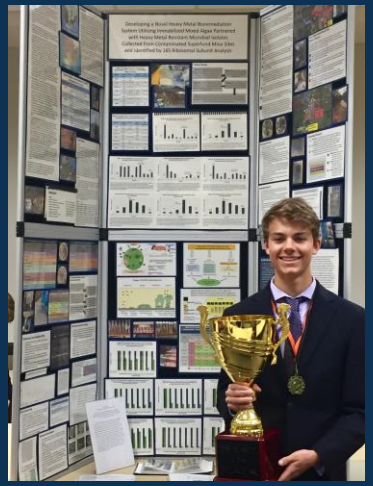


Sabal Elementary School

Science & Engineering Fair Family Information

Science and Engineering Fair Expectations

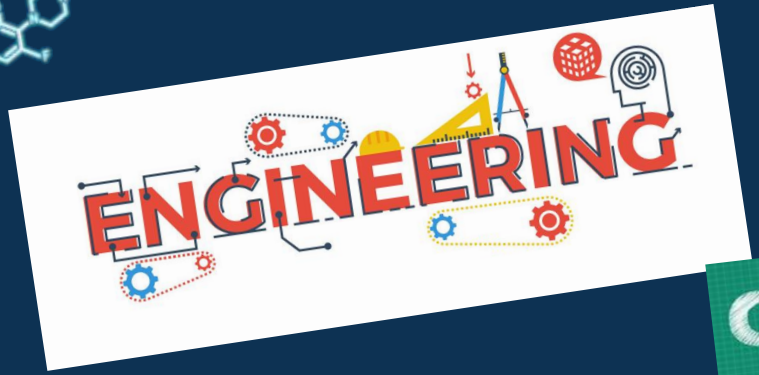
- All 4th grade students will complete a class project (may complete an individual/team project)
- All students 5th - 6th must complete an individual or team project
- All students must present in the classroom
- Any student who has followed the guidelines and has all required parts may enter the school science fair.
- Projects will be online this year (no science backboards)

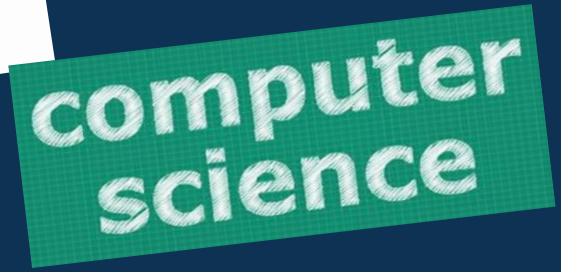
Because of the pandemic, our plan for this year is to have teachers work on the projects in class for 2 weeks. This should give enough time to complete the projects at school.

Students will be given a list of some testable questions. If they choose one of these questions materials can be provided.

All students are allowed to choose their own project and do the entire process by themselves.

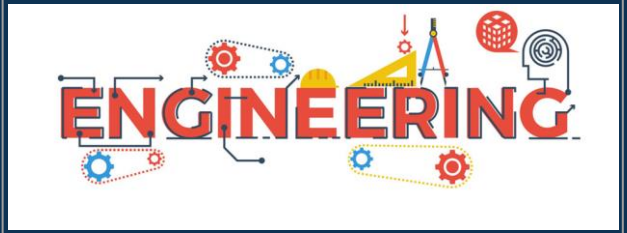
What is the Elementary Science & Engineering Fair?

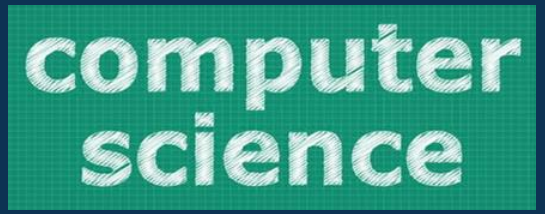




Showcase of Student Projects in 3 Divisions

What is the Elementary Science & Engineering Fair?





Animal Sciences
Plant Sciences
Microbiology
Earth & Environmental Sciences
Chemistry
Physics & Astronomy

Environmental Engineering
Engineering Mechanics

Robotics & Intelligent Machines
Coding

10 Different Categories

Team Projects - 2 students only

- Each member of the team must have his/her own digital logbook.
- Team Projects compete against individual projects.
- The students must be from 4th - 6th grades but can be from different grades.

Science Division

The ***Science Division*** is the most similar to the traditional Science Fair Project.

Categories

- Animal Science
- Plant Science
- Microbiology (NO MOLD)
- Earth and Environmental Science
- **Chemistry**
- **Physics and Astronomy**

Science Division

- Project requires students to use a control group as well as dependent and independent variables
- A detailed daily log
- REQUIRED to complete at minimum THREE trials
- No Summary
- 5th and 6th grades are required to have a bibliography

Engineering Division

The **Engineering Division** allows students to design and then build prototypes to solve a real world problem

Categories

- Environmental Engineering
- Engineering Mechanics

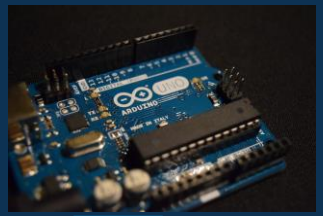
Please note, this division is NEWER to classroom teachers. If your child chooses this division, please understand that teachers are learning along with your child. If you have questions, feel free to ask your teacher.

Engineering Division Categories

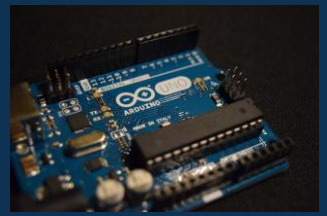
- **Environmental Engineering** –engineering or developing processes and tools to solve environmental problems focusing on why and how events are occuring *(solution to an environmental problem)*
- **Engineering Mechanics** –engineering that involves the movement of structures

Engineering Division

- Requires students to design a prototype and make at least three different modifications to the prototype *(they do not have to build a brand new protype, they are making changes to the existing prototype)*
- No Summary
- 5th and 6th graders are required to have a bibliography
- A detailed daily log



Computer Science Division



The ***Computer Science Division*** allows students to design and then build robots or write code to solve a real world problem

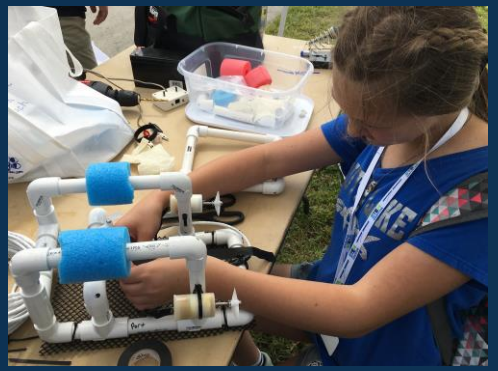
Categories

- Robotics/ Intelligent Machines
- Coding

Please note, this division is NEWER to classroom teachers. If your child chooses this division, please understand that teachers are learning along with your child. If you have questions, feel free to ask your teacher.

Computer Science Categories

- **Robotics and Intelligent Machines** – projects will use machine intelligence to complete a task or reduce the reliance of human intervention
- **Coding** – projects will focus on the study or development of software or information processes to demonstrate, analyze, or control a process or solution.



Computer Science Division

- Project requires students to design a code or robot and make at least three different modifications to the code/ robot
- No summary
- 5th and 6th grades are now required to have a bibliography
- A detailed daily log

Projects That Are **NEVER** Allowed

- Testing that involves any items that could be considered weapons
- Testing that involves fireworks or explosives
- Testing using controlled substances such as alcohol, tobacco or prescription medicine
- Microbial experimentation using samples collected from the environment (NO MOLD OR ALGAE)
- Projects that produce mold either intentionally or unintentionally
- Any project that could cause pain, distress or death to a vertebrate

Requirements For All Projects

- Students should complete all Approval Forms with their family and then bring them to be approved by their teacher before any testing begins

  ** Additional forms may be needed for projects in Science Division*

- Project components must be completed by the date specified by their teacher

- All log books and projects are to be completed digitally. Templates for the log book and the presentation will be provided by your teacher and can also be found on Sabal Elementary School science fair website

Sabal Elementary School's Science and Engineering Fair Website

https://sites.google.com/learn.brevardschools.org/sabal-science-and-engineering-/home

Forms

There are three forms that each student will need to fill out regardless of the type of project:

- Project Approval Form
- Ethics Agreement
- Risk Assessment and Designated Supervisor Form

Risk Assessment and Ethics Forms Due date: December 1, 2020

Please Note: All projects involving human subjects MUST have a Qualified Scientist Form.

Science Division Project

1. Ask “What If” questions to decide on project.
2. Complete Project Approval Forms.
3. Set up your logbook.
4. Identify your variables (independent, dependent, controlled)
5. State the problem in a form of a question, for example: How will salt affect the boiling point of liquids?
6. Write your hypothesis as an If…..then Statement.
7. Research and record your sources.
8. Design the experiment: write out the procedure and materials.
9. Conduct the experiment at least 3 times.
10. Record your data in charts and graphs.
11. Analyze the data.
12. Make conclusions about what happened.
13. Complete your digital Science Fair Board using the provided template

Engineering Division Project

1. Look for a real-world problem you can fix, change or improve.
2. Start an Engineer's Logbook.
3. Complete the Project Approval Forms.
4. Research to become an expert in your problem.
5. State the problem in a question form, for example: *How can runoff be cleaned before it goes into the Indian River?*
6. Use your research to get ideas for prototypes.
7. Brainstorm several designs and record them in your logbook.
8. Write your engineering goal. (similar to a hypothesis) Include the design you think is best and write how you can test it.
9. Build a prototype.
10. Test the prototype, analyze what worked and what didn't and **modify your design.**
11. Final Prototype – create a detailed diagram and upload it in your digital logbook.
12. Complete your digital Science Fair Board using the provided template

Computer Science Project

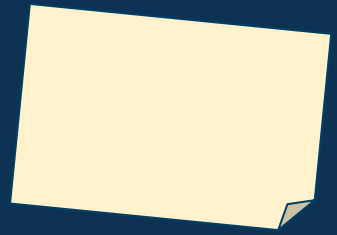
1. Choose: Robotics or Coding.
2. Start a Programmer's Logbook.
3. Complete the Project Approval Form.
4. Research – become an expert in your problem.
5. Develop a project goal.(similar to a hypothesis)
6. List materials and programs.
7. Write an algorithm (step by step procedure).
8. Develop & test program.
9. Modify the program.
10. Final Reflection – tells what you have learned.
11. Complete your digital Science Fair Board using the provided template

Daily Log Template

Date:	Daily log information:
	Type anything you do that involves your project here

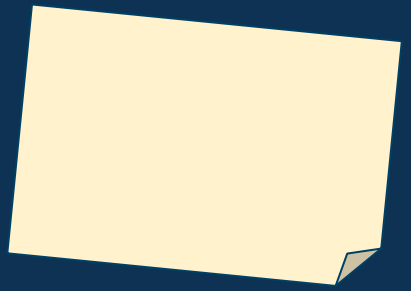
How to Come up with a Question

- Continue your project from last year
- Sciencebuddies.org
- Books
- Consider topics that are interesting to you
- What is something you are curious about or often wondered?
- Ask “What If” Questions
- It should be FUN



Or use the questions provided by your teacher

Research



- Research key terms (science words) about your project
  (evaporation, electricity, insulation, chemical reaction, force, friction)
- Research using a **variety** of sources including: library(books), videos, internet, expert in the field interview)
- You need to include 3-5 credible sources in your research
- In your log book, list each source, take notes on each source and write ***3-5 sentences*** of what you learned on each source
- Cite all of your sources with a Works Cited page (bibliography)

Hypothesis

- A hypothesis is a statement about what you think will happen in the experiment. It is stated in a positive manner. Avoid statements like "**I think**" and "**I predict.**" The hypothesis should be in the form of "If ___, then___."

✔ **If** I measure the bouncing height of a new basketball with three different pressures, **then** the ball with the highest pressure will bounce 10% higher.

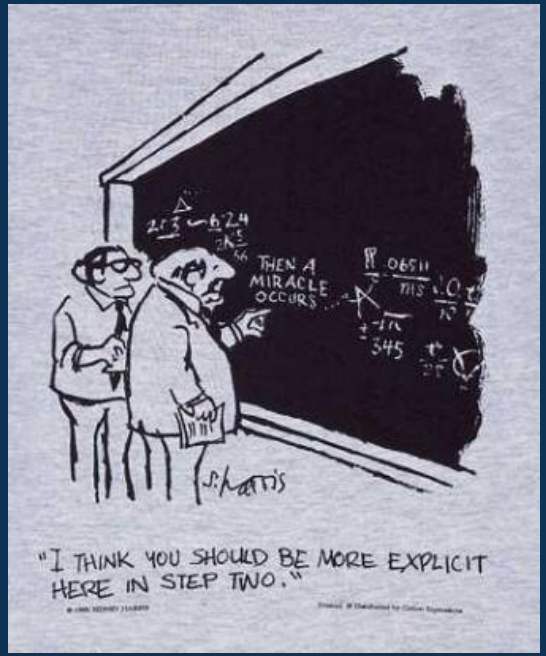
✔ **If** I I test different water samples from the Indian River Lagoon after it rains, then the amount of phosphates will be greater.

Procedure

The procedure is a listing of steps used in the experiment. It is very detailed, like a recipe. It makes it easy for someone to duplicate the experiment. It should also be written in kid friendly terms.

