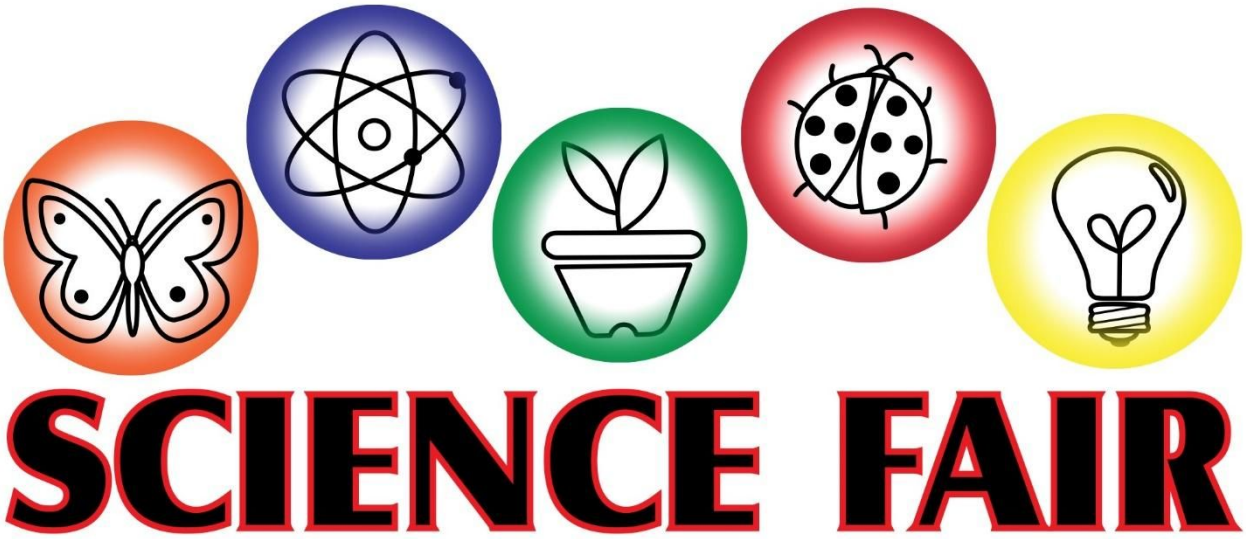


Information Packet
(high school version)

Science Projects

STEPS

1. **Topic:** Make sure it is one that interests you (not one that is easy or that you found online and you don't feel like thinking anymore). Try to answer a questions that you have been asking yourself that is testable.

2. **Problem Statement/Question:** Now, write that questions down. This is your purpose or problem question.

3. **Background:** Research the topic. If there is no research on the topic there might be research on one of the variables or the materials that you will be using for your project.

4. **Hypothesis:** Now that you know some stuff about what you are doing, make an inference about what you think is going to happen (answer your problem question). This is your hypothesis.

5. **Materials and Methods:** What data are you gathering? How will you gather it? What measurements will you be using? What will you need? Make sure you are detailed here. Can someone follow your steps and get the same results? DON'T forget your CONTROL group!

6. **Experiment:** LET'S DO THIS!! . Make sure to repeat your experiment (the more you do the more reliable your results). Try for 10-15 repetitions of your experiment.

7. **Research Log Book:** Make sure you have one! That it is set-up and that you record everything in it!!

   The research log is a day-to-day record of everything that you did in your project. It is PROOF of what you did. The logbook must accompany the report folder for the school and county science fair.

8. **Record and Analyze Data:** Make sure the data is organized (table). Don't forget your units of measure and to label and title everything. Remember to record both quantitative and qualitative data. ANALYZE: this is where you talk about the data you gathered. Apply any relevant statistical analysis (Standard deviation, standard error, chi squared, etc.)

9. **Conclusion:** Was your hypothesis accepted or rejected. Use data to support your claims mention numbers, don't just say "according to the data…" (what data?) What errors or possible errors occurred during the experiment? What would you change if you did it again. What real world applications does this experiment have?

10. **Board Display**: Construct your science fair display. Prepare your titles, charts, graphs, drawings, and diagrams. Make them large enough to see, neat, and colorful. Make sure that you have checked the size and that you don't have anything that is a choking hazard on the board (nothing 3D).

11. **DON'T** leave everything until the last minute. Ask for help!!

Project Outline/Timeline

Project Components -

- ✓ Title
- ✓ Problem Statement
- ✓ Hypothesis
- ✓ Procedures and Materials Lists
- ✓ Data Collection and Documentation
- ✓ Conclusion
- ✓ Project Display and Abstract
- ✓ Log Book

Due Dates -

- ➢ 11/02-03/17 Topics Due for Students
- ➢ 11/-16-17/17 Outline Due for Students (Research Plan)
- ➢ 12/14-15/17 Rough Draft Due for Students
- ➢ 01/09-10/18 Final Project Due

The Scientific Method: The following is a review of the Scientific Method with some key questions and directions on how to design and conduct an experiment.

