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

Nautilus Middle School
IB World School, MDCPS STEAM Designated School

SCIENCE FAIR
2018-2019

Nautilus Science Dept.
Nautilus Middle School, I. B. World School,
MDCPS STEAM Designated School
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A Guideline for Parents & Students

The Design Cycle

The four elements of the design cycle illustrated:

1. **Investigate**
2. **Plan**
3. **Create a product/solution**
4. **Evaluate**

*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 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.**

Ibmyp.nms/2016
All students are required participate in Nautilus M. S. Science Fair.  
Student projects are required to participate in competitions-

Nautilus Middle School Science Environmental and Engineering Science Fair

Those placing and winning in Nautilus M.S. Science Fair are required to participate in the 2019 STEAM EXPO.

Competition opportunities for students include:

- South Florida Regional Science Project & Engineering Fair
- SECME Olympiad
- The Fairchild Challenge
- Dream in Green WE-LAB Academy
- e-Cybermission On-line Competitions
- Future City Challenge
- Robotics (including VEX IQ)

All projects are required to have a
1. Research Plan
2. Summary
3. Abstract
4. Display Presentation Poster

Required categories & resources for students’ project to be submitted:

2019 STEAM EXPO:
1. South Florida Regional Science Project & Engineering Fair

The three competitions of the Science Fair (SFRSEF) are:
- The Poster Project
- 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. 2019 SECME Olympiad Competition

http://science.dadeschools.net/secme/aboutOlympiad.html

3. 2018- 2019 e-Cybermission Competitions

http://www.ecybermission.com/About

4. The 2018- 2019 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 –

USING C - E - R (Claim Evidence Reasoning)

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 with 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
  o Alternative Energy Sources
  o Environment
  o Food, Health & Fitness
  o Forces & Motion
  o National Security & Safety
  o Robotics
  o Technology
**Future City Challenge** Resources for environmental concerns, including agriculture, climate change, Population well-being, Greenhouse, hydroponics, Biosystems & Agricultural Engineering. FCC Team will work with Dr. Foote as Educator Coach, for presentation of model city and competition components due as follows:

**Schedule for Future City 2018 Competition- for those students who team up for this.**

[http://futurecity.org/all-resources](http://futurecity.org/all-resources)

**Checklist**

<table>
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<tr>
<th>Week</th>
<th>Task Description</th>
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| Aug-Sept 11 | Week 1-3  
Identify your topic and your purpose.  
Use library & Internet to research topic. |
| Sept 18 | Week 3-6  
-Plan experiment and collect materials.  
-Conduct your experiment, collect data, state results. |
| Oct 9 | Week 7-8  
-Analyze results & data. Make your conclusions.  
-Write research paper and abstract. 10 Sources.  
**-Present as a Power Point to Class** |
| Oct 16 | Week 9  
- Build display. Build & Tweak display  
-Practice presentations for judging.  
**- Completed & Corrected (TYPED) Research Plan** |
| Oct 30 | Week 10  
-Science Fair Exhibit in Media Center  
-Include Summary of Science Fair Project |

Those placing and winning in Nautilus M.S. Science Fair are required to participate in the 2019 STEAM EXPO.- Regional Competition.

**Projects Deadline for Nautilus M.S. Science Fair Due BY Oct 28, 2018**

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

Competitions in the South Florida Science and Engineering Fair:
1. The Poster Board Project,
2. 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](http://www.nces.ed.gov)
- [www.explorelearning.com](http://www.explorelearning.com)

Collecting and Recording data for Science Fair Project

- Use a science journal for measurements and observations.
  - Always date your entries and observations.
  - 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 right (facing) of Display.

**NAME NEEDS TO BE PLACED** be on the BACK and **Abstract on Lower right (facing display board) 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.explorelearning.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.

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

Outcome / Responding (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.

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
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

6th State Science & Engineering Fair of Florida
OFFICIAL ABSTRACT AND CERTIFICATION

Title: 

First Name(s): 

Last Name: 

School City, State, Zip: 

6th Grade
7th Grade
8th Grade
High School

Abstract:

1. Purpose of Project: The purpose of the project is to demonstrate the effects of pesticides on the environment. This will be done by
2. Materials and Methods: The materials used will include pesticide powders, water, and soil. The method will involve spreading the
3. Results: The results of the experiment will be recorded and analyzed. The data will be presented in a graph or table.

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>
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<tbody>
<tr>
<td>#1 →</td>
<td>Week of 09/14/2018 (1 GRADE)</td>
<td>List about problem statements or questions. (In order of preference- be descriptive) What your project is about!! EXPERIMENT Topic MUST be approved!</td>
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<tr>
<td>#2 →</td>
<td>Week of 9/28/2018 (3 GRADES)</td>
<td>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</td>
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<tr>
<td>#3 →</td>
<td>Week of 10/12/2018 (4 GRADES)</td>
<td>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 (&amp; 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 &amp; results) 10 References /Bibliography (1 grade -Ppt.+2 grades –Research Plan draft= 3 GRADES)</td>
</tr>
<tr>
<td>#4 →</td>
<td>Week of 10/19/2018 (8 GRADES)</td>
<td>Completed &amp; Corrected (TYPOED) 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)</td>
</tr>
<tr>
<td>1st Grading Period</td>
<td>Week of 11/2/2018 (3 GRADES)</td>
<td>SCHOOL SCIENCE FAIR - Media Center (3 grades extra credit for those selected) Winners-REQUIRED to compete in 2019 STEAM EXPO- Regional Competition</td>
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