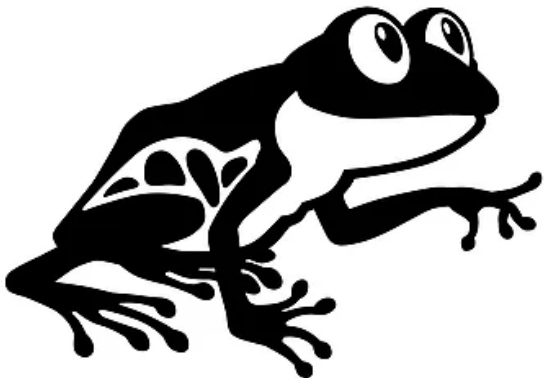
SCIENCE FAIR, 2022 - 2023

PLANNING PACKET

ARCHIMEDEAN MIDDLE CONSERVATORY



Your Name:

Class Section:

THIS PAGE IS DUE ON: 08/30/22

PROBLEM STATEMENT: THE QUESTION BEING EXPLORED IN THE EXPERIMENT

Directions: Write out your problem statement for this year's Science Fair Project on the lines below.

_____

_____

_____

Problem Statement Self-Grading Checklist: Check the box if your problem statement meets the criteria being described.

- ☐ The problem statement shows what different groups will be compared
- ☐ The problem statement shows what measurements will be made

PROJECTS/ TOPICS THAT ARE NOT ALLOWED:

- No bacteria, live cultures, humans, or animals
- No explosive projects/ launching rockets (alka-seltzer, soda, etc)
- No dangerous or harmful substances (fire, strong acids)
- Projects must have a reasonable application

Students, please check with your parents to make sure they are OK with the project you are choosing!

FOR TEACHER USE: IS THIS PROJECT APPROVED?
YES / NO

You may use any of the ideas below for your science fair project, or you may choose your own.

TOPIC: CHEMISTRY

- How does temperature affect the ability of salt to dissolve?
- Do all red flowers have the same pigments/ chemicals that produce color?
- What brewing technique makes the strongest tea?
- Which fruits can ruin your gelatin dessert?
- Does lemon juice or sugar water preserve apple slices better?
- Are different brands of black markers made with the same color pigments?

TOPIC: EARTH AND ENVIRONMENTAL SCIENCES

- Which filtering method for water is best?
- Can pH affect the erosion of concrete buildings?
- Does salt water cause more soil erosion than freshwater?
- How does water quality compare at different Miami beaches?
- How do plants influence soil erosion?
- How does pH affect the erosion of rocks?
- What conditions are best to grow Florida native plants?

TOPIC: ENGINEERING

- Does the shape of a boat change how much weight it can carry?
- What is the best material to put in a sandbag to prevent flooding?
- How does the shape of a parachute affect flight?

TOPIC: PLANT SCIENCES

- What organic farming method is best to keep pests away?
- What ratio of ingredients is the best for compost?
- How often should one add compost when growing vegetables?
- Can plants tolerate grey water?
- What are the effects of hydrogen peroxide on the roots of plant cuttings (or seed germinations?)
- What is the best length of stem cuttings for propagating Florida native plants?
- What is the best method to germinate Florida native seeds?

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BIBLIOGRAPHY: SOURCE INFORMATION FOR THE 5 ARTICLES YOU WILL USE IN YOUR BACKGROUND RESEARCH

Directions: Find five different articles on the internet that are related to your project and fill out the information below for each article.

Source 1:

- Name of Article:
- Author or company name:
- Copyright date or date the article was published: (if there's no date, just write no date)
- Date you went to the website:
- Link to website (make sure you include the full link):

Source 2:

- Name of Article:
- Author or company name:
- Copyright date or date the article was published: (if there's no date, just write no date)
- Date you went to the website:
- Link to website (make sure you include the full link):

Source 3:

- Name of Article:
- Author or company name:
- Copyright date or date the article was published: (if there's no date, just write no date)
- Date you went to the website:
- Link to website (make sure you include the full link):

Source 4:

- Name of Article:
- Author or company name:
- Copyright date or date the article was published: (if there's no date, just write no date)
- Date you went to the website:
- Link to website (make sure you include the full link):

Source 5:

- Name of Article:
- Author or company name:
- Copyright date or date the article was published: (if there's no date, just write no date)
- Date you went to the website:
- Link to website (make sure you include the full link):

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Bibliography Self-Grading Checklist: Check the box if your Bibliography meets the criteria being described.

