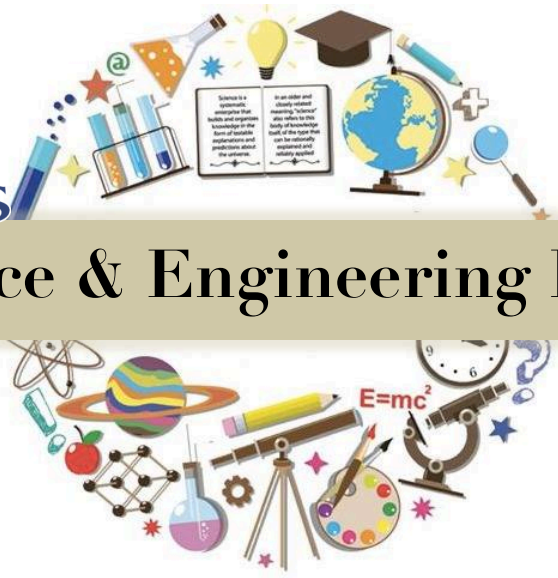


Science & Engineering Fair

Welcome

We are so glad you have decided to be a participant in this year's Springs Charter Schools Science and Engineering Fair! This is an opportunity for our students in grades 4-12 to participate in a science & engineering fair competition. The Science or Engineering fair project is an activity that draws upon basic and advanced skills that have been taught and emphasized throughout science education. Students may generate a project and apply either the scientific method to solve a science problem (science experiment) or develop a solution to a real-world engineering problem (engineering project). We look forward to our annual Science & Engineering Fair that will be held in February. If you need any assistance or have any questions – please contact our Science Specialist for support:

Megan Bunnell
megan.bunnell@springscs.org

Table of Contents

I. Quick Reference Information

Important Dates and Times:

Event	Date and Time	Location	Who Participates?
Homeschool Science & Engineering Fair	February 8, 2019 10 am – 2:30 pm	Springs Event Center 43174 Business Park Drive STE 103 Temecula, CA 92590	ALL Homeschool, Keys and Venture SEF Participants
Springs School wide Science & Engineering Fair	February 20, 2019 10 am – 1:30 pm	Springs Event Center 43174 Business Park Drive STE 103 Temecula, CA 92590	Homeschool, Keys, Venture and Academy Winners
Riverside County Science & Engineering Fair	April 2-3, 2019 Varies	Riverside Convention Center 3637 5th Street Riverside, CA 92501	Winners of the Spring's School Wide Science & Engineering Fair
California State Science Fair	April 29-30, 2019 Varies	California Science Center 700 Exposition Park Drive Los Angeles, CA 90037	Winners of the Riverside County Science & Engineering Fair

Contact for questions:

Megan Bunnell, Springs Charter School Science Specialist
megan.bunnell@springcs.org

Resources:

Springs Charter School Science & Engineering Fair

Riverside County Science and Engineering Fair

California State Science Fair

II. Science Experiment vs Engineering Project

Let's start with the basics – you need to pick an experiment or a project! Before we dive into the details of what needs to be included, let's talk about the difference between the two choices...

Which will YOU Choose?

Science Experiment	Engineering Project
1. State a **question**	1. Define a **problem**
2. Research	2. Research
3. Hypothesis	3. Specify requirements
4. Design **experiment**	4. Alternate **solutions**
5. Test hypothesis – **test ONE variable**	5. Build the best – **test MANY variables**
6. Analyze results	6. Test and redesign as necessary
7. Communicate results	7. Communicate results

PART OF THIS PROCESS IS AN INTERVIEW! THINK ABOUT ...

What COULD the judges ask me?

