Ayers Science Fair Handbook

2017

http://www.AyersScienceFair.org

A Message From the Science Fair Committee

Congratulations for signing up to participate in the Ninth Annual Ayers Ryal Side Science Fair for students in Grades 3-5!

The following information is designed to help you prepare for the fair, including guidelines on how to pick a topic, create a project, and display your project.

This package also includes very important safety rules, including limitations for animal projects. Please pay close attention to the safety rules and limitations. All participants will be required to follow these important rules.

If you have any questions along the way, please just ask. You can e-mail any questions you have to: joshabell@gmail.com or ask Ms. Smith at school.

We look forward to seeing your projects in May!

-- 2017 Ayers Science Fair Committee

2017 Science Fair Schedule

Important Dates

Date	Milestone
Monday, April 24, 2017	Deadline for students to submit their project titles.
Thursday May 4, 2017	Science Fair Day!

Fair Day Timeline

Time	Event
AM Drop-Off	Participants bring their projects to the gym in the morning.
2:00PM	Participants go to the gym at the end of school and prepare their projects which will have been placed on tables by grade. Only participating students are permitted in the gym.
2:30PM - 4:00PM	Students present their projects, after which students should be picked up from the school (or if they attend YMCA AfterCare, be returned to this program).
6:00PM - 8:00PM	All of the Ayers Community is invited to come and see the projects. Participants in the fair should return to school and attend to their displays! During this event students will be recognized for their work.

The Day After the Fair

Science Fair projects remain on display in the gym for other grades to come and see the following day.

Students should plan to bring their projects home on Friday, May 5th at the end of the day.

Safety Rules

The following safety rules must be followed:

1. No combustible materials, such as gasoline or alcohol.
2. No flames.
3. No temperatures above 100 degrees Celsius (212 degrees Fahrenheit) in display.
4. No temperatures below 0 degrees Celsius (32 degrees Fahrenheit).
5. No dangerous chemicals such as toxic materials or medicines, including dry ice.
6. No poisonous or disease-causing organisms.

If the project is too dangerous for the student to handle, it is probably best to choose another project!

Avoid the need for an electrical outlet

Please avoid using electrical power for your display. There are very few display locations that have access to an electrical outlet. Participants cannot be guaranteed a display location that is near an electrical outlet. **Batteries are allowed.**

Animal Projects

Animal study projects would maintain a respect for all living things. For this science fair, the following rules apply:

1. No vertebrate animal studies are allowed except for observations of animals in their natural environment (for example, wild animals in the wild, zoo animals in the zoo, pets around the house). Vertebrate animals include people, dogs, cats, hamsters, guinea pigs, mice, rats, birds, fish, amphibians, reptiles, and similar animals.
2. No projects are allowed that might inflict pain or injury to the animals under observation.
3. Small animals are allowed on display. The animal must be caged or contained. The cage must be small enough to fit on the allotted space for your project. Please no animals larger than a guinea pig, and no cats or dogs on leashes.
4. Live animals must be taken home after the evening of the fair and cannot be displayed during the classroom visits.

Please contact us if you have any questions!

e-mail: info@AyersScienceFair.org

Step 1 : Choose a Topic

There are **three** types of projects in the Ayers Science Fair: **experimental** projects, **research** projects, and **engineering** projects.

Experimental Project	Research Project	Engineering Project
Do experiments to try and test a hypothesis.	*Research and share facts about a topic that interests you.*	*Identify a need and then brainstorm and prototype a solution.*

To pick the right topic for you, check out science books from the library, talk to adults you know that work in the science field, or speak with people who just love science. If you have a computer and internet access, use the website list provided later in this handbook to delve into the endless options.

Looking deeper into a particular category that interests you may also help narrow down possible science fair topics. Most projects can be placed into one of the following categories.

Physical Science	**Earth and Space Science**	**Life Science**
Chemistry Physics Electricity & Magnetism Aerodynamics	Geology Oceans Weather & Climate Environmental Issues Ecology Astronomy	Anatomy Microbiology Genetics Zoology Botany
Applied Science	**Behavioral / Health Science**	***What interests you?***
Applied Mathematics Engineering Computers	Food Sports Forensic Science Psychology & Sociology Consumer Science Health & Medicine	

Step 2 : Create Your Project

Once you have selected your topic, the real fun begins! Your project can be a research-based project, an experimental project, or an engineering project depending on what suits your topic and resources.

Research Projects

For a research project, your goal is to learn facts about your topic and share those facts in an interesting and comprehensive display. Your research display can include: information from the internet and the library, graphics, comparisons, displays of charts and graphs, statistics from conducting a survey, a demonstration, a model, samples, or collections.

Here's an example of a research project:

> *Megan loves collecting crystals! She is fascinated about them and has quite a collection. She wants to display her collection while demonstrating that she has learned something new about them. She decides to ask the question, "What are some common crystals?" Megan will then walk through the following steps to complete her project:*

1. Read books about crystals, investigating what is common and not so common.
2. Research using the internet and find some interesting photographs of really neat crystals. Then she draws some formations herself.
3. Try growing common crystals.
4. Complete her collection so that she has both a polished and rough specimen of each crystal. This will let her ask people visiting her project to try and pair up the matching crystals.
5. Provide general information about each crystal.
6. Find an interesting way to proudly display her collection and project.

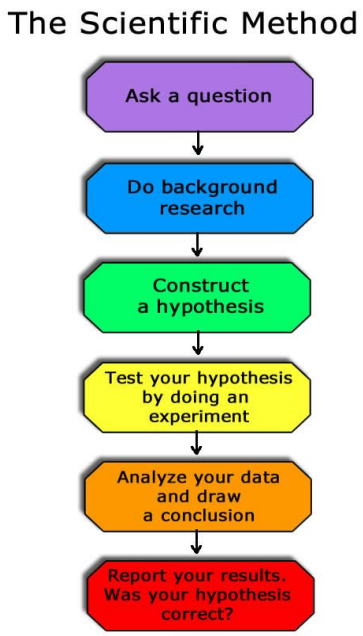
Keep in mind not all research based projects have collections.

Experimental Projects

Experimental projects use the **scientific method**.

The steps of the scientific method are to:

- Based on observations, ask a question
- Do background research
- Construct a hypothesis
- Test your hypothesis by doing an experiment
- Analyze your data and draw a conclusion
- Communicate your results



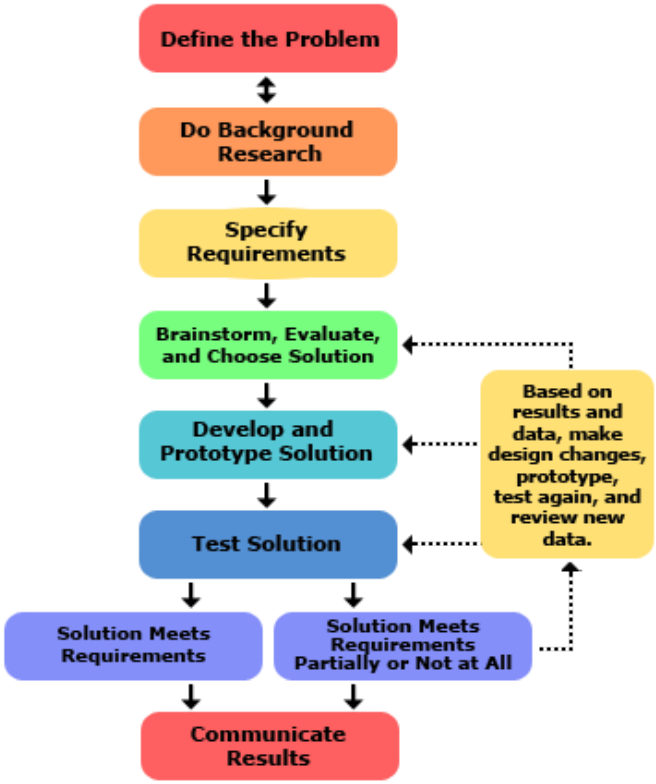
Here is a sample of an experimental project:

> *Alexander is really curious about how batteries work. After doing some initial research, he decides to do an experimentation science fair project - one that requires an experiment and that expects him to follow all six steps of the Scientific Method.*

1. Alexander asks the question, "Can I create my own battery?"
2. He researches the components of a battery and learns all about positive electrons, negative electrons, circuits, and current flow.
3. He creates a hypothesis. In this case, he hypothesizes that he can create a battery using lemons, zinc, copper, and wires.
4. “I believe I can make a battery using lemon, zinc, copper, and wires.”
5. To test his hypothesis, he sets up an experiment using the materials listed in his hypothesis. In this case, copper metal, zinc metal, wires, alligator clips, lemons, and a small LED.
6. Alexander's initial experiment fails. He analyzes his experiment and his research and decides that he used insufficient zinc and copper. After adding more, he lights the LED.
7. Alexander concludes that his hypothesis was correct and demonstrates how to create your own battery.

Engineering Projects

Engineering projects try to come up with a solution to a problem and use the **engineering design process**.



The steps of the engineering design process are to:

- Define the problem
- Do background research
- Specify requirements
- Brainstorm solutions
- Choose the best solution
- Construct a prototype
- Test and evaluate the solution

Here's an example of an engineering project:

Sue knows that fresh water is sometimes hard to comeby, so she wants to learn a technique to create fresh water while away from conventional sources like a spigot or stream.

1. Sue defines the problem, "People sometimes don't have access to drinkable water".
2. She researches multiple ways people and animals collect water when it is scarce such as collecting rainfall or finding bodies of water and how to make it drinkable.
3. Sue decides to specify that her solution should produce a day's supply of water, and should not require electricity.
4. In her research, Sue learns about solar water purifiers, so she brainstorms what she material she could use around her house to build one.
5. Sue constructs a prototype using plastic containers, plastic wrap, small weight, and salt water to simulate sea water.
6. Sue tests her solution, and while it does make some fresh water without electricity, it would not produce a days supply of water. So she again brainstorms how she might change her design to meet this requirement.

Step 3 : Prepare Your Presentation

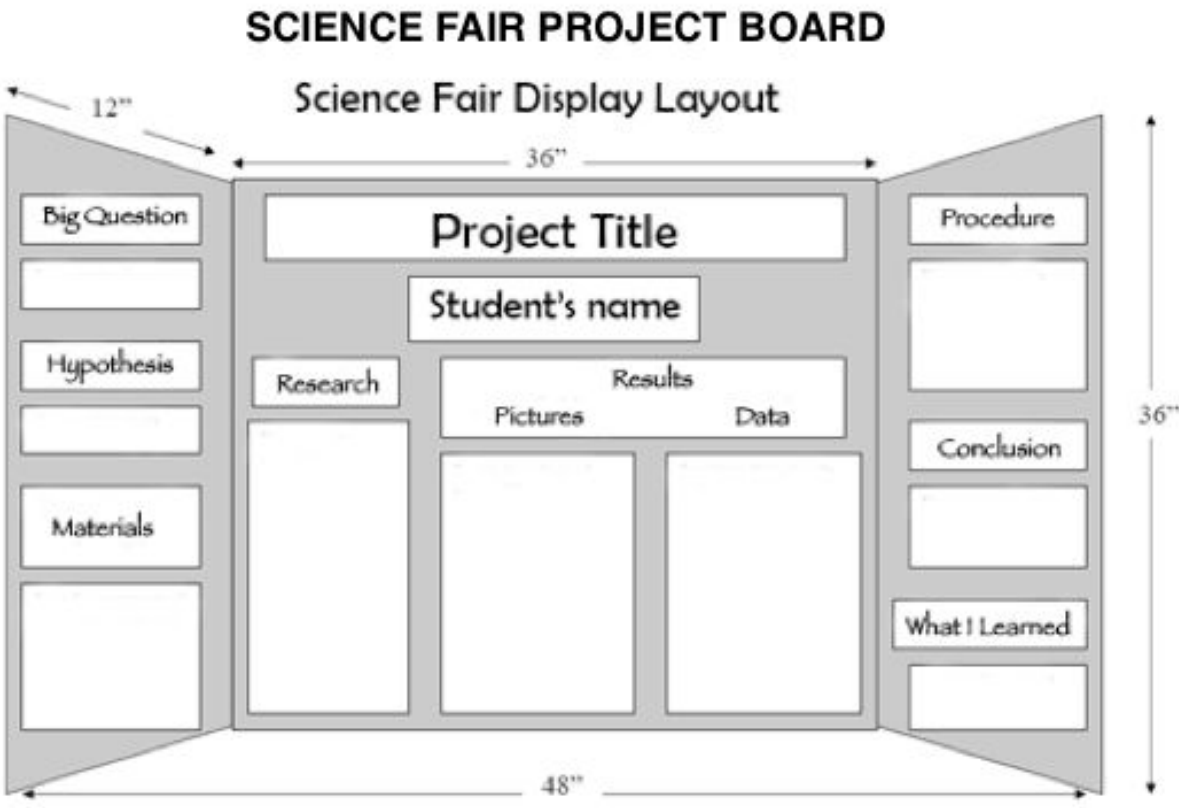
Once your project is complete, it's time to show your work! At the science fair, participants will be given a three-foot wide, two-foot deep space on a table for project display. There needs to be enough room for all the displays, so please do not make yours any wider than three feet wide, two-foot deep.

A tri-fold display board will be provided for you.

Also, remember that participants cannot be guaranteed the availability of an electrical outlet. Avoid using AC power for your display (batteries are acceptable).

Many participants also build models or display parts of their experiments on the table in front of their poster displays. If you took notes or used a journal, you could put your notebook or journal on display!

Here's an example template for a science fair poster:



Presentation Guidelines

Students should be prepared to present their projects and answer questions. The best way to prepare for this, is to practice presenting your project to family and friends before the science fair.

We suggest writing and practicing a short explanation of your project. Introduce yourself, how you got the idea, what experiments you performed or solution you selected, and what your results were.

Here are some good questions that you can include in your presentation or practice answering.

- Where did you get this idea?
- How did you come up with this title?
- What research did you do?
- What was your hypothesis?
- Why did you think that would happen?
- What did you measure and how?
- What does that graph tell you?
- Why/how are your findings important?
- Who might want to know this information?
- What would be the next experiment you would do?
- What was the hardest part (or most fun, or most exciting, or most surprising, etc.)?
- Who helped you?
- If you had to do it all over again, is there anything you would do differently?

You can learn a lot from making mistakes, so if something doesn't work as expected, that's OK!

- Why do you think it didn't work?
- How did you change your experiment or design?
- What would you do differently next time?

> *"I have not failed. I've just found 10,000 ways that won't work."*
> *Thomas Edison*

Online Resources

Can't decide on a topic? Not sure what your project should look like? Use these online resources for ideas!

Always get permission before using the internet!

Science Buddies

- http://www.sciencebuddies.org

Science Buddies has a nice survey tools, which recommends project ideas based upon your interests. It also has excellent explanations of the Scientific Method and Engineering Design Method, as well as other tips to creating an excellent science fair project.

Education.com

- http://www.education.com/science-fair/elementary-school/

Education.com has over 700 science fair project ideas for elementary school students.

All Science Fair Projects

- http://www.all-science-fair-projects.com

Details on over 1,000 science fair projects, which can be searched or browsed.

Discovery Science Fair Center

- http://school.discoveryeducation.com/sciencefaircentral/

Offers Science Fair topics and presentation tips.

YouTube

- https://www.youtube.com/

With adult supervision, you can go to YouTube and search “science fair projects" or "science fair presentations" to get a feel for what a science fair looks like, listen to students discuss their projects, or get an idea for a project.

Frequently Asked Questions

We will maintain a list of frequently asked questions at:

www.AyersScienceFair.org

Please check there for updates, or if you have any questions, e-mail us!

joshabell@gmail.com

Can I work with a partner?

Yes! This year you are allowed to work with one other partner. If you choose to work with a partner, be sure to talk with your parents to help coordinate time to work together on your project! Be sure to name your partner when submitting your project title.

Do I have to do an experiment, or can I research and explain an interesting topic?

Both research projects and experimental projects are acceptable.

If you choose to do a research project, consider doing something to supplement your research, such as building a model or conducting a survey. For example, if you want to study how highway accidents are related to driving habits, you could survey drivers about the speed they drive, whether they wear seatbelts, and whether they eat or talk on the phone while driving. Share your survey results as part of your display!

Can an adult help me with my project?

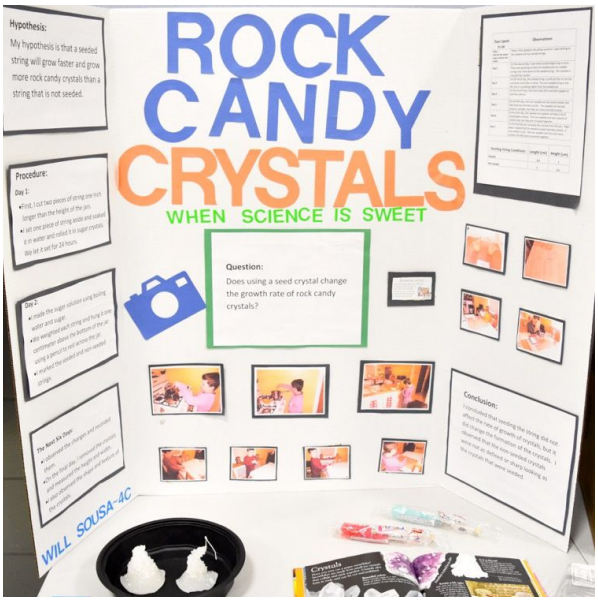
Yes. In fact, an adult should help you with any part of your project that requires supervision. However, you should do as much of your project on your own as you can - especially your display board.

