How to Prepare a Science Project
A Guideline for Parents & Students

Nautilus Middle School

Tomorrow’s Earth is
Today’s Responsibility

THINK GREEN

STEM

SCIENCE FAIR

2016-2017
Nautilus Science Dept.
Nautilus Middle School, J. B. World School
Miami Beach, FL 33140

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Mr. Rene Bellmas, Principal
A Guideline for Parents & Students

All students will participate in Nautilus Middle School Science Fair.
Student projects are to be prepared for competitions in
Regional Science Project & Engineering Fair,
SECME Olympiad,
Fairchild Challenge,
Dream in Green WE-LAB
e-Cybermission Competitions

All projects are required to have a
1. Research Plan
2. Summary
3. Abstract

Required categories & resources for one project to be submitted:

2017 STEM EXPO:

1. Science Project & Engineering Fair
The three competitions of the Science Fair (SFRSEF) are:
   • The Poster Project
   • The Research Paper
   • The International Bridge Building Competition
   •
   http://science.dadeschools.net/scienceFair/default.html
   http://stem.dadeschools.net
   http://stem.dadeschools.net/initiatives.html
   www.sciencefair-projects.org

2. 2017 SECME Olympiad Competitions
   http://science.dadeschools.net/secme/aboutOlympiad.html

3. e-Cybermission Competitions
   http://www.ecybermission.com/About

4. The 2016 Fairchild Challenge
   http://www.fairchildgarden.org/education/TheFairchildChallenge/overview/
   http://www.fairchildgarden.org/education/TheFairchildChallenge/showcase
   http://www.fairchildgarden.org/education/TheFairchildChallenge/frequentlyaskedquestions/
How to prepare a Science Fair Project

1. **Select a Topic:** Choose an interesting topic. Research Internet. Talk to teachers & parents.

2. **Research:** Investigate research through Internet, Libraries, science journals, and magazines. Contact experts and companies. Do not plagiarize or simply copy write-ups.

3. **Purpose & Hypothesis:** The purpose is a description of the problem & what you will do. The hypothesis is an educated explanation of what will happen.

4. **Experiment:** Plan and organize your experiment. List materials and write out your procedure. Keep careful records of data in your science journal.

5. **Research paper & Research Plan without Data/Results - Summary on completion:** This report will provide interested readers with comprehensive information about topic. It should include data collected and a description of experiment, data, and conclusions. Include Abstract and cite sources (at least 10).

6. **Exhibit:** There will be a peer review presented in a Power Point Presentation to student classes. This is the visual display of your project. Use computerized graphs, charts, and tables, in clear legible lettering.

7. **Judging:** Plan how you will present your project visually and informatively.

**Science Fair Projects - Environmental and Engineering Topics.**

**Science Fair Categories** – Projects focus on the environment and engineering, encouraging students to investigate environmental issues and concerns.

(Categories for Science Fair Projects consist of Biomedical & Health Sciences, Cellular & Molecular Biology & Biochemistry, Chemistry, Earth & Environmental Sciences, Engineering, Environmental Engineering, Intelligent Machines, Robotics & Systems Software, Mathematics & Computational Sciences, Microbiology, Physics & Astronomy, and Plant Sciences)

**Suggested site for resources & Step by Step process:**

http://www.ecybermission.com/MissionChallenges

Mission Challenges
- Alternative Energy Sources
- Environment
- Food, Health & Fitness
- Forces & Motion
- National Security & Safety
- Robotics
- Technology
Future City Challenge Resources for environmental concerns, including agriculture, climate change, Greenhouse, hydroponics, Biosystems & Agricultural Engineering
http://futurecity.org/all-resources

Checklist

_____ Aug-Sept 9  Week 1-3  -Identify your topic and your purpose.
Use library & Internet to research topic.

_____ Sept 16   Week 3-6  -Plan experiment and collect materials.
-Conduct your experiment, collect data, state results.

_____ Oct 7     Week 7-8  -Analyze results & data. Make your conclusions.
-Write research paper and abstract. 10 Sources.

- Present as a Power Point to Class

_____ Oct 14    Week 9  - Build display. Build & Tweak display
-Practice presentations for judging.

- Completed & Corrected (TYPED) Research Plan

_____ Oct 28    Week 10 -Science Fair Exhibit in Media Center
-Include Summary of Science Fair Project

Winners are REQUIRED to compete in 2016 STEM EXPO- Regional Competition.

Projects Deadline Due BY Oct 28, 2016

Projects need to be turned into your Science Teacher on time in the form of required science display and research plan.

How to Prepare a Science Display- Graphs and Charts

Three competitions in the South Florida Science and Engineering Fair:
1. The Poster Board Project,
2. The Research Paper, and
3. The International Bridge Building (new rule- 5 bridges can be entered)

Daily logs of observations provide data collected and information organized in visually pleasing, easy to understand charts- in the MIDDLE OF THE DISPLAY.