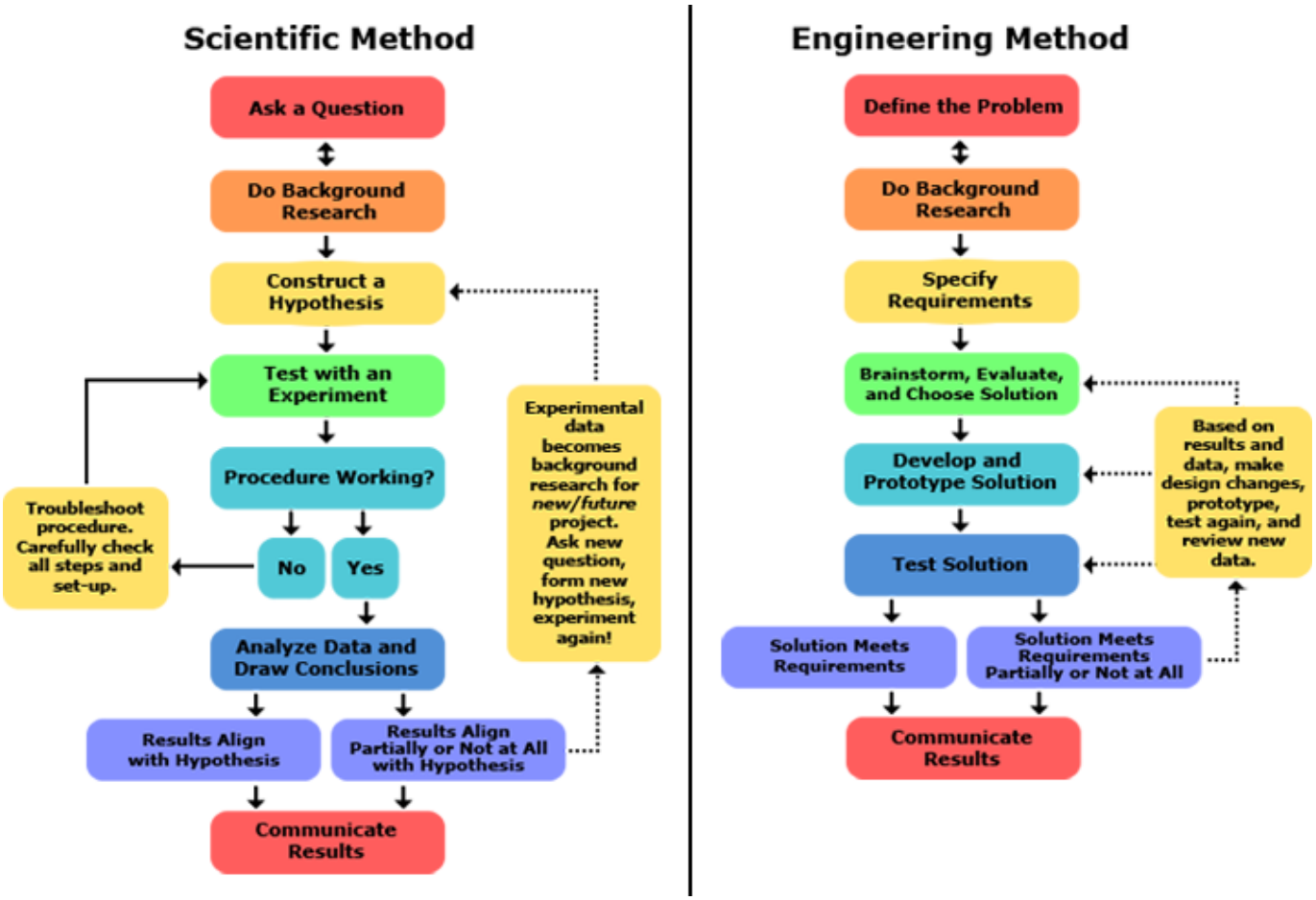
Why is your project important?
How is your project innovative?
What did you learn while working on your project?
What would you do differently if you were to do this again?
What questions do you have now about this field?
What have others done in this field?

Q: Why are there two processes?

A: Both scientists and engineers contribute to the world of human knowledge, but in different ways. **Scientists use the scientific method** to make testable explanations and predictions about the world. A scientist asks a question and develops an experiment, or set of experiments, to answer that question. **Engineers use the engineering design process** to create solutions to problems. An engineer identifies a scientific need: Who need(s) what because why? And then, he/she creates a solution that meets the need.

Q: Which process should I follow for my project?

A: In real life, the distinction between science and engineering is not always clear. Scientists often do some engineering work, and engineers frequently apply scientific principles, including the scientific method. Much of what we often call "computer science" is actually engineering – programmers creating new products. Your project may fall in the gray area between science and engineering, and that's OK! Many projects, even if related to engineering, can and should use the scientific method. However, if the objective of your project IS to invent a new product, computer program, experience, or environment, then it makes sense to follow the engineering design process.



