

Research Proposal Format

Below is a brief outline of the main format for a typical research proposal. Use it as a guide to determine what your specific research topic will be, and follow the timeline in order to make good, steady progress over the next year so you can finish in a timely manner with a strong, competitive project. Be upfront with students about the need to address most, if not all, of these considerations.

- ◆ ***Determine which field of science, math, engineering or computer science you are most interested in:*** it is vital that you choose to work on something that you are truly interested in and curious about. You will get more out of the research, it will be more fun, and you will have a better chance of sticking with it over an extended period of time. You will have to do literature searches into the general area of science to develop broad ideas of what is already known and what open research questions exist in a particular field of science; working with an school science faculty member, you will then begin to narrow the focus of your interests in order to develop a set of possible research questions.
- ◆ ***Proposed research question:*** this needs to be as **specific** as possible in whatever field of study you choose. Depending on which area of science you choose to work, you and your instructor will sit down to determine how realistic your topic of interest is. It is imperative early on to determine whether your research can be done at your school or if you will need to make outside contact with a research group (e.g. at a local college). You and your instructor will also have to estimate how much of a time commitment is likely to carry out your project.
- ◆ ***Brief descriptive title of proposed research:*** a direct statement of your research goal.
- ◆ ***Reason for research:*** Why is it important to find an answer to the proposed research question?
- ◆ ***Background information on your topic:*** Provide a summary of information you have found concerning your topic. Think of things like the research that has already been done in the field, questions remaining from any prior research, highlights of any theory(ies) that may exist to explain the phenomenon, etc. You must show that you have looked through the literature and have found the latest updates in your area of study. Normally people don't get funded if they are 'reinventing the wheel.'
- ◆ ***List of References relevant to your topic:*** keep a running list of all references as you work through the literature. You will be required to have this list for your final paper, and chances are you will need to go back to certain references throughout the entire research experience. This includes all textbooks, reference books, journal articles, Internet sources, private communications with teachers or professors, etc.
- ◆ ***Any hypothesis(es) relevant to your research that you are specifically investigating:*** Describe/explain main points of what you expect to happen in your research based on literature research.
- ◆ ***Resources available to you already at school:*** What equipment, library resources (such as journals, Internet availability, etc.), software, computers, and teachers/experts are going to be available to you at your school? Based on your literature research, it is important to focus on the methodologies and experimental

procedures others have already used in your area of interest. You will either be building off of what others have done or get ideas of other experiments you would like to do, but you need to think about the equipment necessary to investigate your question(s).

- ◆ ***Other resources you think you'll need to be able to proceed:*** From your literature searches, what other equipment/resources/software will you need to design an experiment? Is it affordable (are there funds available for research materials)? Again, this may limit the sophistication of your project dramatically, or even if your project is a possibility at all! Think of any universities, industrial resources or donations, medical research facilities, national labs, etc., for possibilities.
- ◆ ***Potential costs for additional resources:*** This may or may not be easy to do; your faculty advisor will help with this.
- ◆ ***Proposed experiment or simulation:*** What design will it have? What controls will be in place? How will you measure relevant quantities? What are some probable problems/uncertainties you can expect to deal with? What expected levels of precision will your measurements and, therefore, results have?
- ◆ ***Timetable:*** What are your initial projections and expectations as far as the time needed to carry out the data collection and analysis? If this is an assignment, how long do you have to complete it? If you are working independently, timetables vary tremendously from project to project and student to student, so it is difficult to develop a single plan. If you are looking towards competitions, find the dates your report would be due.
- ◆ ***Any other concerns for this research:*** Are live specimens (especially vertebrates) involved? Any possible dangers (risk of explosions, gases, fire, electric shock, radiation exposure, etc)? Basically, make a review of safety requirements that you might need to consider.
- ◆ ***After compiling and analyzing data, reach logical conclusions and write up a research report!*** This is the ultimate goal for the research – what did you learn and discover?! By working systematically and consistently through this list, the sections of your final research report will be in place. All that remains is to touch things up and put the sections coherently together for your report.

As you can see, there are many considerations and details you must think about to do sophisticated research. This is why it is so important to develop good work habits and stick to a schedule as best you can. **With discipline and good time management there is no reason why you wouldn't be able to complete a strong project.**