Line or bar graph should be appropriate for the data analysis.

Refer to: Microsoft excel

- www.nces.ed.gov
- www.explorelerning.com

Collecting and Recording data for Science Fair Project

- Use a science journal for measurements and observations.
  o Always date your entries and observations.
  o Accurate measurements should be in metric terms.
- Keep track of materials used, quantities, and cost
- Consider digital photographs & graphs in paper and display.
- ABSTRACT will be placed on lower left of Display.
NAME NEEDS TO BE PLACED be on the BACK of the display
Place name on back with teacher’s name.
Do not attach products or specimens to the board.
This is a poster display Science Fair Project.

Science Display Presentation

Glossary of Terms

**Topic** - Subject of interest to be explored.

**Background research** - Learning about the topic through library sources, Internet, Science magazines, television (i.e. Discovery, Nat’l Geographic, NOVA, Science Channel, GIZMO at [www.explorelindexing.com](http://www.explorelindexing.com), Ocean Conservancy)

**Problem Statement** - The specific problem to be investigated, state this in the form of a question.

**Purpose** - State about what will be discovered during the experiment.

**Hypothesis** - Educated guess predicting the outcome of experiment.

Your experiment will either support or not support your hypothesis.

**Experiment** -

1. **Materials** – complete list of all items used in experiment.
2. **Procedure** - Step by step, instructions describing experiment. Steps should be explained so the experiment can be duplicated.

**Manipulated/ Tested (Independent) Variable** - Variable that causes change, starts the experiment, & first thing allowed to change

**Outcome (Dependent) Variable** – Variable that may, or may not, be changed as a result of the experiment. It is the variable observed at the end of experiment

**Controls** – Controls do not cause change during experiment, used for comparison, validating the experiment.

**Constants** (are not controls) - factors and items in the investigation that remain the same in all trials.
International Baccalaureate Design Cycle

MYP technology is based on a model of learning that incorporates knowledge, research, skills and design principles in problem-solving contexts, while at the same time maximizing the use of local and readily available resources.

The design cycle connects to real life situations.

When organizing and planning their work, students should follow all four elements of the design cycle. In the early stages a stronger emphasis is given to creating a product/solution, but as experience with the design cycle progresses, investigating, planning and evaluating will also be addressed. The process is rarely a simple linear progression. It involves critical analysis, reasoning and problem solving.

The Design Cycle

The four elements of the design cycle illustrated:

1. Investigate
2. Plan
3. Create a product/solution
4. Evaluate
Resources for ideas and research

To be attached to the back and included in report, at least 10 sources need to be cited.

Science Fair-  
http://science.dadeschools.net/scienceFair/default.html
http://stem.dadeschools.net/initiatives.html  
www.sciencefair-projects.org

SECME Olympiad Competitions  
http://science.dadeschools.net/secme/aboutOlympiad.html

The 2014-2015 Fairchild Challenge  
http://www.fairchildgarden.org/education/fairchildchallenge/middleschool
http://www.fairchildgarden.org/education/TheFairchildChallenge/overview/

e-Cybermission Competitions  
http://www.ecybermission.com/About
http://www.ecybermission.com/MissionChallenges

Hundreds of Science Fair Projects for Middle School Students  
www.all-science-fair-projects.com
www.sciencefair-projects.org  
www.science-ideas.com/middle-projects.htm
parentingteens.about.com/od/sciencefairprojectideas/a/projects27.htm

Science Fair Project Idea Water Topics Middle  www.sciencefaircenter.com

Environmental Science Fair Projects  

Students for the Environment / US EPA  
http://www.epa.gov/students/

Kids Gardening- Resource of National Gardening Association  
http://www.kidsgardening.org/resource-directory
Abstract

61st State Science & Engineering Fair of Florida
OFFICIAL ABSTRACT AND CERTIFICATION

Title:

Student Team Leader:
School City State:

Select one Category

Animal Sciences
Behavioral & Social Sciences
Biological & Medical Sciences
Chemistry
Civil & Environmental Sciences
Engineering
Engineering Design
Finance, Economics, Business & Systems Sciences
Information Sciences
Mathematics & Computer Sciences
Nursing
Physics & Astronomy
Planet Science

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check ALL that apply):
   - human subject
   - potentially hazardous biological agent
   - vertebrate animals
   - microorganism
   - DNA
   - tissue

2. This abstract describes only procedures performed by me/us, reflects my/our own independent research and represents one year's work only. Yes No

3. Did I work or use equipment in a school, research institution or industrial setting? Yes No

4. This project is a continuation of previous research. Yes No

5. The display board includes non-published photographs/visual depictions of humans (other than myself). Yes No

6. All photos on display were taken by (check ALL that apply):
   - Researcher(s)
   - Research Assistant(s)
   - Parent(s)
   - other Citation required on display

7. All charts/graphs/illustrations were produced by the research team. Yes No Citation required on display

I/we hereby certify that the above statements are correct and the information provided in the abstract is the result of my/our own research. I/we also certify that the above properly reflects my/our own work.