III. The Science Fair Project

There are 3 parts that must be included with the final project.

A. **The Log Book**
B. **The Display Board**
C. **The Written Abstract**

A. The Log Book

THIS IS WHERE YOU WILL PUT ALL OF YOUR WORK EXCEPT THE DISPLAY AND REPORT.

Journal

Keep a journal of dates and times spent working on all aspects of the project including: Research, developing your experiment, testing your experiment, and analyzing the data. This will help you when writing your final report.

Actual Data Collected

During your actual experiment you should keep a detailed log of all data collected. Make sure to record dates, times, and **everything** you do. Use pictures and/or diagrams to help show the process you undergo.

All Pre-Report Assignments

All assignments that are completed during the planning of your project should also be kept in this log book. Place them in chronological order.

Additional Relevant Materials

You also may want to add copies or printouts of your resources, extra pictures that will not be placed on your display board and anything else that you used for this experiment.

B. The Display Board

THIS IS WHERE YOU PRESENT YOUR PROJECT TO THE AUDIENCE AND JUDGES. IT IS A SUMMARY OF YOUR FINDINGS AND SHOULD BE CONCISE AND GRAB THE READER'S ATTENTION.

Display Board Mandatory Sections

- **Title Information**
- **Question** (Problem)
- **Hypothesis** (Research)
- **Materials**
- **Procedure**
- Data (Tables, Pictures, Graphs)
- **Results/Analysis**
- **Discussion**
- **Conclusion**
- Next Steps
- **Acknowledgments**

Must Include

- Titles for the above **bolded** sections
- Diagrams/Pictures/Charts
- Name & School on Back
- 3 sides (Hinged)
- Must stand on its own

Dimensions

Maximum Size:

- *2.5 ft deep (front to back),*
- *4 ft wide (side to side)*
- *6.5 ft high (table)*
- *9 ft high (floor)*

The FINAL Display

THIS IS THE FINAL PRODUCT OF YOUR EXPERIMENT, RESULTS AND CONCLUSION - AND WILL BE DISPLAYED DURING OUR SCIENCE FAIR FOR ALL TO SEE.

- ALL writing on board should be typed or neatly printed in pen and easily read from 5 feet away.
- Pictures or Diagrams are key!
- 3D Models or Materials can also be included.
- Color...Color...Color!
- **HAVE IT PROOFREAD!**

Title Information: Project Name (Can be different from question), your name, Date, Course, Instructor, School.

Question (Problem): State the problem or question you are answering

Hypothesis and Research: State your hypothesis and reasoning for it. *(Research knowledge goes here)*

Materials: List the materials you need during your experiment. Be specific.

Methods: The methods or procedure is a detailed list of steps you used to conduct your experiment. The steps must be numbered and detailed enough for someone to re-do the experiment.

Results: This section is a summary of your raw data. The data should be compiled and presented into colorful readable data tables and/or graphs. In addition, write your results in narrative form. Summarize all data including the qualitative observations, which could not be put in a data table or graph.

Results Discussion: Analyze why you think you got the results you did. Discuss any errors that may have occurred, how they may have affected your results, and what you may change in the future.

Conclusion: State whether your hypothesis is correct or not, and your final conclusion. This statement should not add to or take away from the problem or hypothesis.

Acknowledgements: A "Thank You" to all the people who helped you. *(Family, friends, teachers, or experts who participated in your experiment.)*

C. The Written Abstract

Write this LAST!

Abstract: Brief (one page max) typed summary of experiment including an overview of your question, hypothesis, results and conclusion.