- ☐ I listed 5 different articles
- ☐ I included the title of each article
- ☐ I included the author or company name for each article
- ☐ I included the date I found each article
- ☐ I included the date each article was published, or I wrote "no date" if copyright date cannot be found
- ☐ I included the full link to each article

HELP FOR FINDING YOUR ARTICLES:

- You are NOT finding the answer to your problem statement; you will find the answer to your problem statement by doing the experiment
- Make a list of "key words" from your problem statement that you can google
  - For example, if your project involves bean plants, google the key word "bean plants" to find an article about how to take care of them
- You can look for articles explaining what the materials you are going to use are made of.
  - For example, if you are using bleach, google what bleach is made of
- You can look for articles that will help you decide what materials to use.
  - For example, if your problem statement is: which soil is best to grow bean plants, then you can google different types of soil that you may want to use
- You can look for articles that help you figure out how to do the experiment
  - For example, if you are testing different boat shapes, you can find articles explaining how to make the different boat shapes

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BACKGROUND RESEARCH: A PARAGRAPH OR MORE THAT SUMMARIZES WHAT YOU LEARNED FROM THE 5 ARTICLES LISTED IN YOUR BIBLIOGRAPHY

Directions: Write your paragraph (or more) on the lines below. You MUST include the following:

- At least one quote from all 5 articles listed in your bibliography.
- Every quote must be included in a sentence that states the author or company name.
    - For example: According to Chocolatelovers.com, "dark chocolate has the highest amount of caffeine."
- Every quote must be followed by an explanation of what that quote means or why that quote is important to your project.
    - For example: According to Chocolatelovers.com, "dark chocolate has the highest amount of caffeine." This shows that someone who can't have caffeine should eat white chocolate instead of dark chocolate.

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Background Research Self-Grading Checklist: Check the box if your Background Research meets the criteria being described.

- ☐ I included a quote from Source 1 that is listed in my bibliography
- ☐ I mentioned the author name or company name in the sentence that has the quote for Source 1
- ☐ I explained why the quote from Source 1 is important and/or what it means
- ☐ I included a quote from Source 2 that is listed in my bibliography
- ☐ I mentioned the author name or company name in the sentence that has the quote for Source 2
- ☐ I explained why the quote from Source 2 is important and/or what it means
- ☐ I included a quote from Source 3 that is listed in my bibliography
- ☐ I mentioned the author name or company name in the sentence that has the quote for Source 3
- ☐ I explained why the quote from Source 3 is important and/or what it means
- ☐ I included a quote from Source 4 that is listed in my bibliography
- ☐ I mentioned the author name or company name in the sentence that has the quote for Source 4
- ☐ I explained why the quote from Source 4 is important and/or what it means
- ☐ I included a quote from Source 5 that is listed in my bibliography
- ☐ I mentioned the author name or company name in the sentence that has the quote for Source 5
- ☐ I explained why the quote from Source 5 is important and/or what it means

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HYPOTHESIS: AN EDUCATED PREDICTION ON WHAT THE OUTCOME OF THE EXPERIMENT WILL BE; BASED ON BACKGROUND RESEARCH

Directions: write out your hypothesis for your science fair project on the lines below.

_____

_____

_____

_____

Hypothesis Self-Grading Checklist: Check the box if your hypothesis meets the criteria being described.

- ☐ the hypothesis predicts what will happen to each test group
- ☐ the hypothesis supports the prediction with what was learned from the background research

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VARIABLES: OUTLINES HOW THE EXPERIMENTAL SET-UP WILL BE CONTROLLED.

THERE ARE FOUR VARIABLES:

- Independent Variable: the **one** characteristic that is different between all test groups
- Dependent Variable: the measurements being made / data being collected
- Constants: **all** the characteristics that will remain the same between the test groups
- Control Group: the **one** test group that is under normal conditions

Directions: write out your variables for your science fair project. All experiments must have all four variables identified.

★ Independent Variable: _____

★ Dependent Variable: _____

★ Constants: _____

★ Control Group: _____

Variables Self-Grading Checklist: Check the box if your variables meets the criteria being described.