Example

1. *Gather all materials.*
2. *Measure 500 milliliters of soil and pour it into the pot. Continue for each of the 5 pots being tested.*
3. *Pat the soil down and dig small hole (10 centimeters in the middle of each pot filled with soil.*
4. *Place a lima bean seed in each hole and cover the hole with the dirt.*
5. *Water each plant with 20 milliliters of water once every two days.*
6. *Record observations in daily log.*



Materials

⇨ The materials section is a detailed list of everything used in the experiment. Include what, how much, and what kind of things used.

Non-Example

- Water
- Flower pots
- Seeds
- Dirt

Example

- 5 liters of rain water
- Six 4 cm. clay pots
- 12 bush bean seeds
- 10 liters of potting soil

Science Variables

- **Independent Variable** The variable you are "messing with".
- **Dependent Variable** The variable that you will record and measure. It's changes "depend" on the independent variable.
- **Control Variables** All aspects of these variables must remain constant.

"How Does Aspirin Affect the Growth Rate of Roses?"

Independent Dependent Control

"What is the Effect of Coke on the Decay of Teeth?"

Independent Dependent Control

Control Group

- **Control Group** The group that receives no treatment or test.
  (What you would normally do)
- Used to compare with the experimental groups

"How Does Aspirin Affect the Growth Rate of Roses?"

- The control group would be roses in water without aspirin so we can compare if aspirin has an affect on growth.

"What is the Effect of Coke on the Decay of Teeth"

- The control group would be teeth not treated with coke so we can compare the decay of teeth treated with coke to those not treated.

Testing & Analyzing the Results

Results include both **data** and **observations.**

- ✓ Record measurements and observations in the Daily Log.
- ✓ Think about the data and observations and decide what those results mean.
- ✓ Try to use mathematical calculations such as mean, median, mode, and range (6th grade)
- ✓ Construct graphs or tables digitally that will show results clearly; Create-a-Graph, Google Sheets or Excel

Writing the Conclusion

☑ Look at the data. The conclusion can be written in one or two paragraphs.

1. Did the data support the hypothesis? If not, why do you think it did not? What could be done differently the next time? How would people apply your findings to everyday life?

2. Do NOT say your hypothesis was right or wrong… It is either the data supports or does not support your hypothesis. Do not worry about **negative results**, or results that come out differently than expected. Just explain why you think you got those results. If the results turned out as expected, **explain why** your hypothesis SUPPORTS your data. This is where you apply and explain your scientific thinking. What is the SCIENCE behind your results? Justify your reasoning.

Your final project will be completed digitally. There will be no actual board.

Final project and digital presentation

Due date:
December 10

Entering the School Science and Engineering fair

- Any 4th - 6th grade student who completes an individual or team project may enter the School Science Fair to be held on December 16th.
- If students do not have all parts required for their project done and turned in by December 10th then they can not enter the school fair or be entered into the Regional fair.
- Only students who enter the School or Regional science fair will be interviewed by outside judges. All students will be interviewed by their teacher.

Entering the School Science and Engineering fair

- **Students who enter the school science fair will be interviewed by judges in an online call.**
- **Students must come to Sabal to be interviewed.**
- **<u>At least Three</u> Trials are required for each project entered into the Science Division.**
- **<u>At least Three</u> Modifications are required in Computer Science/ Engineering Division.**
- **Required display and log parts:**

  Detailed Daily Log Research/ Bibliography Data/Graphs

  Results (Data Analyzed and Discussed)

