

**SARASOTA COUNTY  
STEM FAIR**

**Coordinator Handbook  
Elementary  
Grades 3-5**

# Sarasota County STEM Fair Rules

## Dates/Action Steps

The 2021-2022 Sarasota County STEM Fair will be a combination of virtual and in-person events. Please see timeline below for details.

| DUE DATE   | DESCRIPTION  | COORDINATOR ACTION STEPS   |
|--|--|--|
| FRIDAY,<br>SEPTEMBER 17,<br>2021                 | <a href="#">The STEM Fair School Registration Form</a> must be submitted by all schools that will be participating in the Sarasota County STEM Fair.   | Save PDF as "ES_SCHOOL NAME Registration Form." Upload saved PDF to STEM Fair Teams or Mail or email to <a href="mailto:cheri.dame@sarasotacountyschools.net">cheri.dame@sarasotacountyschools.net</a> .   |
| SEPTEMBER<br>TBA                                 | <b>STEM Fair Coordinator: Updates</b> to learn more about policies, procedures, and requirements for 2021-2022 STEM Fair participation.  | Watch pre-recorded video with all details. Submit FORMS survey after completion.   |
| SEPTEMBER-<br>DECEMBER                           | <b>School Site STEM Fairs:</b> All students participating must submit an <a href="#">Elementary STEM Fair Application and Safety Assessment</a> . It is <b>mandatory</b> that this form is filled out completely and accurate. It should be complete and dated <b>BEFORE</b> experimentation begins. | School site coordinator holds all of the forms (either digitally or paper) so they are easily available when students are chosen to enter the County STEM Fair.  |
| NOVEMBER<br>TBA                                  | <b>STEM Fair Coordinator Training: ZFairs</b> to learn how to upload school site winners to the county STEM Fair virtual platform.   | Watch pre-recorded video with all details. Submit FORMS survey after completion.   |
| WEDNESDAY,<br>DECEMBER 22,<br>2021               | <b>School Site STEM Fair</b> is complete and county participants are determined. It is strongly suggested that each school has a judging process to determine the projects that will compete.  | Determine your top 20 projects. Begin to collect/create digital files for upload to the virtual STEM Fair site. These include a PDF of the student display and logbook as well as a <5-minute video submission.  |
| FRIDAY,<br>JANUARY 14,<br>2022                   | <b>Virtual STEM Fair Registration</b> should be completed for each project that will be participating in the Sarasota County STEM Fair. In addition, <b>Required STEM Fair Paperwork</b> for each project/team that will be entered into the Virtual Fair must accompany the registration.           | Submit safety form and student PDFs and video link <b>electronically</b> via <a href="#">ZFairs</a> ). <a href="#">Coordinator Directions</a> Parents must submit Media Release <b>electronically</b> through <a href="#">ZFairs</a> . <a href="#">Parent Directions</a> |
| MONDAY-SUNDAY<br>JANUARY 31-<br>FEBRUARY 6, 2022 | <b>Round 1 Sarasota County Virtual STEM Fair Judging</b><br>Judges will review student work on ZFairs.com.   | No action needed.  |
| MONDAY,<br>FEBRUARY 8,<br>2022                   | <b>Notification of Invitation to Round 2 Judging</b> will be sent to each coordinator.   | Confirm entrant acceptance of invitation via email. School sites will need to prepare field trip paperwork and Round 2 students will need to design in-person presentation materials.*   |
| THURSDAY,<br>FEBRUARY 24,<br>2022                | <b>Round 2 Sarasota County STEM Fair Judging and EXPO</b><br>Panel of Judges interview students to determine category winners (3-12).  | Chaperone students to daytime in-person event.* The evening event is open to parents and students who have projects participating in the STEM Fair.*   |

\*Events and/or dates subject to change as directed by Sarasota County School Board

## Eligibility

Students grades 3-5 enrolled in any of Sarasota County public, charter, or private elementary schools are eligible to compete in this year's STEM Fair.

## Selection

Each school will be able to enter a total of 20 projects. These entries can be in any combination from the following five categories: Engineering, Earth/Space, Life, Physical Science, and Mathematics/Technology. Students are to be selected through a campus selection process. Schools are encouraged to enter projects in all five categories. It is **highly recommended** that the students go through a judging process like the Sarasota County STEM Fair. The campus selection process will be at the discretion of the school.