References: Attach to abstract. List the resources you used. 3 sources min (5 recommended). Must have at least 1 print source and 1electronic source. (*ex. Science book, encyclopedia, website)*

IV. Fun and Helpful Facts

- You can do the project as a team! A maximum of three students per team – the project will only be judged in division: Grades 4-5, 6-8 or 9-12. If you have students in different grade divisions, the project will be judged in the division of the oldest team member
- If you need electricity, please be specific about that – AND you must have a power switch
- There are A TON of regulations about projects involving live subjects or human/animal tissues. Please read those CAREFULLY and get your project pre-approved prior to starting your research/experiment.
- If you are using audio/visual presentations/photographs – those all must be approved prior to the Science Fair.
- There is A LOT of information available for you on any specific questions you have through the Riverside County Science and Engineering Fair Information. Or just ask . . . don't assume the project you want to do meets the requirements/regulations – confirm before you start!
- There are SOOOOOOO many categories . . . perhaps peruse them to get ideas (RCSEF Info)
- Here are a few sources for Ideas/Research:
  - Botanical Gardens
  - Industries
  - Nature Centers
  - Public Libraries
  - Marine Reserves
  - Animal Hospitals
  - Natural Museums
  - Airports
  - Commercial Nurseries
  - Colleges/Universities
  - Zoos, Aquariums, or Wildlife Rescue Centers
  - Local hospitals (inc. research facilities/libraries)
  - Medical, Dental, Veterinary Offices
  - Scientific Websites
- **There are NO projects allowed that use tobacco, alcohol, or any controlled substance.**
- You CANNOT include the following on your display:
  - logos
  - reference to institutions/mentors
  - items intended to be distributed
  - references to a patent status
  - contacts or website information
  - previously won awards
  - prior year's materials/displays
  - items with extreme temperatures that can cause harm, flames
  - items that have moving parts that can pinch can only be a display
  - distracting sounds/lights
  - no storing items under the table
  - living organisms
  - soil, sand, rock, cement or waste
  - taxidermy or preserved animals
  - food, raw plant materials
  - body parts or fluids
  - chemicals (including water)
  - hazardous substances/devices, sharp items, weapons
  - 3-D Printers
  - dry ice
  - batteries (open-top cells/wet cells)
  - glass

V. Judging Criteria (subject to change)

Science Project Judging Criteria	Engineering Project Judging Criteria
Research Question (10 pts.) 1. Clear and focused purpose 2. Identifies contribution to field of study 3. Testable using scientific methods	**Research Problem (10 pts.)** 1. Description of a practical need or problem to be solved 2. Definition of criteria for proposed solution 3. Explanation of constraints
Design and Methodology (15 pts.) 1. Well-designed plan and data collection methods 2. Variables and controls defined, appropriate and complete	**Design and Methodology (15 pts.)** 1. Exploration of alternatives to answer a need or problem 2. Identification of a solution. 3. Development of a prototype/model
Execution: Data Collection, Analysis and Interpretation (20 pts.) 1. Systematic data collection and analysis 2. Reproducibility of results 3. Appropriate application of mathematical and statistical methods 4. Sufficient data collected to support interpretation and conclusions/claim	**Execution: Construction and Testing (20 pts.)** 1. Prototype demonstrates intended design 2. Prototype has been tested in multiple conditions/trials 3. Prototype demonstrates engineering skill and completeness
Creativity (20 pts.) a. Project demonstrates significant creativity in one or more of the above criteria	**Creativity (20 pts.)** a. Project demonstrates significant creativity in one or more of the above criteria
Presentation Display (35 pts.) **Poster – 10 pts.** 1. Logical organization of material 2. Clarity of graphics and legends 3. Supporting documentation displayed **Interview - 25 pts.** NOTE: *not applicable for Elementary (Grades 4 and 5) Division as those students are not interviewed* 1. Clear, concise thoughtful response to questions 2. Understanding of basic science relevant to project 3. Understanding interpretation and limitations of results and conclusions 4. Degree of independence in conducting project 5. Recognition of potential impact in science, society, and/or economics 6. Quality of ideas for further research 7. **For team projects, contributions to and understanding of project by all members**	**Presentation Display (35 pts.)** **Poster – 10 pts.** 1. Logical organization of material 2. Clarity of graphics and legends 3. Supporting documentation displayed **Interview - 25 pts.** NOTE: *not applicable for Elementary (Grades 4 and 5) Division as those students are not interviewed* 1. Clear, concise thoughtful response to questions 2. Understanding of basic engineering relevant to project 3. Understanding interpretation and limitations of results and conclusions 4. Degree of independence in conducting project 5. Recognition of potential impact in science, society, and/or economics 6. Quality of ideas for further research 7. **For team projects, contributions to and understanding of project by all members**