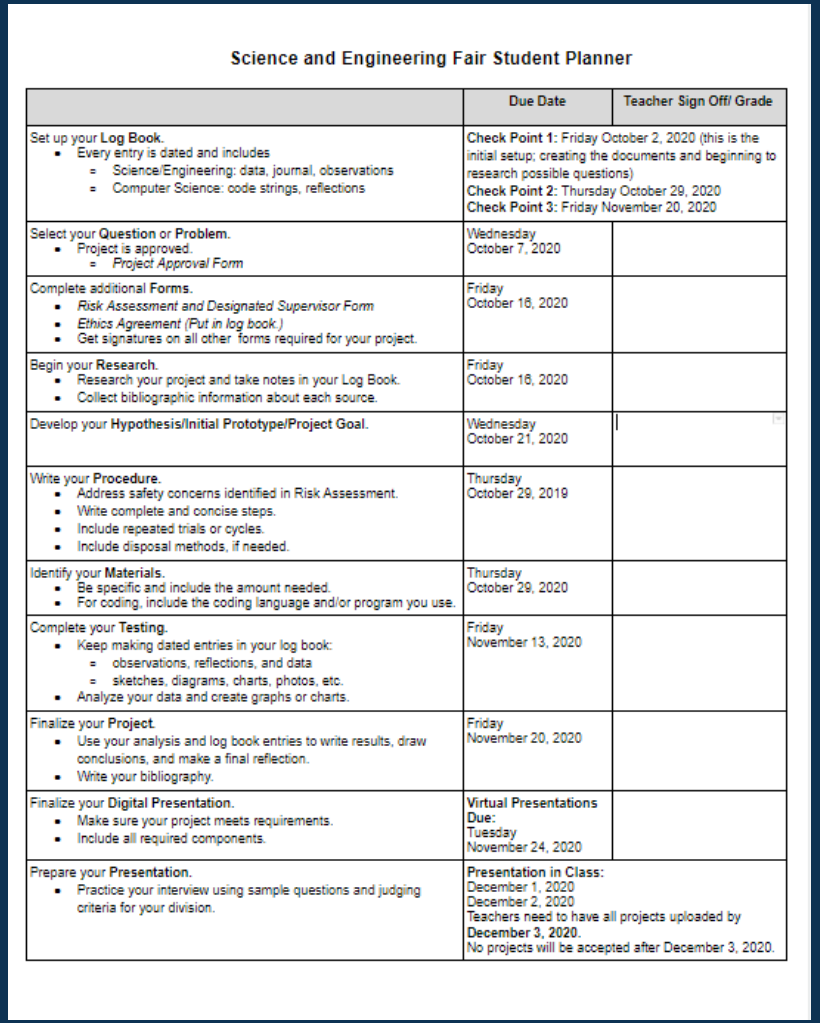
  Conclusion All required forms

Regional Science Fair Information

- Students who compete in the school science fair and place in the top 3 can be entered into the Regional Fair.
- Students are not judged by grade level. Students are now judged ONLY by category and division.
- The Regional Fair will also be virtual, held in February.

Feel free to use The Science and Engineering Fair Student Planner

- Make sure to keep track of when different components of your Science and Engineering Fair are due.
- Frequent checks are necessary to keep all students on track with their project.



Science and Engineering Fair Student Planner

	Due Date	Teacher Sign Off/ Grade

Set up your **Log Book**.
• Every entry is dated and includes
  ▪ Science/Engineering: data, journal, observations
  ▪ Computer Science: code strings, reflections
	Check Point 1: Friday October 2, 2020 (this is the initial setup; creating the documents and beginning to research possible questions)
	Check Point 2: Thursday October 29, 2020
	Check Point 3: Friday November 20, 2020	

Select your **Question** or **Problem**. • Project is approved. ▪ *Project Approval Form*	Wednesday October 7, 2020	
Complete additional **Forms**. • *Risk Assessment and Designated Supervisor Form* • *Ethics Agreement (Put in log book.)* • Get signatures on all other forms required for your project.	Friday October 16, 2020	
Begin your **Research**. • Research your project and take notes in your Log Book. • Collect bibliographic information about each source.	Friday October 16, 2020	
Develop your **Hypothesis/Initial Prototype/Project Goal**.	Wednesday October 21, 2020	
Write your **Procedure**. • Address safety concerns identified in Risk Assessment. • Write complete and concise steps. • Include repeated trials or cycles. • Include disposal methods, if needed.	Thursday October 29, 2019	
Identify your **Materials**. • Be specific and include the amount needed. • For coding, include the coding language and/or program you use.	Thursday October 29, 2020	

Complete your **Testing**.
• Keep making dated entries in your log book:
  ▪ observations, reflections, and data
  ▪ sketches, diagrams, charts, photos, etc.
• Analyze your data and create graphs or charts.
	Friday
	November 13, 2020	

Finalize your **Project**. • Use your analysis and log book entries to write results, draw conclusions, and make a final reflection. • Write your bibliography.	Friday November 20, 2020	
Finalize your **Digital Presentation**. • Make sure your project meets requirements. • Include all required components.	**Virtual Presentations Due:** Tuesday November 24, 2020	
Prepare your **Presentation**. • Practice your interview using sample questions and judging criteria for your division.	**Presentation in Class:** December 1, 2020 December 2, 2020 Teachers need to have all projects uploaded by **December 3, 2020**. No projects will be accepted after December 3, 2020.	

Wrapping up - Sabal Elementary Science & Engineering Fair

- All projects are due by December 10, 2020
- Project presentations will occur in the classroom the 2nd week of December
- The Virtual Science & Engineering Fair will take place in two parts:
  - All Projects will be Judged Digitally December 11-14
  - Students with Projects selected to be entered in the school fair will be interviewed on December 16
- If you have any questions, please contact your child's classroom teacher or Mrs. Warnick-Ellis