**Aaron Cohn Middle School**

**Student Science Research Projects &**

**Science Fair Competition**

**Guidelines & Information**

 **Aaron Cohn Middle School Columbus Regional**

**Science & Engineering Fair Science & Engineering Fair**

 **December 3, 2019 January 2020**

**\*Do not begin any experimentation until approval has been received! This may disqualify you from the regional fair!**

**For questions, please ask your Science teacher or contact:**

**Science Fair Coordinator: Diane Carr**

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**Scientific Inquiry Process: A Brief Overview**

**QUESTION OR PROBLEM STATEMENT:**

A purpose or question or a problem to solve. The question must be answered by using the scientific inquiry process and not just a report based on what is already known.

**RESEARCH AND RESEARCH SUMMARY:**

Begin by searching for key terms related to your topic. Allow yourself enough time to conduct adequate research on your topic in order to be able to propose a logical and well-written hypothesis. Your research should be well rounded – books and personal interviews are options in addition to internet resources. Plan to have at least 5 resources. To write a good summary, identify what information is important and condense that information for your reader. The better you understand a subject, the easier it is to explain it thoroughly and briefly.

**HYPOTHESIS:**

Based on research, past knowledge and experiences, investigators are then able to propose a feasible outcome or answer to the question being investigated. This prediction is stated as the hypothesis to be tested. The hypothesis may either be supported by the results of the test or it may be rejected based on the data obtained.

***Example Hypothesis:***

*If a baking soda solution is added to bean plants then the plants will grow better because the baking soda will carry more oxygen to the roots.*

**CONTROLLED EXPERIMENT:**

The hypothesis is tested by the means of a controlled experiment. This type of experiment includes a control group which serves as the comparison and the experimental group in which only one factor is being manipulated. All the other parts of the experiment are identical in every way.

***Example of Controlled Experiment:***

*In the case of the bean plants being watered with the baking soda mixture, some plants would not be watered with the baking soda mixture and those would be the control plants. Then some of the plants would be watered with the baking soda mixture and those would be the plants that would help test your hypothesis. All the plants must be treated the same in all other respects: kind of pot, soil, water, temperature, light, etc. Using many plants for each group and taking pictures as changes occur are highly recommended.*

**IDENTIFY VARIABLES:**

As you begin to plan your experimental procedure, determine what factors need to be controlled and what exactly you are testing.

**MATERIALS AND PROCEDURE:**

The materials list includes all materials required to run the experiment with correct names for all instruments as well appropriate amounts needed where appropriate. The procedure should be complete and thorough. It includes all the steps necessary to run the experiment. It is written so that any person could follow it and duplicate the experiment exactly.

**EXPERIMENT:**

All experiments should have more than one sample per test. A minimum of five samples is the industry standard for science experiments, but the number of samples in any study depends on the question and how accurately it will be answered.

**DATA:**

Your observations, whether quantitative or qualitative, are typically best displayed in data tables. Use appropriate units as needed. Graphs should be labeled correctly and display information in an appropriate format

**CONCLUSION:**

The conclusion includes a restatement of the question as the purpose for the experiment. It includes whether the hypothesis was supported or rejected, data to support the conclusion about the hypothesis, any errors that occurred during the experiment, and finally interesting questions that your results lead you to ask.

**Required Forms for Science Fair**

The following forms are required for ALL projects submitted for science fair competition and ***MUST BE COMPLETED PRIOR TO BEGINNING THE EXPERIMENT***:

* **Form 1** – Checklist for Adult Sponsor
* **Form 1A** – Student Checklist
* **Research Plan**
* **Form 1B** – Approval Form
* **Form 3** – Risk Assessment Form

**Additional Forms**

The following forms MAY be required depending upon the type of project being done, level of risk of the project, etc.:

* **Form 1C** – Institutional/Industrial Setting *(ONLY if doing research in one of these facilities)*
* **Form 2** – Qualified Scientist
* **Form 4** – Human Subjects
* **Form 5A** – Vertebrate Animal *(NOT being done in a Regulated Research Institution)*
* **Form 5B** – Vertebrate Animal *(BEING DONE in a Regulated Research Institution)*
* **Form 6A** – Potentially Hazardous Biological Agents *(includes potting soil)*
* **Form 6B** – Human and Vertebrate Animal Tissue

**All forms are available on the following website and must be completed via the computer and printed. No handwritten forms will be accepted!**

<https://www.georgiacenter.uga.edu/sites/default/files/gsef-2019-required-forms-approvals.pdf>

<https://student.societyforscience.org/intel-isef-forms>

**Writing the Hypothesis and Purpose Statement**

When writing your hypothesis you state how you believe that the independent variable will affect the dependent variable and why you believe that to be. It is normally one sentence that states what you think the answer to your topic question is based on your research. If the independent variable is changed then the dependent variable will be, because of this reason.

**Example Hypothesis:**

***IF*** *the temperature of the air in a balloon is increased,* ***THEN*** *the balloon will expand,* ***BECAUSE*** *of the increased speed of the molecules take up more space.*

**Independent variable:** The variable or factor that you change

**Dependent variable**: What are you measuring for, what change(s) do you expect to see?

**Purpose Statement:** Why are you conducting this experiment? What do you hope to accomplish? A good start to a purpose statement is “The purpose of this experiment is to determine\_\_\_\_\_.”

**Materials and Writing your Procedures**

A scientist will list all materials needed to conduct his experiment, along with the amounts needed and the specific procedure to follow. When writing your steps, be sure to list everything – don’t be vague or omit anything just because it should be common sense.

**The Project Notebook (logbook)**

Review the following webpage prior to beginning:

https://www.sciencebuddies.org/science-fair-projects/project\_laboratory\_notebook.shtml#usingalabnotebook

This is your most important work – it contains EVERYTHING from the very beginning to the end of your experiment, essentially it’s a timeline.

* + Dates and amount of time you worked on the project
	+ Research information
	+ With whom did you work?
	+ Who gave you assistance?
	+ Explain what you did.
	+ When you do the experiment, record your results in the log book.
* It must be written in black ink only. If you make a mistake, just draw a line through it.
* Do NOT tear out pages.
* The log book should be a standard composition book.

**The Abstract**

The abstract is a short summary of your project. It should tell the purpose, procedure, results, and conclusion of your experiment. The abstract should be 250 words or less. Less than 150 would probably be too brief.

This is the form by which your project will originally be judged. It is very important that it is thorough

The abstract must be typed online in the form box provided.

Following is the format of the information that should be included in your abstract.

• Write a sentence that makes a broad statement about your topic of research.

• Write the next sentence or two on your more focused topic question.

• Write several sentences indicating the problem to be solved and the hypothesis.

• Write a very brief statement as to what you did (procedure).

• Write a brief statement as to your observations (data).

Write all of the above information in paragraph form. Make sure your display board copy is in much larger font so it is easily readable by the judges. Projects selected to compete at regional competition should have an acrylic sign holder in which to display their abstract (regional competition form will be provided)

**The Display Board**

The display board is a standard size tri-board and stands on its own. It includes all of the above parts, suggested order (left to right – Research Question, Introduction, Abstract ?, Hypothesis, Materials, Procedure, Data table, Graph, Conclusion, and Bibliography).

Title is on the center portion of the board or you may place it on an additional title piece which are available where triboards are sold, but these are not required.

The board should be well laid‐out, attractive, and easy to read. Name and teacher is labeled on the back top left corner of display board. Photo credits are given.

Abstract must be displayed separately and vertically either in a page protector or a clear photo frame. It must be displayed vertically.



Suggested layout: