**Griffin Middle School**

**Science Fair Project**

**2019-2020**

This year our students will design and complete a science fair project. These projects will be completed individually by the students, with the support of ***all of their*** ***teachers*** and the STEAM club sponsors. The project will include a logbook, lab report, and a tri-board display.

**The projects will be judged in classrooms the week of December 3rd & 4th. Winners will then compete in the school science fair to be hosted December 9th. Top projects will compete in the Cobb-Paulding Science Fair hosted at Smitha Middle School, Saturday, February 8.**

**Important Due Dates:**

* PLEASE PURCHASE A COMPOSITION NOTEBOOK AS SOON AS POSSIBLE!
* Topic/question to be approved by teacher **– September 16th and 17th**
* Hypothesis/background info(research) – **October 3rd and 4th**
* Materials/procedures/variables **– October 7th and 11th**
* Experiment Complete – **November 6 and November 7th**
* Completed written report **– November 18th and 22nd**
* Class Competition (Entire Project) **– December 3rd and 4th**

**Pieces of the project:**

There are several pieces to this project, but we have plenty of time and it can easily be chunked to make it manageable for teachers as well and the students. There are 3 critical pieces to the project.

1. **Log book (ie composition notebook)** that students will use to compile their information. This will be the most important tool as it will house all parts and pieces of the project. Students will use it to take notes, ask questions as well as complete graphic organizers.

1. **The written lab report** is where students will put the pieces of their project together to communicate all aspects in written format. The reports is a formal expression of what has already been completed in the log book.
2. **The display** is where students give brief description and aesthetically pleasing presentation of the main ideas of the project from original question to conclusion.

This document describes a general guideline for the project, report template as well as the display template.

**Project steps and support team:**

1. **Statement of problem: (see appendix for additional information)**
	* See Asking Scientific Questions for a Long-Term Project.
2. **Research (read) on the topic**. This will allow you to form a hypothesis and plan an investigation.
* Check with your **ELA**, **reading,** and / or **science** teachers:

? Are you reading information that will support you in the development of a hypothesis and/or planning an investigation?

? Does one of your teachers have a suggestion for something you should read?

1. **Procedure:** Plan an investigation that allows you to test the hypothesis.

What is your control group?

What is the independent variable?

What is the dependent variable?

* Check with your **science** teachers:

? Have you considered all possible sources of data? (Reading/Math)

? Are your data sources reliable? (Reading/ELA)

? Will you have collected enough data? (Reading/ELA/Science)

1. **Experiment:** Carry out your investigation.

Record your data and observations in your logbook.

* Check with your **math** and **science** teachers:

? Have you accurately collected all possible sources of data?

? Are your results reliable? Are there outliers that need to be considered?

? Have you collected enough data? (How many trials did you have?)

1. **Record observations (formal):** Make graphs, tables, diagrams, etc. from your results.
* Check with your **math** and **science** teachers:

? Have you accurately presented all sources of data, including outliers?

? Have you communicated the results in an organized manner?

? Have you included analysis of the data to include captions that make initial connections between your hypothesis and the outcomes?

1. **Written Report:** Construct an explanation from your data. This conclusion should either refute or support your initial hypothesis.
* Check with your **ELA**, **reading**, and **science** teachers:

? Are you connecting information that will support you in the development of an explanation that either refutes or supports your hypothesis?

? Does one of your teachers have a suggestion for something else you should include?

1. **Present:** Summarize, organize, and present your process and results on a tri board.

**Written Lab Report:** Each section on a separate sheet of paper**.**

**Template**

**Title:**

\* a brief, concise, yet descriptive title (this may be the last thing you decide based on your research)

**Statement of the Problem:**

\* There should be a testable question that can be answered with an experiment and how this problem impacts society.

**Hypothesis:**

\* Write a possible solution for the problem based on what you have read.
\* Make sure this possible solution is a complete sentence and testable.