☐ I only have one independent variable

☐ the independent variable identifies what is different between my test groups

☐ the dependent variable identifies what is going to be measured as the experiment is done

☐ the constants list all characteristics that will be the same amongst all test groups

☐ the control group identifies the one test group that is under normal conditions

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MATERIALS: A LIST WITH DETAILS OF ALL OBJECTS BEING USED IN THE EXPERIMENT

Directions: List all objects used in the experiment using the bullet points below. You must include: the name of the object, the amount needed, the size if applicable, and any other relevant details.

-
-
-
-
-
-
-
-
-
-
-
-

Materials Self-Grading Checklist: Check the box if your materials meet the criteria being described.

- ☐ Name of all objects was included
- ☐ quantity of all objects was included
- ☐ size of objects was included, as necessary

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PROCEDURES: A LIST OF STEPS/ACTIONS NEEDED TO CONDUCT THE EXPERIMENT

Directions: Use the numbers below to write out step by step directions on how to do the experiment. Be specific and make sure you include directions for repeating for 3 trials.

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.

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16.

17.

18.

19.

20.

21.

22.

23.

24.

25.

26.

Procedures Self-Grading Checklist: Check the box if your procedures meet the criteria being described.

- ☐ Directions are provided on what to do for all test groups
- ☐ Directions specify how to measure out any liquids or materials that need measuring
- ☐ Directions specify how to repeat for 3 trials
- ☐ Directions specify what to do with all materials being used

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DATA TABLE: DISPLAYS THE MEASUREMENTS FOR ALL TRIALS AND AVERAGES

Directions: fill in the table below as you do your experiment. If you don't need to use all the rows, you may leave them blank.

Title:

INDEPENDENT VARIABLE:	TRIAL 1:	TRIAL 2:	TRIAL 3:	AVERAGE:

CALCULATING THE AVERAGE: $\frac{trial\ 1+trial\ 2+trial\ 3}{3}$

Data Table Self-Grading Checklist: Check the box if your Data Table meets the criteria being described.

- ☐ The data table has a title
- ☐ All test groups are included in the table
- ☐ The independent variable is labeled
- ☐ Measurements for all 3 trials are shown
- ☐ The average for each test group was calculated and included on the table

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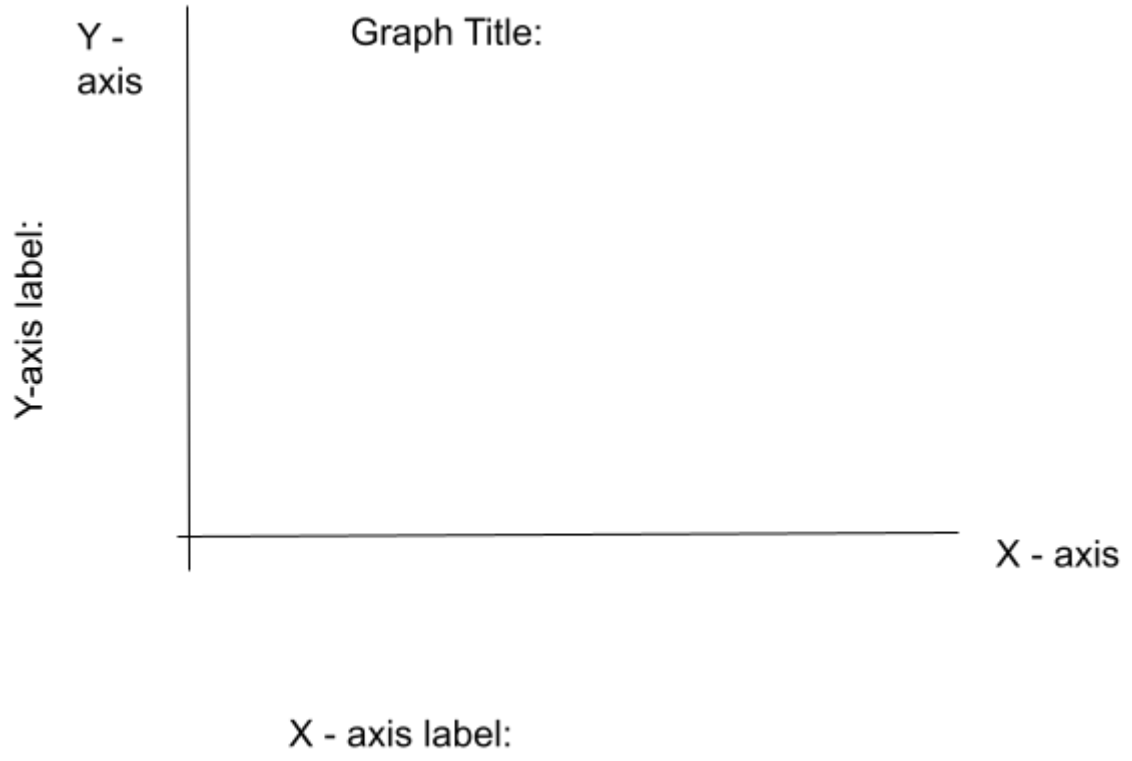
DATA GRAPH: PROVIDES A VISUAL OF THE OVERALL OUTCOME.

