. If you decide to use humans or animals you will need to get permission and also complete special paperwork.

- You may not bring acid, dry ice or flammable materials to school. If you use those materials in your experiment, you need to take pictures and bring the photographs to show.

- You may not bring liquid or mold in unsealed containers to the Science Fair. Anything that is messy and could damage someone’s else’s exhibit will not be admitted into the fair.

TOP

MATERIALS AND EQUIPMENT LIST

Scientists make a complete and detailed list of the materials and equipment they need for their experiment.

You might do the procedure and the list at the same time in your daily log. As you make your plan for your experimental procedure, start listing everything you will need to do the experiment.

3. In the end, you want to have a separate list that includes size, kind, and/or characteristics of each item (2 points).

4. The final draft versions of your experimental procedure and your materials and equipment list must be double-spaced typed on a computer at home or at school using Times New Roman 12 (1 point).

5. At the top of one page type **Experimental Procedure** centered in bold. Underneath write your complete directions for how to do your experiment (1 point).

6. At the top of the next page write **Materials and Equipment List** centered in bold. Underneath write your detailed and specific list of what you need to do your experiment (1 point).

Experimental procedure/

materials and equipment list points possible __10__ **points earned** _____

TOP

EXPERIMENTAL DATA

Scientists conduct their experiment and record all observations (called the data). They organize their findings in graphic form.

In your daily log design a data sheet or table to record your observations. The data sheet should include places to record the date and time of each entry, your measurements and observations, and any notes or comments you want to make. Following your experimental procedure exactly, perform your experiment and keep careful, accurate records in your data sheet. Whenever possible use numbers to show results.

Remember that you need at least five repetitions for your experiment to be valid! If one result is very different from the rest, you may need to do additional trials or provide an explanation of the discrepant results.

When you are all done with your experiments, go back to the computer to make your final draft charts and graphs.

Your final draft data sheet must have *labels* clearly showing where you will record:

1. the date and time of each entry
2. your measurements and observations

Your final draft entries in the data sheet must show:

3. accurate records of experimental results
4. records given in number form (wherever possible)
5. at least five repetitions of the experiment

Your final draft graphs must show:

6. title for each graph
7. x-axis and y-axis labels
8. your data must be clear--easy to read and understand

You must have at least two graphs:

9. one to five graphs showing individual results for the five repetitions
10. one graph showing the averages of the results

Experimental data points possible __10__ **points earned** _____

TOP

ANALYSIS OF RESULTS

Scientists explain what they did and summarize the results of their investigation. Scientists

address some of the problems they encountered, analyze information about the experimental trials, and discuss how their experiment could be improved or revised.

Look back at the notes and comments you wrote while you were performing the five repetitions of your experiment. In your daily log ask yourself questions and write out rough draft answers:

- What did I observe?
- What do my graphs/charts/diagrams show?
- What caused the results?
- What do the results mean?
- Were there any problems?
- How could I improve my experiment?

Write your final draft analysis of results

1. Your final draft must be double-spaced typed on a computer using Times New Roman 12.
2. At the top of the page write **Analysis of Results** centered in bold.

Underneath write one to three well-developed paragraphs summarizing the results of your experiment. Include the following information (2 points each):

3. Tell what happened during the course of your experiment.
4. Clearly and simply explain what you observed.
5. Explain what your graphics mean.
6. Tell about any problems you had and how you could improve your experiment.

Analysis of results points possible __10__ **points earned** _____

TOP

CONCLUSION

Finally, scientists write the conclusion, explaining the answer to their original question and telling

whether or not their hypothesis was correct.

The conclusion should include all of the following:

- State whether your hypothesis was correct—and why—and how your data proves or disproves it.
- Explain what you learned and how it relates to the background research.
- Explain the importance of your experiment and how it relates to real life.
- Make a statement about further questions you have and possible extensions to your experiment.

Thoroughly discuss the issues in your daily log. Use this chance to reveal your thought processes!

Write your final draft conclusion.

1. Your final draft must be double-spaced typed on a computer using Times New Roman 12.
2. At the top of the page write **Conclusion** centered in bold.

Underneath write one to three well-developed paragraphs summarizing your conclusions. Include the following information (1 point each):

3. State whether your hypothesis was correct and explain why it was correct or incorrect.
4. Explain how your data proves or disproves your hypothesis.
5. Explain what you learned from doing your experiment.
6. Explain how what you learned relates to the background research you did.
7. Explain why your experiment is important.
8. Explain how it relates to real life.
9. Make a statement about further questions you have.
10. Suggest possible extensions to your experiment.

Conclusion points possible __10__ **points earned** _____

TOP

SCIENCE FAIR PROJECT PART THREE

Due in March

SCIENTIFIC JOURNAL

Scientists organize all their written materials and graphics into a folder or notebook called a scientific journal. This journal represents the final written product of their research.

You have done most of the work for your project. Now you need to assemble it for presentation. Your written work goes into 3-ring folders. These represent the final written product of the science project and are comparable to the publication step of the writing process.

Your daily log will go into one folder labeled **Daily Log**.

1. In it will be your diary and all the rough draft work you have done so far.

2. You will add more diary entries right up to the day of your presentation.

All of your final draft work goes into another folder labeled **Scientific Journal**. It includes all your written work and graphics, all labeled and in order:

3. title page

4. acknowledgments

5. table of contents

6. background research

7. topic question
8. hypothesis
9. experimental procedure
10. materials and equipment
11. data sheets and graphic display of data
12. analysis of results
13. conclusion
14. bibliography

Scientific journal points possible __13__ **points earned** _____

TOP

DISPLAY

Scientists publish their work to share with peers and the public. A project display provides an attractive presentation of the student's work and helps others to learn about the experiment.

The purpose of the display is to summarize the investigation. It is important to plan out the display and arrange the items before putting it together. Completeness and neatness are important. Work with your parents to devise a logical and attractive layout that follows the guidelines:

1. sturdy and self-supporting display board
2. within size limits—30" deep by 48" wide by 108" tall
3. attention-getting title
4. lettering easily read from a distance
5. materials arranged logically--left to right or top to bottom
6. neat, clean, straight lines and edges, quality lettering

7. attractive and colorful layout and design (get parents to help)
8. include visuals and hands-on materials
9. include the following with labels:

- question
- hypothesis
- experimental procedure
- materials and equipment
- analysis of results
- conclusions

Display points possible __9__ **points earned** _____

TOP

ORAL PRESENTATION

Scientists are honored to be asked to present their findings at a conference. You will meet with judges at the Science Fair to discuss your work.

Prepare a short talk to explain your experiment. Like the display and the journal, your talk should tell the story of the experiment, and it should follow the steps of the scientific method. Greet your judge with a smile, introduce yourself clearly with your first and last name, shake hands. While giving your presentation, you should direct the judge's attention to the display, referring to each section as you explain each step. Be prepared to answer questions from your judge.

Make sure your daily log is completely up-to-date for the Science Fair.

Relax and have fun! Now is your chance to share the results of all your hard work.

TOTAL POINTS FROM JUDGES (OUT OF 50 POSSIBLE) _____

TOTAL POINTS EARNED FROM ME (OUT OF 100 POSSIBLE) _____

FINAL GRADE _____