 Ways to write the hypothesis:

* If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The hypothesis of my experiment is that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will cause \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* I hypothesize that if I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will result.

\* Tell your controls, independent variable, and dependent variable.

**Materials:**

\* Make a list of ALL items and amounts of the materials used in the lab.

**Evidence:**

\* There should be evidence of grade-level appropriate background research. There must be a MINIMUM of 3 resources, cited using APA style. We can’t emphasize this enough…. **Make sure to cite the research and summarize in your own words.** Be sure to include more than three sources.

**Procedure:**

\* Write in complete sentences with lots of detail what you did in the lab.

\* Your procedure should be written so that others can repeat the experiment.

 **Example:**

 **OK**

 Using a 250 mL beaker, measure 1 liter of water.

 **NOT OK**

 Add water to the container.

\*Make sure to run at least three trials and show evidence of a thorough experiment.

**Observations/Results (Data):**

\* This is a paragraph written telling results.

\* This section should include any data tables (labeled appropriately), graphs, charts, observations, photos, or additional notes you make during the lab.

\* When you applied your independent variable, what happened to the dependent variable?

\* The data should be relevant to the testable question and used to evaluate the hypothesis.

**Conclusions:**

\* This is written as a paragraph to accept or reject your hypothesis.
\* EXPLAIN why your hypothesis was right or wrong using your data including experimental evidence.
\* Include a summary of the data - averages, highest, lowest, etc. to help the reader understand your results.

\* This is your opinions and conclusions based on your results – what you learned from the results.

**Display**

**Display: note display mirrors the written lab report**

The projects will be displayed on. If you are selected to compete in our school science fair, please make plans to attend. Students will be standing at their projects and presenting them as people come. This should be lots of fun!

**THINGS TO DISPLAY:**

**Log Book**

* The logbook shows the ongoing record of your practices.

**The Written Report**

* The written report should be set in front of the display board. Also, parts of the report will be on the display board.

**Objects/Equipment Used**

* This is anything used in the experiment that will help people understand your project. It may be the experiment itself.

**Backboard**

* This tells the story of your whole experiment. This should include the title, problem (question), hypothesis, procedure, variables, results, conclusion, charts or graphs, and pictures.
* THIS SHOULD BE NEAT AND PLEASING TO THE EYE! Make sure that it is presented in a manner to makes the purpose, procedure, and results clear.

**YOU ARE THE EXPERT ON YOUR PROJECT. YOU SHOULD BE ABLE TO ANSWER ANY QUESTIONS ASKED.**

TITLE

* Graphs
* Tables
* pictures

**Problem**

**Hypothesis**

**Procedure**

**Results**

**Conclusion**

**Variables**

**Materials**

**Display of Equipment/Objects**

**Written Lab Report**

**Log Book**

**Science Teachers**

**Overview:**

Science teachers are at the hub of all questions including but not limited to:

1. Develop good quantifiable question- 9/16- 9/17

Get signed parent letter returned

Preview expectations

Set up logbook

1. Guide through developing a hypothesis – 10/3-10/4
	1. Logbook check
2. Create a procedure for experiment – 10/7 – 10/11
	1. Approval Form 1B completed by student AND guardian before experimentation (form on TEAMS)
3. Observations and results discussed – 11/6 – 11/7
4. Final check list completed – 11/18-11/22

**Differentiation:**

Suggestions for co-taught and general education as needed:

1. Allow students to work in pairs
2. Give co-taught classes option for project
	1. Assist reading teacher with research that supports project options

**What does this look like? Examples of hypothesis / good question.**

* Clear question
	+ Poor questions start with “what is the best....” You can easily improve the clarity of the question by defining exactly what you mean by “best.”
	+ Poor Example: “What is the best type of material for silt fences?”
	+ **Better** **Example**: “How is soil captured by different types of silt fences to the prevent the movement of soil?”
* Safe
	+ As with any science investigation, you must choose a topic safe to investigate with equipment we have at school/home. (see required forms)
* Quantifiable (numerical data not opinion)
	+ You should be able to arrive at an answer to your question through experimentation.
	+ Your experiment needs to have components that can be changed (variables) or be observed to change, such as temperature and measured (data).