## Group Projects

No more than three students can compete in a group project. If team members represent multiple grade levels, the team will compete at the lowest grade level. For instance, if a team consists of a 3<sup>rd</sup> grader and a 5<sup>th</sup> grader, the team will compete against other 3<sup>rd</sup> graders.

## Required Forms

Each Elementary School that wants to participate in the Sarasota County STEM Fair will need to submit a **STEM Fair School Registration Form** no later than 4:30 PM on **Friday, September 17, 2021**. This form identifies the schools that will be participating and is used for planning purposes. This form can be uploaded into the STEM Fair Teams folder for registrations. Save file as "ES\_SCHOOL NAME Registration Form" before uploading.

Students participating in the STEM Fair at the school level and the district level, must complete the **Elementary STEM Fair Application and Safety Assessment** **before** beginning the project to ensure students are aware of safety rules and project guidelines. Each project being entered in the Sarasota County STEM Fair (or each student if a team) must have the Application and Safety Assessment forms submitted through the **Virtual STEM Fair Platform** no later than **January 14, 2022**.

In addition to the paperwork for each student/project, coordinators will enter all projects being submitted to the Sarasota County STEM Fair through the **Virtual STEM Fair Platform** no later than **January 14, 2022**. Coordinators will receive direction for logging in to the platform prior to January. Additional training on this platform will also be offered.

**NOTE: Deadlines will be strictly enforced. Project changes after the deadline will not be accepted.**

## Project Safety

Student projects must meet the safety requirements explained in the **STEM Fair Safety Guidelines Form**. A few key points of this form include:

- Projects **CAN NOT contain mold or bacterial growth**.
- All projects involving humans and live animals must involve minimal risk.

Please refer carefully to this document for further guidance. BEFORE a student begins the experiment or design, consult with STEM directors if you are unsure if the project meets the safety guidelines.

## Project Virtual Display, Logbook, and Video

Students are required to create a virtual display of their project. The only acceptable file format is PDF. Students can create the display in any platform you have access to at your school site, but the end product must be exported to a PDF for the Sarasota County STEM Fair.

The virtual display should highlight all the same STEM Fair project components that a typical project board would include. The components should include:

- Experimental Project: title, purpose/question, hypothesis, background research, variables, materials/procedures, data: graphs/charts, data analysis, images, and conclusion.
- Engineering Project: title, problem, background research, needs statement, design requirements, materials/procedures, prototype (build-test-redesign), results, data: graphs/charts, data analysis, images and conclusion.

Logbooks must accompany all projects. This can be done digitally or handwritten. However, the final logbook must be in a format that can be uploaded to the virtual STEM Fair platform. This may mean scanning handwritten logbooks to create a PDF.

In addition to the virtual display, students participating in the Sarasota County STEM Fair will need to create a video presentation of their project. This will replace the interview portion for Round 1 of judging. It is an opportunity for students to showcase their project and any information that is not already included in their virtual display. It is the site coordinator's discretion as to whether a video is required at the school level for school selection purposes.

The video SHOULD NOT be simply the student reading their display/logbook. This information will already be available to the judges. Students are encouraged to include information not already available. Some talking points aligned with the judging criteria that may assist students in the video creation include:

1. Summarize your project, including the basic science/engineering principles of your project.
2. Describe the support you received from others in completing your project.
3. Discuss strengths and weaknesses of your experimental/engineering design.
4. Explain the importance of your investigation/prototype to the real world.
5. Tell about an unexpected outcome or something you learned during this project.

Technology Requirements: Video should be 5 minutes or less and should incorporate the above talking points. Students have flexibility to be creative in their presentation. The video must be saved and made accessible to share via a sharing link. This can be accomplished by saving the video to One Drive and changing the sharing status to “Anyone with the link”. Copy the link and add the link in the virtual platform submission.

Display boards are optional at school site fairs this school year. Physical displays cannot be entered into Round 1 of the Sarasota County STEM Fair, only digital presentations. **They are not required for Round 1, however,** if a student is invited to the Round 2 in-person judging session, they will need a physical display. This should be a traditional tri-fold board or a digital version.

For all Round 2 display boards, or if school sites are having students create display boards that are not virtual for the school site judging, be sure to abide by the following safety considerations.

1. The following **ARE NOT ALLOWED** at the project/display:
  - a. Living organisms, including plants
  - b. Soil, sand, rock, cement, and/or waste samples
  - c. Taxidermy specimens or parts
  - d. Preserved vertebrate or invertebrate animals
  - e. Human or animal food
  - f. Plant materials, living or dead (except those that are used in the manufactured construction materials in building the display)
  - g. All chemicals including water
  - h. All hazardous substances or devices
  - i. Items that may have contained or been in contact with hazardous chemicals

- j. 3-D printers
  - k. Dry ice or other sublimating solids
  - l. Sharp items
  - m. Flames or highly flammable materials
  - n. Batteries with open-top cells or wet cells
  - o. Glass or glass objects
2. Photographs on the display board must be of the researcher ONLY. The researcher must have parent/guardian permission to have their photograph on display on the board. This is determined by information found in the Sarasota County Student Information System (SIS). The school-based coordinators will be responsible for this information. For non-public schools, a signed media release must be turned in with student paperwork. Photographs of persons other than the researcher ARE NOT ALLOWED on the display board or other presentations.
3. Only paper and pictures should be on the display board. There should not be any other items attached to the board, such as 3-dimensional objects, vines, foam board backing, aluminum foil, fabric, lights, etc. Items other than paper and pictures will be removed. Corrugated border or paper border is acceptable. Please, no headers that attach to the top of the display board. The display board must not display actual materials used in the project; i.e., food, seeds, teeth, crystals, etc.

## Judging

At least two independent judges will review each virtually uploaded project. Judges will view the virtual display, logbook, and the student video component. Scores from the two judges will be averaged together to arrive at the total score. Of the possible 100 points, 25 points are determined by the video submission. Once a project has been reviewed by the judges, scores will be tallied. If there is a large disparity between the two initial judges, a third judge will review the project. Judging scores will not be released, but coordinators will receive feedback submitted from the judges that can be shared with students.

## Awards

Awards will be based upon the scores provided by the judges. For each of the five categories, there will be two winners per grade level, a first place and a second place. An overall category winner will also be chosen. This category winner will

have the highest score for that category, regardless of student grade level.

### Special Awards

In addition to the 1<sup>st</sup> and 2<sup>nd</sup> place awards, students may also receive special award recognition.

### Scoring Rubrics

Judges use the scoring rubrics below when evaluating projects. All questions assessing the project itself are scored using the Project Display Rubric. All questions requiring a student response are scored using the Student Response Rubric.

|   | <b>Project Display Rubric</b>                        | <b>Student Response Rubric</b>  |
|---|--|---|
| 0 | No evidence or incorrect                             | Student has no understanding or is unable to respond or section is missing. |
| 1 | A weak attempt made / many errors or major flaws     | Student has little knowledge or flawed understanding.                       |
| 2 | Partial evidence / some flaws or omissions           | Student has some knowledge but lacks complete understanding.                |
| 3 | Missing some evidence / few minor flaws or omissions | Student has good knowledge but lacks complete understanding.                |
| 4 | Clear evidence / minor flaws or omissions            | Student is able to articulate an adequate understanding.                    |
| 5 | Clear evidence / no flaws                            | Student able to articulate a clear understanding.                           |

### Types of Projects

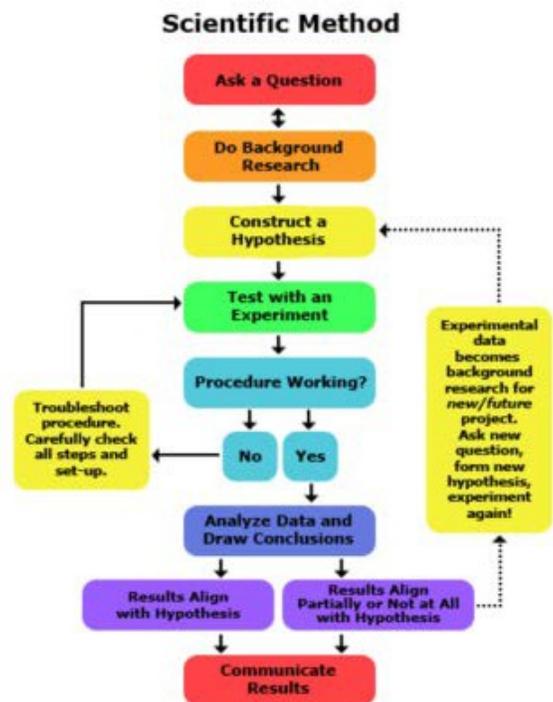
There are two project options for completing a STEM Fair project. An Experimental Project answers a TESTABLE QUESTION and follows the

