# Science & Engineering Fair

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## 2018 Student Handbook


When you do a Science & Engineering Fair project, you get to drive your project in the direction that you want to take it. You get to decide what you learn and how you want to learn it. Being in the driver's seat of your learning experience is really exciting!

## Who will ride next to you?

Regardless of your age, you will need to have the help of an adult while you take your Science & Engineering Fair ride. You can expect that your adult support will help you set realistic goals. They can help you stay on track until you reach your goals. Just remember that this is <u>your</u> project, so you decide how you want to do it – you drive it, always! Asking your adult support to do certain parts of your project would be like asking them do your homework for you. That would defeat the whole purpose of your project. And it would rob you of your opportunity to develop important STEM skills and "Skills for Success."

## Get your friends on board!

Working with a friend on a Science & Engineering Fair project can be really fun! Plus, two brains can be better than one brain at solving a problem. Working with a friend will definitely challenge your team skills. Team skills can be tough to develop, but they are some of the most important skills you can have in life. Just remember that positive and respectful communication makes for a strong team. Which would you prefer to hear: "Wow, great idea! Maybe we can also try *this*." Or "I don't like your idea. I think we should do it my way instead." Always remember to be positive and respectful.

## Start down a road of discovery – ask questions

Do you remember the last time you asked "How does *that* work?" or "Why does *that* happen *that* way?" These types of questions might jumpstart your Science & Engineering Fair project. Scientists and engineers ask questions – lots of questions!

There is science behind EVERYTHING! Try to find the science or engineering behind your favorite activity. You can find science in a sport, music, art, or history. Or maybe just sit and observe the science and engineering in your everyday life. It could be food, pets, appliances, vehicles, weather, or electronics.

## Which type of science drives you?

Science can be categorized into four main Scientific Branches[1]. Some scientists work across different branches. Some stay within a single Scientific Branch. Take a look at the Scientific Branches in the table below. Is there a Scientific Branch that interests you the most?

| Scientific Branch | Description | Example Fields |
|---|---|---|
| **Life** | Study of all living organisms and their life processes, on Earth and beyond. | Biology<br>Medicine<br>Ecology |
| **Physical** | Study of nonliving things, their physical properties, and how they work in the universe and beyond. | Physics<br>Chemistry |
| **Social** | Study of the social life individuals within a society and the environment around them. | Economics<br>Political Science<br>Human geography<br>Sociology |
| **Earth & Space** | Study of Earth, sky and space physical properties and their interaction. | Geology<br>Astronomy<br>Meteorology |

**Table 1: Scientific Branches[2].** 

[1] Information Based on the Next Generation Science Standards.

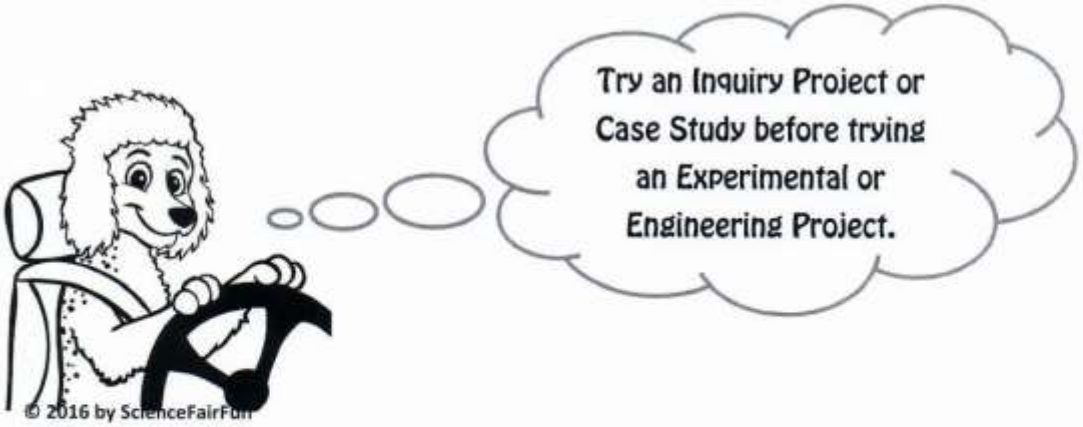
[2] Modified with permission from STEM World Publishing's "Make Science Fair Fun™ – Experimental Project, Step-by-step Workbook, Grades 4-6", 2018.

