**Log Writing Guidelines**

Logs during your sophomore year have two important goals:

1. To make you aware of cutting edge developments in science/engineering/technology.
2. To get you to interact with those ideas and practice expressing your understanding.

This guide is designed to offer you tips and examples to help you better understand the expectations that we have outlined in the log rubric. The guide is organized according to the main requirements of the log rubric: New Learning, Questions, Further Developments, and Applications.

**New Learning (The body of the paper)**

While there is no required order to the sections of a log, most logs start with information about the topic.

Things to do in the background section:

* Make sure that your explanations demonstrate that YOU have learned new science/engineering/or technology concepts. **The bulk of your paper needs to be about science and technology**. (Also, the learning should not be something that a high school student already knows.)
* Make sure that your explanations demonstrate depth of thinking. This is a math, science, and engineering class and **I want you to find out** **HOW things work**. You will likely run across terms that you have never encountered before. Don’t avoid them, but be sure to explain them.
* Connect the new science learning to its impact on society, politics, the law, and yourself. This gives your paper meaning. BUT AVOID MAKING THESE CONNECTIONS THE BULK OF YOUR PAPER. Be sure to have an introduction that draws the reader into the importance of the topic.
* Use credible sources and reference all statements that are neither opinion nor common knowledge. “science4kids.com” is not likely to be appropriate for this class. The credibility of your paper is enhanced by good quality sources from a variety of media. Look beyond websites to include periodicals, professional journals, books, etc.

Things to avoid in the background section:

* Plagiarism. Explain complex terms in your own words. If you use the term “unsaturated hydrocarbon”, I expect you to explain what it means.
* Non-academic language. A log is a formal piece of writing. Examples of non-academic writing:
	+ This occurs most often in transitions. Example: “First off…”.
	+ It can also occur with thinking out loud situations. Example: “I was trying to think of a further development and..” This is not a diary. Organize your thoughts and present the further development in polished form. Do not include the process of discovering it.
	+ It can also occur with general questions: “What do you think?” “Who can say what will happen in the future?” It’s your paper, it is not a discussion with the reader.
* Extreme language. This occurs most often in the opening paragraph and would be considered a “hook” in your English class. This is a science/engineering course and *credibility and objectivity* are important here. Example: “Everyone knows that nuclear power plants are dangerous”. Everyone is an absolute term (and would require a reference). The sentence does not lead the reader to believe that the author is being objective. Better alternatives:
	+ 72 % of the American population believes that nuclear power plants are dangerous2.
	+ Many people believe that nuclear power plants are dangerous.
* Significant inaccuracies. While you are expected to have pursued a topic that was new to you with critical thinking and depth, it is likely that you will still have questions at the end. However, a paper that looks as if very little thought has been applied (as evidenced by more than one false statement) may not be considered to be “new learning”.

**Questions**

These should be relatively easy, but don’t forget to include a few. **Avoid the obvious**. We are looking for insightful questions that demonstrate that you have been interacting with the material. Look for the answer to your question and show what is known about it.

**Further Developments**

Further developments are a statement of the direction the field is headed or an application of the idea that is not obvious. It can be new research that is happening right now. It can be your idea for an application.

Things to do in further developments:

* Do not start the paragraph with: “One way to further develop poison dart frogs is….” A further development is an L2k construct that encourages you to organize your thoughts. I would bet a frog does not think that it needs to be developed in any way.
* A well reasoned further development must have references supporting the idea.
	+ This is particularly easy if you are just reporting cutting edge research in a field.
	+ If you are proposing a new idea…. for instance…. that gene therapy be used to cure an illness, then find another illness where gene therapy was used successfully. (This is creating plausibility by analogy.) Either way, you will need a reference to support your thinking.
* Check to see if your idea has been done before. It’s okay if it has been done but make sure that you reference the prior work and explain how it relates to your idea. There are no 100% new ideas. Find the most similar work to yours and explain the similarities and differences.

Things to avoid in further developments:

* The obvious. (Obvious ideas are those that another high school student that did not do the research that you have done might have come up with.)
* Ideas that are not based in reality. (This is why you will need a reference.)
* Examples of poor further developments:
	+ I propose that we do research and find a medicine that will cure the illness. (If you were to explain exactly HOW you were going to do that, then that would be much better.)
	+ I propose that we make the technology smaller.
	+ I propose that we get more money to fund research in this area.
* The further development must not be a topic that should have obviously been covered in the background section. For a log on burns, you can’t use the treatment of burns as a further development. No discussion of burns would be complete without discussing treatments.
* Suggestions that foundations need to be created…. or that awareness needs to be raised.

**Applications**

Ideas for applications:

*Experiments* – Must pertain to the topic, and data and graphs must be included. An explanation of the meaning of the results is needed. Doing a log on conductivity in metals? Do an experiment showing how temperature affects conductivity. Include images of your experiment as evidence.

*Projects* – Build something related to your project. Doing a log on hydraulics? Build a simple hydraulic apparatus. Doing a log on turbines? Build a simple steam turbine. Include images of your experiment as evidence.

*Interviews* - The interview must be with a professional or someone that would be considered an expert on the subject matter. Give the credentials of the person to establish credibility. (What is their occupation? What degree do they hold.) Avoid family members and friends unless they are employed in the field. A transcript must be included.

*Proposed Experiments* – these should be used sparingly as they are extremely difficult to get correct. They must comply with all of these requirements:

* The experiment must be plausible and cannot be a simple statement saying “do more research”.
* The experiment needs to be something that could not feasibly have been done by you in the 2 week time period. (If you could have done the experiment, you are expected to do the experiment.) It may also be that the materials are not reasonably obtainable by you or your teacher. (Ask me. Sometimes you may be surprised what we can get.)
* A hypothesis, independent variable, dependent variable, appropriate control and constants must be identified and a step by step outline of the study must be provided.
* The experiment should not be obvious and the results should provide significant insight into the field of study. Explain why the experiment is important and what information would be learned that is not already known.

Things to avoid in applications:

* Surveys of your friends and family.
* Interviews of individuals that have no expertise in the area.

**Topics that are off limits**

There are a few topics that are off limits. These topics, while very interesting, are more likely to cause you to avoid new learning in science/engineering and are more likely to tempt you into surveying your friends. Avoid them at all costs.

* Psychology topics (dreams, anxiety, sleep, education, etc.)
* Sociology topics