Problem/Purpose

- What is your goal?
- What idea are you trying to test?
- What is the scientific question you are trying to answer? (must be answering a question or solving a problem/models are not accepted unless they are answering a question or solving a problem)

Hypothesis

- Explain how you think your project can demonstrate your purpose.
- Make a prediction regarding the outcome of your experiment.
- State the results you are predicting in measurable terms.

Research

Summarize current research being done on your topic or any other information that had to be looked up such as:

- Safety precautions
- Information about one or more components of your experiment.
- Any other information that you had to look-up (if you Googled it put it here)

Procedure

- Give a detailed explanation of how you will conduct the experiment to test your hypothesis.
- Be clear about the variables (elements of the experiment that change to test your hypothesis) versus your controls (elements of the experiment that do not change).

- Be **very specific** about how you will measure results to prove or disprove your hypothesis. You should include a regular timetable for measuring results or observing the projects (for example, every hour, every day, and every week).
- Your procedure should be like a recipe - Another person should be able to perform your experiment following your procedure. Test this with a friend or parent to be sure you have not forgotten anything.
- Must be in paragraph (narrative) form. Should be in 3rd person and past tense. Example: *The researcher placed 5ml of baking soda in the beaker with 10ml of vinegar.*

Materials

- Include all materials and equipment that were used.
- Your paragraph of materials should include all of the ingredients of the procedure recipe.
- Must be in paragraph (narrative) form. Should be in 3rd person and past tense. Example: *The scientist used 10ml of water and 5ml of ascorbic acid, each of which were placed in a 25ml beaker.*

Observations/Data/Results

- Keep a detailed **journal** of observations, data, and results. Your journal should contain data measurements and written notes about what you are sensing (hearing, seeing, or touching) about your experiment.
- If appropriate, photograph your project results or phases of the project to help your analysis and possibly to demonstrate your experiment on your exhibit board.
- Graphs for measurable (quantitative) data must be included and charts should be used to present both qualitative and quantitative data.

Analysis

- Explain your observations, data, and results. This is a summary of what your data has shown you.
- List the main points that you have learned.
- Why did the results occur? What did your experiment prove?
- Was your hypothesis correct? Did your experiment prove or disprove your hypothesis? This should be explained thoroughly.

Conclusion

- Answer your problem/purpose statement. Including accepting or rejecting your hypothesis based on your data.
- What does it all add up to? What is the value of your project?
- What further study do you recommend given the results of your experiment? What would be the next question to ask?
- If you repeated this project, what would you change?

Research Log Book

- A composition book or small spiral notebook may be used for the entries.
- The logbook should include:
  - Write in black or blue pen, NO PENCIL!
  - Each entry must be dated at the top, numbered at the bottom, and describe what was done each day.
  - Include entries describing the times research information was found and briefly describe it. Record resource information; remember it is NOT just websites.
  - Put descriptions of equipment used in entries, including any that was built.

- Place data collected in trials recorded in the logbook.
- Observations or other thoughts of the researcher must be included.
- Show calculations.
- Include contacts such as scientists, engineers, and other sources or assistance should be included.

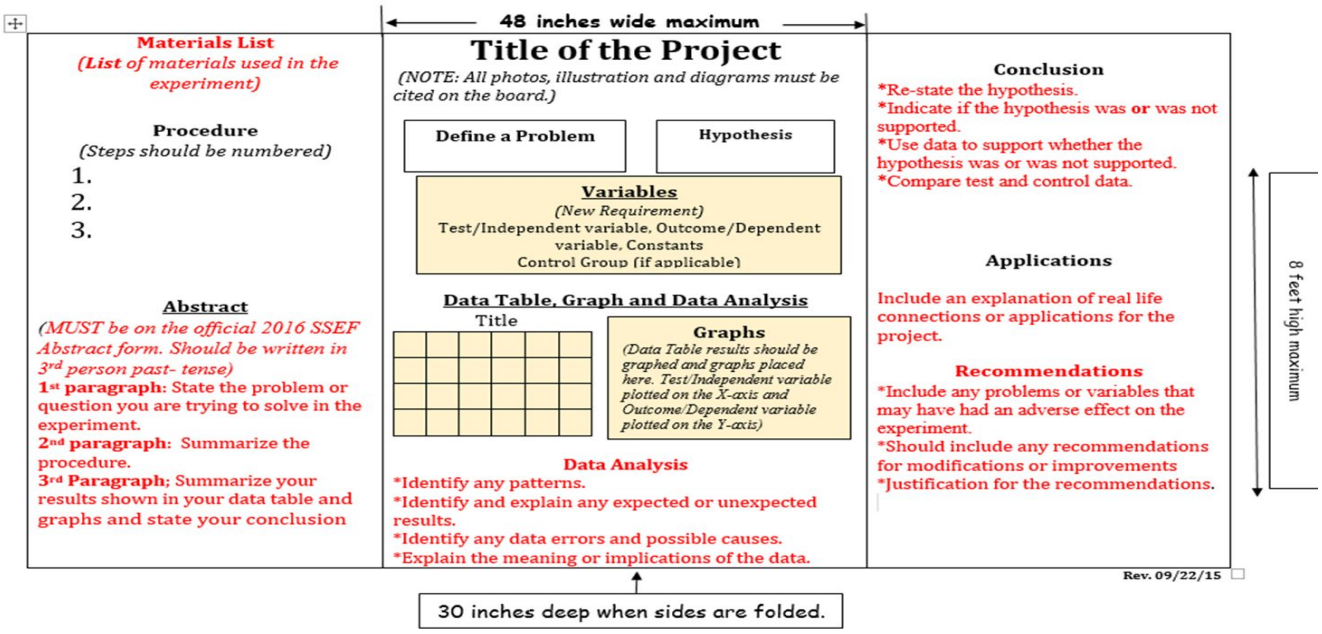
When in doubt, include it in the logbook.

