The Process of a Research Experiment

1. What is it that the experiment is about? What are you investigating and why (what are your goals for the research experiment?)
2. Explain how you went about investigating it
    a. Discuss the steps you followed in designing and conducting the experiment, including your setup, the equipment and tools you used and how you used them.
    b. Use drawings or pictures as well as words to illustrate your work
3. List the data you collected
    a. Use tables, graphs, or any other charts that help organize and present your data.
4. Analyze the data you collected
    a. Does the data address your goals?
    b. Justify your results using the data
5. Conclusions
    a. What exactly did you do?
    b. What observations did you make and what are your findings?
    c. How do they meet or not meet your goals?
    d. Are the findings what you expected?
    e. Discuss the strategies you attempted in setting and carrying out your work (and how successful they were), your analysis, any unexpected results, errors, possible alternative findings, and explanation.
    f. Discuss any revisions that you think may be necessary in regard to your methods and findings.
6. Reflections
    a. What did you think of this experience?
    b. What did you learn?
    c. How did this activity help you (or not?)
    d. What were some of the issues and how did you address them?
7. Suggestions
    a. How could your results help someone (what group might be interested in knowing more about your results or could benefit from your research?)
    b. What will you try next?

Adapted from NSTA Science Scope Magazine, “Tried and True: Teaching the practice of science, unteaching the scientific method”, Summer, Volume 33, 2010.

Hints for Keeping a Project Data Book

A project data book is your most important piece of work. Accurate and detailed notes make a logical and winning project. Good notes show consistency and thoroughness to the judges and will help you when writing your research paper.

- Don't remove any pages. Simply put a line through errors.
- All pages should be numbered before any data is entered.
- All entries should be dated.
- Each new entry should begin on a separate page.
- Use more than one notebook if necessary.
- Don't put rough drafts of the research paper in the notebook.
- All entries must be legibly printed or typed.

Contents of the Project Data Book

- List of potential science fair projects
- Project title
- Experimental design. Identification of variables etc.
- Data Tables (Raw and Summary Data)
- Regular observations (similar to a diary)
- Calculations
- Graphs
- Reading notes from literature pertaining to the project, including references and citations

Documentation: The proof that the experiment was completed

- Date all entries in the Project Data Book.
- Photograph whenever possible. Photograph the progress in various stages when possible.
- If scientific equipment is used (Spectrometer, HPLC, IR, NMR,) save all print outs from the machine.
- If the project is to be a continuation from past years you must have all your old notebooks.
- The burden of proof that the project was completed is on the student. To avoid any questions as to the validity of your experiment you should document everything.