scientific method. An Engineering Project SOLVES A PROBLEM and follows the engineering design process. Refer to later sections in the handbook that delineate components of these projects.

## Experimental Projects

Experimental projects REQUIRE actual manipulation of a variable to determine its effect. This type of project follows the steps of the scientific method. Projects in this category can be entered in the STEM Fair in one of the following categories:

- \* **Physical Science** is the study of non-living things, including sciences such as chemistry and physics. (i.e. How does paper airplane design affect the distance it can fly?)
- \* **Earth and Space Science** explores the interconnections between the land, ocean, atmosphere, and life of our planet, including sciences such as geology, meteorology, and astronomy. (i.e. Does the type of plant affect the amount of soil that is eroded from a hill due to rainfall?)
- \* **Life Science** is the study of plants, animals, and other living organisms, including sciences such as biology, botany, and zoology. (i.e. How does soil type affect the rate of germination of a bean seed?)
- \* **Mathematics** is the study of quantity, structure, space, and change, including investigating math rules or principles or math in nature (i.e. Do the seeds in fruits occur in specific number patterns?)
- \* **Technology** is the study of the practical application of science used to improve the quality of life including the sciences of computer hardware, software, and applications. (i.e. How does temperature affect how a PC operates?)



## Components of an Experimental Project

### TOPIC

Good science projects are based on topics. These topics should be grade appropriate so that students can investigate on their own. An effective way for students to start developing topics is by asking themselves questions that can be answered through measurable experimentation.

- Brainstorm for topic ideas as a class. Don't discard any ideas for now. List topics or questions just the way that the students suggest them.
- Discuss the qualities that make a topic good or poor. Can the topic be answered by doing a test? What variable would change? What would be measured? Having a testable question based on the topic is essential in investigating an experimental project.
- Use a bulletin board to motivate students to select their science project topics. As students turn in a written copy of their ideas, write their topic titles and names on a strip of construction paper and display on the board. Caption the board "Our Science Project Topics." The ideas displayed on the board may spark ideas in other students.
- Have students list all the science projects that they have seen or done in the past. Encourage them to come up with a new "twist" on an old idea and not to do a project for which they know the outcome - regardless of whether they have seen or done it before. They should be learning something new.

### PURPOSE

This component of a science investigation explains in one statement why you are doing the experiment. The purpose can best be stated in the form of a question or a cause and effect statement.

### RESEARCH

Background research is helpful to better understand your experiment or design. Areas of research can include key vocabulary, history of topic, and student questions. Sources for research include books, magazines, experts, internet articles, text books, and encyclopedias. Research should be recorded and sources should be cited in the Bibliography.

## **HYPOTHESIS**

The hypothesis is a statement that explains what you think might happen based on general understanding of the topic. It is not a wild guess.

## **VARIABLES**

A variable is any factor that can be controlled, changed, or measured in an experiment. The student should include an independent variable, a dependent variable, and all controlled, or constant, variables.

## **PROCEDURE**

The procedure includes a quantitative list of the materials used in the investigation, a numbered step-by-step description of the investigative method used, and the identification of the experimental variable, the control, and factors that are held constant. If the experiment does not have a control it should be noted in the procedure. The student should understand what a control is and why it was not appropriate for his/her project.