X-AXIS: INDEPENDENT VARIABLE

Y-AXIS: AVERAGE OF THE THREE TRIALS



Data Graph Self-Grading Checklist: Check the box if your Data Graph meets the criteria being described.

- ☐ The independent variable is labeled on the x-axis
- ☐ The dependent variable is labeled on the y-axis
- ☐ The markings on the x- and y-axis are of equal intervals/jumps
- ☐ The graph has a title
- ☐ The average from the data table is plotted properly on the graph

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RESULTS: A PARAGRAPH DESCRIPTION OF WHAT THE TABLE AND GRAPH SHOWS

Directions: using complete sentences, write out what was observed for each test group. Include values for all averages in your sentences. At the end of your paragraph, discuss the overall pattern: which test group had the highest measurement and which test group showed the lowest measurement?

Results Self-Grading Checklist: Check the box if your Results meets the criteria being described.

- ☐ The averages of the three trials were written in sentences for all test groups
- ☐ The overall pattern was written at the end of the paragraph

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CONCLUSIONS: ANALYZES AND DISCUSSES WHAT CAN BE LEARNED FROM THE EXPERIMENT AND HOW IT CAN APPLY TO THE REAL WORLD.

Directions: Use the following fill-in-the-blank sentences to plan your conclusion section. You must answer all sentences.

My hypothesis was

_____

_____.

The results _____ (support -or- don't support) the hypothesis because

_____.

The errors that occurred during my experiment were

_____

_____.

If I were to conduct this science fair project again, I would improve it by

_____

_____.

In conclusion, this experiment taught me

_____

_____.

What was learned in this experiment can be useful in the real world because

_____.

Conclusions Self-Grading Checklist: Check the box if your Conclusions meet the criteria being described.

- ☐ All fill-in-the-blank sentences were answered.
- ☐ I included as much detail as I can think of for all sentences
- ☐ Multiple errors were discussed

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ABSTRACT: A SUMMARY OF ALL STEPS OF THE EXPERIMENT

Directions: Use the following fill-in-the-blank sentences to plan your Abstract section. You must answer all sentences.

The purpose of my science fair project was to test_____
_____.

The hypothesis for this project was
_____
_____.

This hypotheses was tested by measuring
_____.

The factor that was different between all test groups was
_____.

The factors that were kept the same were
_____.

The control group was _____.
The results of this experiment were _____
_____

The results show that the hypothesis was _____ (supported or not supported) because_____
_____.

If one were to further test this problem statement in the future, one can improve the experiment
by_____
_____.

This project can help the world by
_____.

Abstract Self-Grading Checklist: Check the box if your abstract meets the criteria being described.

- ☐ All fill-in-the-blank sentences were answered.
- ☐ I included as much detail as I can think of for all sentences

YOUR FINAL SCIENCE FAIR BOARD IS DUE THURSDAY, 11/3

Science Fair, 2022-2023 Pacing Guide

08/30 - Problem Statement
09/08 - Bibliography
09/15 - Background Research
09/20 - Hypothesis
09/22 - Variables
09/29 - Materials and Procedures
10/13 - Data Table and Graph
10/20 - Results, Conclusions, Abstract
11/3 - Final Science Fair Board Due