**Science Fair Project**

**General Requirements**:

* You will have 19 weeks to complete this research project.
* You will work either independently or in groups of two. You will have an opportunity to work on the project during school. However, you will be required to work on the project outside of school. If you are working with someone, consider a classmate that lives close to you or someone that you can easily work with out of school.
* Each group is required to submit one project proposal. A project proposal document can be found in this packet. Complete the sheet and return it by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* You will be required to assemble a tri-fold display. Guidelines and suggestions on how to arrange information on the display are contained in this packet. Your poster display is due \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* You will be required to give a five-minute oral presentation on your research project in front of the class and in front of people. (like in the Living Museum)

**Project Description**

* You must use the scientific method to collect original data to solve a problem. You will be required to clearly state your problem and hypothesis, execute a controlled experiment, present and analyze the data and form a conclusion based on the findings of your research. You should perform a research project to:
	+ Analyze a system or find out what happens if its altered
	+ Engineer or invent something new
	+ Conduct an experiment to test an effect
* Your project should be any type of research that involves collection of original data that leads to discovery. Follow these steps to complete the project.
1. State the Problem. What do you want to discover? What is the objective or purpose of your experiment? Choose something that interests you, something that you have always wanted to learn more about. State the problem you hope to solve in the form of a question. For example, Does soil pH affect tomato plant growth? Does studying with music help students perform better on an exam?
2. Complete Background Research. Research the problem you intend to answer. Have scientists tried to conduct similar experiments? What were their findings? What are known facts about the topic you are researching? Be sure you record your sources of information. You will need to provide a Bibliography of sources you used.
3. Form a hypothesis and why you are making that hypothesis. Use information you collected during the background research to make an educated predication.
* The format for a hypothesis should be: “I predict…. Because…”
1. Design and perform a controlled experiment. You must conduct a controlled experiment, manipulating only one variable, or the factor you are testing, at one time. In this section, there are many elements you must identify and describe:
* The materials you will need
* The independent variable, the factor you are going to manipulate or test in your experiment
* The dependent variable, the factor you are measuring
* All other elements of the experiment, the controlled variables, that are kept constant between test groups
* In most experiments, you will need to design a control group and experiment group(s). The experimental group(s) will receive the independent variable and the control group will not. For example, if I am studying the effects of soil pH on tomato plant growth, I would design experimental groups with tomato plants growing in acidic or basic soil. The control group would have tomato plants growing in neutral soil.
* You must determine the sample size. The sample size should be large enough to reduce error and improve the reliability of your experiment but small enough so you can maintain and organize data.
* You must write the step of the experiment with enough detail so that another person could duplicate your experiment with ease.

\*\* When engineering a solution to a problem, you will not identify variables. Instead you will build a prototype or model of the solution to the problem. You may have to rebuild and retest your model until you are satisfied with how it solves the problem.

1. Organize and Analyze Data. The result section should contain raw data. Raw data consists of actual measured vales recorded during the experiment. Use tables to present this information. All tables should have descriptive titles, and they should show the units of data entries clearly. The data section should also contain any graphs that are required. This is an effective method for communicating experimental results. All graphs should have descriptive titles. These titles should tell what the graph is intending to show. Each axis of a graph should be labeled with the variable and units. If making a graph by hand, use graph paper and always label graph coordinate lines so that it is easy to see how many units each division represents. Alternatively, you can create a graph using a computer program. A figure legend should accompany all tables and graphs. A figure legend is a brief statement (1-3 sentences) about the general trend of the table or graph.
2. Conclusion. This is the interpretation and conclusion of your research project and should include the following:
* What are the major findings of the experiment, what do they mean and how do they relate to the objective/purpose of the experiment?
* How do the major findings relate to your hypothesis?
* What did you learn? What do the results mean? Do the results contradict or agree with previous experiments of known facts? Do the results of you experiment change your views on the topic you researched?
* You should also include any recommendations that you feel would improve the experimental procedure. If you have any further investigations that might be suggested, you should also include them here.

**Timeline**:

Week 1-2 of the project

* Research possible project topics. What interest you? Explore biology, chemistry, physics, environmental, social and/or political issues. Narrow your choices down to five possible project topics.
* Submit Project Proposal. You should choose a topic and use the project proposal to draft the framework of your project. You should decide on the research problem and general method of the experiment.
	+ Due: **December 19th**
* Began Background Research

Weeks 3-6 of the project

* Finalize your research. All background research should be completed. You will need to have at least ten sources.
* Begin a rough draft of a Sources. Use APA format. Visit <http://owl.english.purdue.edu/owl/resource/560/02/> for help with proper citation format.
	+ **Rough Draft Due: January 30th**
* Gather Materials. Collect any materials you may need to complete your project (including materials needed to perform your experiment.)
* Design a controlled experiment. Design the experimental method. Identify all variable and test groups and determine how you will collect data.

Weeks 7-9 of the project.

* Perform the Controlled Experiment. Conduct your experiment. Some may need to begin their experiment earlier, others may be able to begin their project later. **But keep in mind it is better to begin the experiment earlier in case your experiment has significant flaws and you need to adjust your method.**

Week 10-15 of the project.

* Organize and Analyze Data and Draw a Conclusion. Organize your data into tables and graphs. Write figure legends for each table and graph you create. Begin writing a conclusion, using the guiding questions to help you.
	+ Rough Draft of Conclusion Due: **April 2nd**

Weeks 16-17 of the project.

* Purchase a Tri-Fold Display. The board should be approximately 36 X 48 inches. Obtain any other art supplies (glue, cardstock, markers) that you may need.
* Compose the finishing products of your project. Type up the different portions of your project that you will display on your board (i.e. background research, tables, graphs, conclusion, etc). Most of these elements should be already written in the guide. Double check spelling and grammar. Make sure the font is large enough. A person should be able to read your written pieces 3 – feet away.
* Organize the display board. Use your creative skills! The display should be organized and pleasing to look at. Consider using some bright color; they will help attract attention to your display. Also consider displaying models or materials from your project. You must receive prior approval from a teacher if you are going to display live animals.
	+ Tri-Fold Display Due: **April 16th**

Week 19 of the project

* Prepare and practice your oral presentation. Share the responsibility of the presentation equally among group members. Create notecards if needed.
	+ Oral Presentation Due in front of class week of **April 27th**

**In May we will present our projects during the Living Museum.**

Research Project Proposal Form

Due Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Group Members:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The topic of my/our project is:

The problem I/we are investigating:

Write a short paragraph explaining your experimental design. You will need to identify your variables and describe your method.

List any resources you have found so far to be helpful in your project.