Mr. Bausback's Science Project Information and Guidelines

A science project is a chance for you to gain a better understanding of how science works through solving some problem that you may wonder about. It is a chance for you to become a scientist by experimenting and showing other people how you solved your problem. Here is an example of a project a student in my class did to give you an idea of what a good project involves and is all about. A science project involves the following four stages:

1. FIND YOUR PROBLEM: Do you ever wonder about anything? If so, it might make a good science project. Maybe you are at the beach one day and find out that it is closed because of high levels of bacteria. "Hmmmmm" - you wonder to yourself - "if this is bad for us, I wonder how it affects the sea life here?" Ah ha! Here's a problem to solve! Here's a science project! Now you just need to figure out how you're going to design an experiment to see if high levels of bacterial pollution have an effect on sea life. But..... you need to get specific. Pick a sea creature you can test. You look around and find many mussels in the area. You're on your way!

2. HYPOTHESIS: Your hypothesis is an **educated** guess on the solution to your problem. It is not the answer to your question - that's what you are going to find out through experimenting - it's an educated guess as to what will happen. Perhaps you talk to several biologists and do some research on the World Wide Web and discover that, indeed, high bacteria levels cause sea creatures to leave polluted areas. Your hypothesis might be "High levels of bacterial pollution will cause mussels to be smaller and less healthy." Just remember, an uneducated guess (your unresearched opinion) is better to leave out. It's not a hypothesis. You need to do a little background research to develop a hypothesis.

3. EXPERIMENT: Now this is where you get into the real "science" of doing your project. You must test your hypothesis for it to be a science project. You design experiments to do this. How would you test the hypothesis on the mussels? I had a student do this project, and she collected 10 mussels from five sites in Santa Barbara once a week for two months. Her collections were designed to be random selection, and she picked the day of the week to collect which coincided with the Santa Barbara County pollution reports so that she would be able to have bacterial counts.

Measurable Data: ***You must get quantitative data for your experiment.*** For example, "Three mussels were big and seven were small" is basically worthless data. It's your opinion. Big to you is small to someone else and perhaps medium to another person. To make this data meaningful, this student measures the length of each mussel in millimeters. She massed each mussel collected. She then scraped out the interior and desiccated (dried) the shells and contents separately and massed these to see if the shells varied in content according to the location of the collection. She wanted to get quantitative color data - so she picked up a color chart of oranges, which she could use to match up a color with the mussel's appearance. "The mussel is pale orange" is useless data. It's your opinion. "The mussel match color 3a on the attached color key" is quantitative data. You measured it!

Experimenting is the most critical part of your project. This is what distinguishes the great projects from the "not so great" projects. Whatever you are experimenting on - do it to many. In this example, collect many mussels on many dates. One mussel won't tell you much because living things are all inherently a little different.

4. CONCLUSION: This is where you describe and interpret the results of your experimenting. You talk about the shortcomings of your project and how you could improve or expand upon what you have learned. Where would you go from here if you were to continue? This is also where you can make your results more interesting by adding information you get from other sources on your subject. For example, you work with a mentor who is an expert in biology and find out more about bacterial counts and how they affect sea life. You search the web and collaborate with scientists around the world sharing information. The more you have learned, the greater the success of your project.

SURE SIGNS THAT YOU ARE DOING A GOOD SCIENCE PROJECT:

1. You are solving some problem you wonder about.
2. You yourself can test your hypothesis.
3. You are testing and experimenting often and continually.
4. You are interested in the problem and curious about what you will find out.
5. You have a control (ask your teacher if you aren't sure).
6. You are testing many objects in each experimental group (for better averages).
7. You keep careful records of all data collected in your testing.

8. You are collecting ***quantitative data***!
9. You are working with a mentor who is a scientist.
10. You are (but are embarrassed to admit it) enjoying doing it.

SURE SIGNS THAT YOU ARE NOT DOING A GOOD SCIENCE PROJECT:

1. You are not doing any testing or experimenting.
2. You are just looking up information about something or you are just doing a report.
3. You test, but only one object.
4. Your data is just qualitative (basically your opinion, not measured things).
5. Your testing can be finished in a weekend (good projects test over a long period of time).
6. You "project" is surveying and tallying the results.
7. You "borrowed" your science project from someone else.
8. You spend more time on the display than you do on experimenting.
9. You are doing a project that has been done by students hundreds and hundreds of times, for example "How does the color of light affect plant growth?"
10. You aren't working with a mentor or you are working with one who isn't a scientist.

OTHER RESTRICTIONS:
1. No projects on water purity, watering or fertilizing plants, or light on plants.
2. No projects, which test only humans as subjects. There are too many variables, which you cannot control (diet, sleep, genetics, habits, etc.). Ask me if you aren't sure.
3. No projects testing products (i.e.: "Which antibacterial soap works the best?")
4. No cliché projects (like which sound insulation works best, etc) Ask me to be sure.

MAY I HAVE A PARTNER?
Yes. You may work alone or with one other person who is in any of my honors chemistry classes. Carefully consider this decision. Typically, one partner does more work than the other one, and you will both receive the same project grades. Also, Mr. Bausback will not mediate any conflicts between you and your partner. Remember, you have the chance to work alone on this and it is your decision to choose and work with a partner. Also, you may not change partners or go from partners to "solo" or "join forces" with another solo person after the project proposal is presented to the class.

WHAT IS DUE WHEN?

This project is required for all honors chemistry students. Project points are earned through the term through the progress reports turned in and the final project. The project will be worth 15% of your grade each term you are in chemistry. Students with quality projects will be encouraged to enter the Santa Barbara County Science Fair, in which many prizes and honors will be awarded. There is also a chance for extra credit in doing this. See Mr. Bausback's website for details.

The following assignments will be due throughtout the project. See Mr. Bausback's website for the due dates.

All of the following have guidelines, which are posted on my web site. Be SURE to follow the guidelines so you know what is expected and how you will be graded. All of these are due when listed. Late ones will receive half credit and will only be accepted up to one week after the deadlines listed. No "Late Passes" will be accepted. If you plan to be absent on the due date, send it in with someone else.

FIRST TERM
Final project idea proposal: Students have researched ideas and have settled on one idea and found and been in contact with a Mentor by this date. Students present the idea to the class. No group or solo partner changes after this date.
First Progress Report: This report will be presented in Power Point to the class. Any changes in themes must be approved by Mr. Bausback by this date. Theme changes after this date will lose 10 percentage points on the final project.

SECOND TERM
Photo Report: You will turn in five photographs of you experimenting, working with your mentor, etc.
Final Project Display: You will bring this in to class and present it to your colleagues.