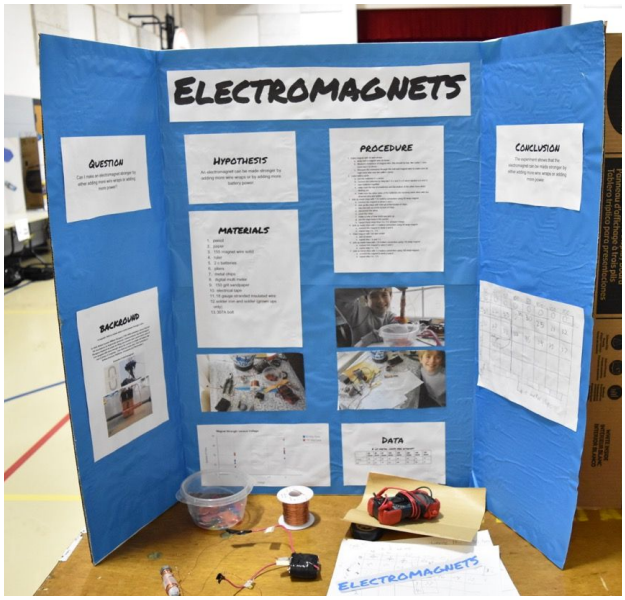
What should my display look like?

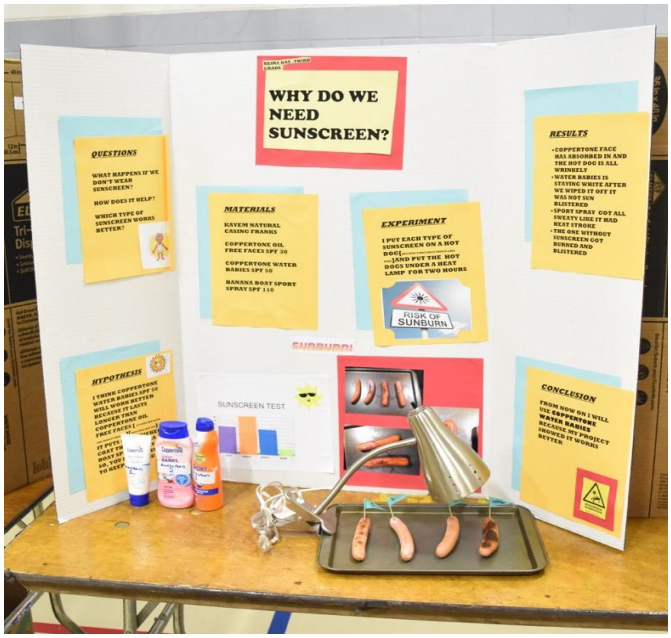
Your handbook includes ideas about what your display should include. Most importantly, your display should be neat and organized, and it should focus on the important aspects of your project. Be creative - use artwork or pictures to make it interesting to review. Do not forget to put your name, project title, and grade on the front of your display!

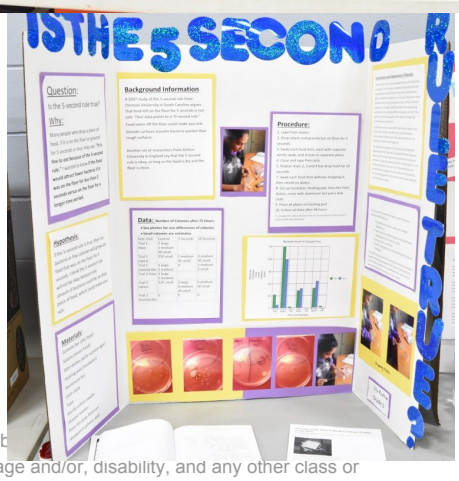
What do some past projects look like?

Here are some pictures from previous years science fair!









Science Fair Project Submission Sheet

Please return this sheet to school on or before **Monday, April 24, 2017**.

You may also submit this information online at www.AyersScienceFair.org.

If you have any questions, please e-mail: joshabell@gmail.com.

Student's Name: _____ Grade: _____

Teacher: _____

Type of Project:

☐ Research Project ☐ Experimental Project ☐ Engineering Project

Partner's Name (Optional): _____

Project Title: _____

Pick-Up Method After Fair-Day 2-4PM Event: ☐ Student Walks Home ☐ Guardian Pick-Up ☐ YMCA After-Care

What is the idea of your project?

Describe your project in a sentence or two. For example, what do you plan to research, or what question do you plan to investigate in an experiment, or what problem or need do you try to solve in an engineering project?

_____

_____

_____

Guardian's Signature: _____