Student Team Leader Signature Date

FOR SSEF OFFICIAL USE ONLY

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COMPLETING THE ABSTRACT:
Abstracts are limited to a maximum 250 words and must fit within the predefined area. Please be sure to consult the information from your affiliate fair for the proper formatting of the header information as fairs differ in what is required (or not allowed). The abstract should include the following:

a) purpose of the experiment  
b) procedure  
c) data  
d) conclusions  

It may also include any possible research applications. Only minimal reference to previous work may be included. An abstract must not include the following:

a) acknowledgments (including naming the research Institution and/or mentor with which you were working), or self-promotions and external endorsements  
b) work or procedures done by the mentor  

COMPLETING THE CERTIFICATION:
At the bottom of the Abstract & Certification form there are six questions. Read each carefully and answer appropriately. The Affiliated Fair Scientific Research Committee will review and approve the abstract and answers to the questions.

Please bring a copy of your Abstract & Certification to the fair and be sure to consult with your affiliated fair regarding the rules of making copies to distribute.

TIPS ON WRITING A PROJECT ABSTRACT
A project abstract is a brief paragraph or two (limited to 250 words or 1,800 characters) highlighting and/or summarizing the major points or most important ideas about your project. An abstract allows judges to quickly determine the nature and scope of a project.

- Emphasize these aspects: purpose (hypothesis), methods (procedures used), data summary or analysis, and conclusions.
- Focus only on the current year’s research.
- Omit details and discussions.
- Use the past tense when describing what was done. However, where appropriate use active verbs rather than passive verbs.
- Use short sentences, but vary sentence structure.
- Use complete sentences. Don’t abbreviate by omitting articles or other small words in order to save space.
- Avoid jargon and use appropriate scientific language.
- Use concise syntax, correct spelling, grammar, and punctuation.

AVOID A REWRITE
- Focus on what you did, not on the work of your mentor or of the laboratory in which you did your work.
- Do NOT include acknowledgements, self promotion or external endorsements. Don’t name the research institution and/or mentor with which you were working and avoid mentioning awards or honors (including achieving a patent) in the body of the abstract.
- Be sure to emphasize the current year’s research. A continuation project should only make a brief mention of previous years’ research (no more than a sentence or two).

For typing on template form, use this website for Form 1A (Abstract)
http://science.dadeschools.net/scienceFair/generalRulesAndRegulationsRSEF.html
<table>
<thead>
<tr>
<th>Steps</th>
<th>Dates Due</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 ➔</td>
<td>1st Grading Period</td>
<td>Week of 09/09/2016 (1 GRADE)</td>
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<tr>
<td></td>
<td>1 GRADES</td>
<td></td>
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</tbody>
</table>
| #2 ➔ | 1st Grading Period | Week of 09/16/2016 (3 GRADES) | 1- Problem statement you are going to use.  
2- Hypothesis  
5a- Tested/Manipulated variable = 1 condition changed/ manipulated for the experiment.  
5b-Outcome/Responding variable = what is measured (quantitative)  
5c- Controls: See How to Start a LAB or SF project |
|       | 3 GRADES | | |
| #3 ➔ | 1st Grading Period | Week of 10/7/2016 (4 GRADES) | Draft Research Plan with ABSTRACT and References Presented as a Power Point to Class (1 grade)  
1- Problem Statement  
2- Hypothesis  
3- Procedures  
4- Materials/Equipment  
5- Variables x. Testing/Manipulated, y. Outcome/Responding (& control)  
6- Data Table  
7- Graphing Data Analysis  
8- Results Even though data may be incomplete at this time.  
9- Conclusions  
10- Applications:  
11- ABSTRACT =(Max 250 word summary of experiment & results)  
10 References /Bibliography (1 grade -Ppt.+2 grades –Research Plan draft= 3 GRADES) |
|       | 4 GRADES | | |
| #4 ➔ | 1st Grading Period | Week of 10/14/2016 (8 GRADES) | Completed & Corrected (TYPED) Research Plan (APA Format) including data in LAB REPORT: = (2 GRADES)  
Corrected typed Research Plan (APA Format) in a presentation Report Folder with a Table of Contents  
DISPLAY BOARD: (6 GRADES) |
|       | 8 GRADES | | |
|       | 2nd Grading Period | Week of 10/28/2016 (3 GRADES) | SCHOOL SCIENCE FAIR - Media Center (3 grades extra credit for those selected)  
Winners-REQUIRED to compete in 2016 STEM EXPO- Regional Competition |