

# Honors Project Proposal Outline Guidelines

2010 – 2011

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Here is the format for your research project outline. Each group needs to submit a single, word-processed version of your project outline. Please include the headings listed below for each section of your outline. The group's grade for this assignment will be based on both quality as well as completeness.

Your project outline will communicate exactly what your group will be studying, what materials your group will need, who you have contacted, and when your group will be performing each planned task. (IT IS OKAY IF YOU END UP NOT FOLLOWING YOUR PROPOSAL EXACTLY, BUT IT IS CRITICAL THAT AT THIS POINT YOUR GROUP HAS THOUGHT THROUGH ALL OF THE STEPS OF YOUR PROJECT, AND UNDERSTAND ALL OF THE MATERIALS THAT ARE NEEDED. ASSUME NOTHING!!!!) Your outline should indeed outline your complete project. There should be no "to be determined" phrases. If you think there will be, you had better come in and have a discussion with your teacher ASAP!

In addition, your outline needs to be developed through research; in other words, you will not be making decisions based *solely* on *your* opinions. You will be making decisions based on the opinions of other researchers who have done similar studies to yours. This will ensure that 1) your methodology is accepted by the scientific community and 2) the data you collect will properly support your study goals.

Before your group proceeds with your investigation, your outline needs to be approved by your instructor. This approval will be given after your outline has been graded. Honors students must also have all of their ISEF paperwork signed and completed prior to proceeding with your investigation.

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## Outline Format – What A Complete Outline Should Contain:

Your outline should be organized with the following sections and parts:

### **Title**

The title should be less than ten words and should reflect the factual content of the research. A good title is straightforward and uses keywords that researchers in a particular field will recognize. An example might be "Experimental Study on Stabilizing Controls for Rotating Solar Collectors". Titles can be adjusted as your investigation proceeds – but provide your best guess at this point.

## **Purpose /Justification**

In this section, **state what your *specific* research question or topic is**. The first sentence is often a brief, concise description of your question (for example, "The goal of this study is to measure the effectiveness of difference stabilizing systems that are designed to limit unnecessary motion of rotating solar panels").

Next, **include a hypothesis**. Your hypothesis should explain *what* you expect to see and *why*; for example, "... since hydraulic braking systems are the most energy efficient way of controlling movement (Kirsch, 1997), and angle of incidence is far more important to solar panel efficiency than precise rotation (Beran 2003), it is anticipated that a passive hydraulic design will provide the most effective stabilization of the solar panels". Some investigations don't require a hypothesis, but most do. Check with your teacher if you are unsure whether or not yours requires one. **YOUR HYPOTHESIS SHOULD BE SUPPORTED BY THE RESEARCH ARTICLES YOU HAVE FOUND IN EARLIER PHASES OF YOUR RESEARCH.**

It is common for students to miss the point of this section of a paper. The purpose of this section is NOT to, for instance, discuss the history and development of solar panels. Rather, in this section you are presenting a case for your investigation – the way you intend to use the panels, how the way you are testing them is valid, why your methodology is sound, etc . . . .

Finally, provide a couple of sentences explaining how your project addresses some real issue, need, or problem. Your research project will only be meaningful if you make it meaningful by selecting an investigation that attempts to learn about something that we don't have a solution for or that we don't already know about. Eventually, the introduction section of your final report will need to develop this connection with appropriate citations from your research articles. You *do not* need to include such citations for this assignment.

## **Methods**

This section is intended to be the majority of this assignment. In this section you will provide a detailed list of the steps you plan to follow in carrying out your study. **You should include enough information that someone from another class or another school could duplicate all important aspects of your project** without needing to ask you questions, but you should take care not to include details that would not make a significant difference in the results someone else would expect to get. For example, it might be critical to note mounting angles and total area of a solar panel – but it would not be important to specify the brand of multimeter that was used to measure electrical output.

For this outline, simply list all of the steps you plan to take in a bulleted fashion.

When procedures from a lab book or another report are followed exactly, simply cite the work, noting that details can be found in that particular source (when possible, append these procedures as an appendix). However, it is still necessary to describe special pieces of equipment and a general description of the process used. This can usually be done in a short paragraph, possibly along with a drawing of the experimental apparatus. Pictures are often a critical component here. Generally, this section attempts to answer the following questions:

- *What materials will be used? How much of each material?*
- *How will they be used?*
- *Where and when will the work be done?* (This question is most important in field studies.)
- *How much data do you plan to collect? How many trials will be needed?* Typically the more the better. You will be required to statistically analyze your data by using either lines of regressions (looking for relationships between variables) or t-tests (comparing different groups of data with one another). To use these statistical tools in a meaningful way, typically at least ten sets of data are required; more is better.

Remember, your findings will need to be verified by others if it is to become a part of our larger body of accepted knowledge. **It is essential that this section contain enough information so that others can repeat your investigation in every detail without needing to ask you about it.**

### **List of Materials**

Provide a list of all materials you will be supplying, all of the materials that you expect the school's science department to supply, and all of the materials that still need to be purchased. For materials that still need to be purchased, provide the cost and vendor (where shall we obtain it?). Also, include a list of all of your contacts both outside and inside of school who have agreed to work with you. This should include other student groups. If you know some of your materials will require a lengthy lead-time to receive, consult your instructor. It might be appropriate to purchase those materials **PRIOR** to the due date for this outline. The school's science department is limited as to what it can fund to support individual projects. Keep this in mind when finalizing the design of your investigation. In other words, work within your resources.

### **Timeline**

In this section, you should spell out the major tasks associated with your procedure. This does not need to be supported by research; your timeline is an estimate of when you will be doing the various tasks that comprise your project and how long each task will take. Your instructor will be looking specifically at the duration of each of the steps of your intended procedure. Each member of your group should have a copy of the timeline. Please type your timeline as a table so it is easy to follow.

### **Data Sheet**

Using a spreadsheet or a word-processing program, design a data sheet that can be printed out and copied for your group members to use when collecting **ALL** of the data you will need over the course of your project. A good data sheet has blanks for every single thing you will need to write down each time you collect data. It should also reflect the number of total trials you plan to carry out.

## POINT BREAKDOWN:

Points will be awarded in the following manner:

### INTRODUCTION / TITLE

1. The title abides by the above guidelines: 1
2. Your specific research question or topic is stated 2
3. A hypothesis is provided for your questions 2
4. Your hypothesis is supported by research you have found 4
5. Connections of your research to meaningful issues is provided 3

### METHODS

6. A complete procedure (from start to finish) is supplied 16
7. The number of trials / test and reason for these numbers is supplied 5
8. Where and when will testing take place 3
9. There are no “to be determined” issues 5

### LIST OF MATERIALS

10. Student-supplied materials (with quantities) 5
11. CVHS-supplied materials (with quantities; students verify with your instructor first rather than just assuming CV has the materials . . . . 5
12. All materials (with quantities) that need to be purchased, complete with cost and vendor information (who will we purchase these things from?) 5

### TIMELINE

13. All major steps of your procedure are included? 3
14. There are “best-guess” durations for each step? 3
15. Individual responsibilities are listed for each of your steps? 3

### DATASHEET

16. Is it complete? 3
17. Does it reflect the number of trials the group is intending to run? 3

### OVERALL QUALITY

18. Quality of Presentation (neatness, formatting, etc...) 3
19. Absence of grammatical and spelling errors 3
20. Quality of overall writing (is in one paper, or 3 separate ones simply attached?) 3