## **DATA**

Data refers to the measurable information gathered in an investigation. These may include:

- Hand Written Scientific Journal (sloppy copy or log)
- Drawings
- Measurements (metric)
- Photographs
- Tables, graphs

The following items should be thoroughly explained and emphasized:

- Precision in recording data
- Consistent use of uniform intervals of time
- Specific labeling of groups, specimens, subjects, etc.
- An adequate number of trials (3 or more depending on problem)
- Averaging of data where appropriate
- Use of photographs
- Appropriate graphs

## **GRAPHS**

Graphs are an organized way to display the data collected during an investigation. They enable the student to see the relationship between the variable and the results.

## **CONCLUSIONS**

Consider the analysis of the data as it relates to the "purpose" or question when forming the conclusion. The conclusion may include a statement of support or non-support for the hypothesis, a review of the effectiveness of the experimental procedure, and real word applications.

## **LOGBOOK**

Scientists record in a logbook and it is a required part of every project. It should contain all the information from the beginning to the end of the scientific process. Logbook entries should be dated. Logbooks can be done digitally or handwritten. However, the final logbook must be in a format that can be uploaded to the virtual STEM Fair platform. This may mean scanning handwritten logbooks.

## **DIGITAL DISPLAY**

Students will need to create a digital display of their project and findings. The display should highlight the following components:

project title, purpose/question, hypothesis, background research, variables, materials/procedures, data: graphs/charts, data analysis, images, and conclusion.

## Judging Criteria for Experimental Projects

### **I. Purpose/Hypothesis (10 pts)**

- clear and focused purpose with a creative approach used to answer the question
- contributes to field of study and is testable using scientific methods

### **II. Design and Methodology (15 pts)**

- procedure is clear, including specific directions and metric units
- well-designed plan and data collection methods with complete material list
- variables and controls are defined, appropriate and complete

### **III. Execution: Data Collection, Analysis and Interpretation (30 pts)**

- systematic data collection and analysis done quantitatively, precisely and related directly to the hypothesis
- results are reproducible
- appropriate application of mathematical and statistical methods
- sufficient data collected to support interpretation and conclusions (evidence of at least three trials and an overall average of those trials)
- data displayed graphically and correctly labeled
- clear statement that shows support of the hypothesis

### **IV. Creativity (10 pts)**

- project demonstrates significant creativity in one or more of the above criteria
- project demonstrates imagination and inventiveness that offer different perspectives to new possibilities or new alternatives

### **V. Presentation (35 pts)**

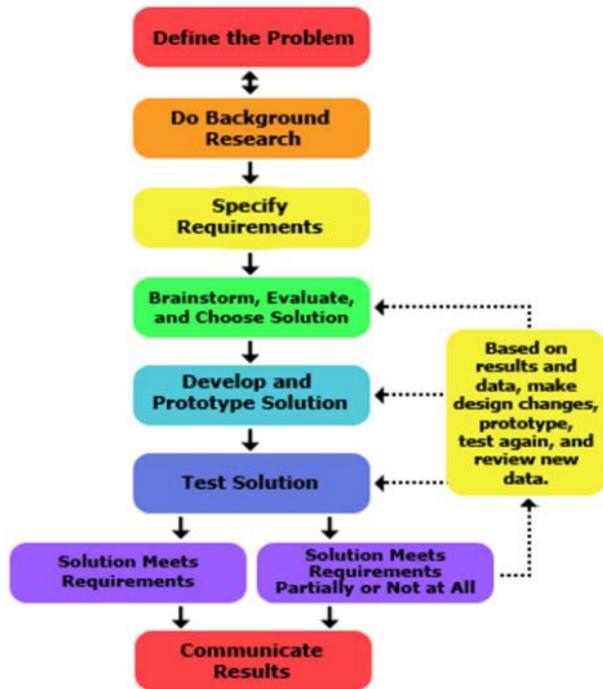
#### **a. Poster (10 pts)**

- logical organization of material with supporting documentation displayed
- clarity of graphics and legends

#### **b. Interview (25 pts)**

- clear, concise, thoughtful responses to questions
- understanding of basic science relevant to project
- understanding interpretation and limitations of results and conclusions
- degree of independence in conducting project
- recognition of potential impact in science, society and/or economics and quality of ideas for further research

## Design Process



## Engineering Projects

Engineering projects are design projects which determine a need for a new or improved product or process. This type of project **REQUIRES** the development of a new idea or product that will solve a problem or need. This type of project follows the engineering design process. Projects in this category will be entered in the STEM Fair as an **Engineering Project**.