*Adapted from Thia R. Thomas

Reference Page:

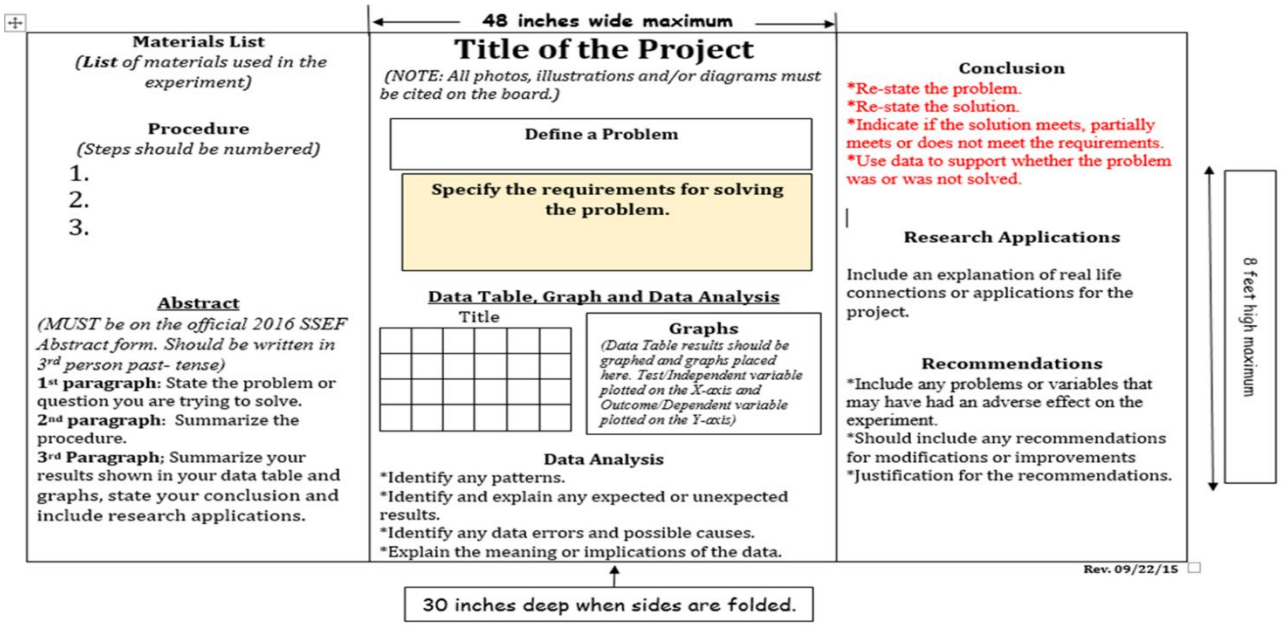
- The bibliography should list all the printed materials the student used to carry out the project. Items should be listed in alphabetical order in **APA format**.
- These website are a great place to go to find the proper way of writing a bibliography. http://www.bibme.org/ , http://www.easybib.com or http://www.knightcite.com. Also http://www.Icyte.com lets you "tag" information from Internet sources as you research.

Sample: SCIENCE FAIR PROJECT DISPLAY BOARD



*Please note that the new height requirement is no more than 4 feet

Sample: Engineering PROJECT DISPLAY BOARD



*Please note that the new height requirement is no more than 4 feet

What is an Abstract?

An abstract is a one-page, summary that gives the essence of the project in a brief but complete form — it should not exceed 250 words. Anyone who reads it should have a fairly accurate idea of the project after reading the abstract.

What *is* an Abstract?

An abstract is a 250 word summary of your work. The first thing judges see on the day of judging. It is SUCH an important document!

Paragraph #1 - Purpose of the Experiment (Background)

- Why does this study matter? Use basic current information on the topic. Start with a hook; current stats are always good.
- A statement of the problem and hypothesis being studied.

Paragraph #2 - Procedures Use (Experimentation)

A summarization of the key points and an overview of how the investigation was conducted BE CLEAR AND SPECIFIC!

- An abstract does not give details about the materials used unless it greatly influenced the procedure or had to be developed to do the investigation.
- An abstract should only include procedures done by the student. Work done by a mentor or work done prior to student involvement must not be included.

Paragraph #3 - Observation/Data/Results

- This section should provide key results that lead directly to the conclusions you have drawn.

- It should not give too many details about the results nor include tables or graphs.
- Conclusion, including statistical analysis and significance.

Bonus Tips

Don't use "I, me, we, us". Instead say "the researcher"

*adapted from SSEF 63rd State Science & Engineering Fair of Florida