You should also be able to adequately control your variables

**Social Studies Teachers**

**Overview: Goal to work 9/30 – 10/4**

1. Review the question and the hypothesis with student. Support students with connecting project to real world problems that affect society. This is a very important aspect of the question.
2. Double check question to make sure it is relevant to society.
3. Complete graphic organizer to attach into log book.
4. Begin rough draft if possible. If not, have graphic organizer complete for writing ‘problem’ in ELA.

**Differentiation:**

Sentence starters for students

**What does this look like / examples of “problem”:**

The world has entered a global water crisis. Being able to effectively AND economically clean water is key.

**Reading Teachers**

**Overview: Week Of 9/18 – 10/4 (more if available)**

1. Support students will conduct research to collect evidence to inevitably form a hypothesis.
2. Must have 5 credible sources written in APA format.
3. Consider use of graphic organizer in TEAMS.
4. Students may come to you for additional help with connecting or refuting their hypothesis. Students do not like to say they were wrong and may need additional help communicating this.
5. Collaborate with Mrs. Q to conduct mini lessons or work in media center.

**Differentiation:**

Assist with selected reading that supports guided questions provided by science teachers.

**Possible resources:**

News ELA

Read works…

**ELA Teachers**

**Overview: Week of 9/30 - 10/4**

1. Pulse check with students to complete hypothesis AFTER topic has been researched. (Science will be working on also, but may need assistance) – **October 3rd and 4th**
2. Students may come to you for support to look for additional sources.
3. Complete / revise problem (SS) – **October 14th and 18th**
4. Begin written report - **October 14th and 18th**
5. Written Report Complete **– November 11th and 15th**

**Math Teachers**

**Overview: Week of November 11th – 15th**

Students will have completed the experiment and should have all data collected in their logbook. They should come to you with help communicating the data. They will need to be able to articulate the data as well as represent it with graphs or charts.

1. Assisting in communicating or coaching any type of question regarding collecting or communicating data.
2. Students may come to you with questions regarding control groups or variables. If you are uncomfortable giving guidance / advice, please direct student to STEAM club or a science teacher.
3. Calculate / graph data

**Appendix**

The foundation to a good science fair project is a good question. If you would like additional information, please see below.

Create an investigation (see accompanying Possible Science Fair Questions document)

From your interests, observations, or teacher’s suggestions, choose something that you would like to investigate. Then, write a question that will guide your investigation. General criteria for your question:

* Clear question
	+ Poor questions start with “what is the best....” You can easily improve the clarity of the question by defining exactly what you mean by “best.”
	+ Poor Example: “What is the best type of material for silt fences?”
	+ **Better** **Example**: “How is soil captured by different types of silt fences to the prevent the movement of soil?”
* Safe
	+ As with any science investigation, you must choose a topic safe to investigate with equipment we have at school/home. (see required forms)
* Quantifiable (numerical data not opinion)
	+ You should be able to arrive at an answer to your question through experimentation.
	+ Your experiment needs to have components that can be changed (variables) or be observed to change, such as temperature and measured (data).

You should also be able to adequately control your variables

1. Check that your question is rigorous enough.

? Is the topic of the question interesting enough to sustain my interest for several months? \_\_\_\_\_\_\_\_\_

? Will the topic allow me to safely carry out an investigation that will provide me with data to support a conclusion or new/improved innovation? \_\_\_\_\_\_\_\_\_\_

? Is the topic of the question currently relevant to an issue or concern?

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

? By answering my question, does it have the potential to improve the world around me in some way? \_\_\_\_\_\_\_\_\_\_