## Components of an Engineering Project

### DEFINE THE PROBLEM

A good engineering project is based on a problem that needs a solution. Examining the world is a great way to begin defining a problem.

- An effective way to start to brainstorm engineering project ideas is to have students write down problems that they encounter over a few days. This can give many ideas of problems that one might be able to solve by changing the way something is done or by creating a new device.
- Another idea is to research inventors and their inventions. Think of changes that can be made to this invention to make it better.

### RESEARCH

Research will determine that the problem does not already have a solution. It helps a scientist know what was already done. Scientists can also learn from the work that was done before. Areas of research can include key vocabulary, history of

product or problem, and student questions. Sources for research include books, magazines, experts, internet articles, text books, and encyclopedias. Research should be recorded, and sources should be cited in the Bibliography.

### **NEED STATEMENT**

Decide on one problem to solve and write a statement that explains the need and the prototype that will be invented, that is new or improved, that will meet this need.

### **DESIGN REQUIREMENTS**

Identifying design requirements gives exact details about the prototype. It should include specific information such as size, shape, appearance, cost and material. This can include a detailed drawing of the prototype with labels, title, and dimensions (in metric units). Describe what the prototype is expected to do and how it will be tested.

### **MATERIALS**

A clear material list should include everything needed to create and test the prototype. Remember to use the metric system for measurements.

### **PROCEDURES**

This is a step-by-step list of steps in the process of building and testing your prototype.

### **PROTOTYPE**

**Build-** Using the materials and procedure listed, build the invention prototype.

**Test-** Use the prototype in multiple trials as specified in the design requirements.

Test a minimum of 3 times. Record data to measure if the prototype is successful.

Does it solve the problem? Does it need improvements?

**Redesign-** After analyzing the test, redesign as necessary.

**Retest-** Use the redesigned prototype in multiple trials. Repeat the recreate and retest steps until satisfied with the prototype.

## **RESULTS**

Results can be displayed as graphs, charts, or other visual representations of the data from the trials.

## **CONCLUSION**

A conclusion analyzes the results, the prototype, and if they supported the original needs statement. It can address questions that came up during the creation and testing of the invention. State other information that was discovered in the process.

## **LOGBOOK**

Scientists record in a logbook and it is a required part of every project. It should contain all the information from the beginning to the end of the engineering process. Logbook entries should be dated. Logbooks can be done digitally or handwritten. However, the final logbook must be in a format that can be uploaded to the virtual STEM Fair platform. This may mean scanning handwritten logbooks.

## **DISPLAY**

Students will need to create a digital display of their project and findings. The display should highlight the following components:

project title, problem, background research, needs statement, design requirements, materials/procedures, prototype (build-test-redesign), results, data: graphs/charts, data analysis, images and conclusion.

## Judging Criteria for Engineering Projects

### **I. Research Problem (10 pts)**

- description of a practical need or problem to be solved
- definition of process for proposed solution

### **II. Design and Methodology (20 pts)**

- exploration of alternatives to answer need or problem
- identification of a solution
- background research is diverse with multiple sources
- procedure is sequential and describes the investigation clearly

### **III. Execution: Construction, Testing, and Results (25 pts)**

- prototype demonstrates intended design
- prototype has been tested in multiple conditions/trials
- prototype demonstrates engineering skill and completeness
- quantitative, metric data collected and displayed appropriately
- conclusion based on success in regard to the problem being solved and suggestions for further efforts or practical applications

### **IV. Creativity (10 pts)**

- project demonstrates significant creativity in one or more of the above criteria
- project demonstrates imagination and inventiveness that offer different perspectives to new possibilities or new alternatives

### **V. Presentation (35 pts)**

#### **a. Poster (10 pts)**

- logical organization of material with supporting documentation displayed
- clarity of graphics and legends

#### **b. Interview (25 pts)**

- clear, concise, thoughtful responses to questions
- understanding of basic science relevant to project
- understanding interpretation and limitations of results and conclusions
- degree of independence in conducting project
- recognition of potential impact in science, society and/or economics and quality of ideas for further research