## Which road do you want to take?

Scientists and engineers use many different methods for doing research. Take a look at the table below. It shows common Research Methods that students follow during Science & Engineering Fairs. It also shows how some Science & Engineering Fairs categorize Project Types based on the Research Method. The table might help you decide on a method to use for your project. Also, you can use computer programs, apps and coding as part of any project.

| Project Type | Research Method | Questions | Goal |
|---|---|---|---|
| **Inquiry** | Scientific Inquiry Process | "How does *this* work?" or "Why does *that* happen?" | Summarize or demonstrate a science or engineering principle or fact. |
| **Case Study** | A published scientific method, theory or procedure | "Will *that* scientific method, theory or procedure work on *this* problem?" | Use a published method, theory or procedure to do a similar project, often including collecting data. |
| **Experimental** | "The" Scientific Method | "How does *this* affect *that*?" or "If I were to change *this*, then how would *that* turn out differently" | Design and perform an experiment that answers a testable cause-and-effect question. |
| **Engineering** | The Engineering Design Process | "How can I make *this* so it serves *that* purpose?" | Improve how something is made to meet specific needs. |

**Table 2: Project Types & Research Methods[3].** 




[3] Modified with permission from STEM World Publishing's "**Make Science Fair Fun™ – Experimental Project, Step-by-step Workbook, Grades 4-6**", 2018.

## Project tips[4]

| | |
|---|---|
| **References** | • Reference at least one source of information: book, magazine, journal, interview, educational videos, images, webpage, etc..<br>• If you used more than one source, then give a reference for each source.<br>• If you copied sections of a published project, then you must provide a reference to the section that you copied. You can write "Copied from ...". If you copy other people's material (words, images, etc.) on your board and don't give a reference, then that is called plagiarism. Plagiarism is illegal.<br>• It is okay if you follow a published project found on the Internet or in a book. But, try to add your own ideas to the project. Use your creativity and problem solving skills. These skills are some of the most important skills you can develop during your project. |
| **Project Board** | • The project board content should flow from top to bottom and left to right.<br>• Be sure that you can explain everything that you put on your project board.<br>• If you can, print out your section headings using a 70-point font or larger.<br>• If your computer skills are not speedy, then simply hand-write the content for your board. You can also hand-draw tables & graphs.<br>• Use as many drawings, figures, photos, and graphs as you can. They should show what you did and what your results were.<br>• Do not include too much text. Someone should be able to read and understand your project board in less than 10 minutes. They should not need your help to understand what you did.<br>• All projects should include at least a Title, Introduction, and Bibliography (or References).<br>• Experimental Projects should also include the following sections: Question, Hypothesis (or Prediction), Background, Experimental Set-up, Experimental Procedure, Results, and Conclusions.<br>• Be aware of limits on the project board size. Review the **Rules Checklist.** |
| **Models** | • Experimental or model items are strongly encouraged.<br>• Be aware of restricted materials at your display. Review the **Rules Checklist**. |
| **Notebook** | • Use a notebook to plan and take notes throughout your project.<br>• If your notebook contains a lot of information, you might want to use page markers to organize your notebook. You might title the sections. For example: Brainstorming, Data Collection, 1st Experiment, 2nd Experiment, etc. |



[4] Modified with permission from STEM World Publishing's "**Make Science Fair Fun™ – Experimental Project, Step-by-step Workbook, Grades 4-6**", 2018.

## Challenging conditions

Science & Engineering Fair projects are challenging! That's what makes doing them such a great learning experience. Sometimes a project doesn't go as planned. Don't fall into the trap of getting discouraged. What you think of as a "mistake" might actually be an important step to answering your question. Doing a project is all about having fun learning and experiencing what its like to be a scientist or engineer. It is not about having a perfect project.

## Rules of the road

Check out the **Rules Checklist**, then do 3 simple steps:

1. Before you begin your project: read the **Rules Checklist** with an adult.
2. After you complete your project: complete the **Rules Checklist**.
3. The day of the fair: include the **Rules Checklist** in your project notebook.

## What your journey will look like

Regardless of your project type or topic, you will follow the same steps[5].


↻ Keep in mind that this step might need to be repeated.






[5] Modified with permission from STEM World Publishing's "**Make Science Fair Fun™ – Experimental Project, Step-by-step Workbook, Grades 4-6**", 2018.

## A successful journey

You will get to showcase all that you learned during your Science & Engineering Fair. You'll want to focus on sharing how you used your STEM Skills and your Skills for Success: creativity, problem solving, communication, and teamwork. Its not about having a "perfect" project. It's okay if your project didn't work out as planned. Scientists' projects rarely turn out as expected the first time. You are successful if you learned something new and have improved your skills!

## Advancing beyond your school's Science & Engineering Fair

If you like competitions, then you might want to attend or enter a Regional Science & Engineering Fair. To enter one, you might need to complete extra paperwork. Some of the paperwork might be due before you begin research. Most regional fairs are for students in 6th - 12th grades and only allow Experimental and Engineering Projects, not Inquiry Projects. So, look into your options before starting your project.

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