General Science Fair Information/How-Tos

The PPLD Science Fair is an unadjudicated fair. This means that we have no rules about how a student presents at our science fair.

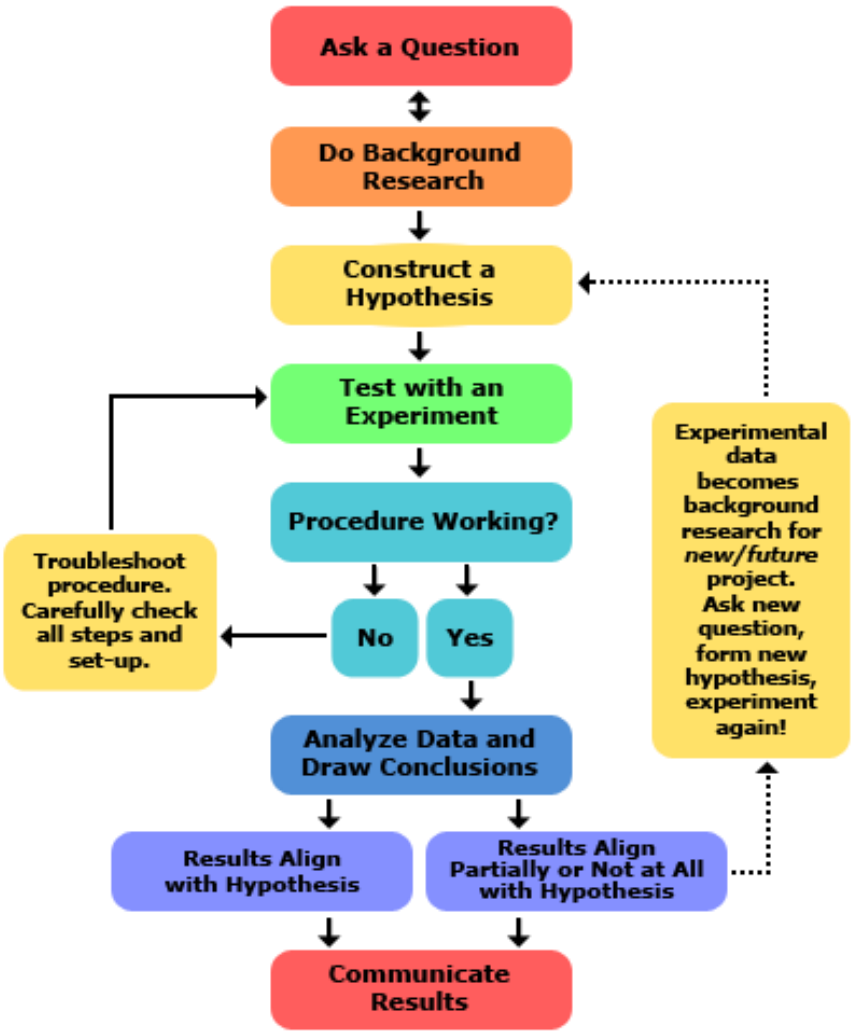
However, some families may wish to participate more fully in regional and state science fairs. These fairs have specific requirements. For this reason, we have compiled some information and resources here.

- What is the Scientific Method?
- The scientific method is a process for experimentation that is used to explore observations and answer questions. Does this mean all scientists follow *exactly* this process? No. Some areas of science can be more easily tested than others. For example, scientists studying how stars change as they age or how dinosaurs digested their food cannot fast-forward a star's life by a million years or run medical exams on feeding dinosaurs to test their hypotheses. When direct experimentation is not possible, scientists modify the scientific method. In fact, there are probably as many versions of the scientific method as there are scientists! But even when modified, **the goal remains the same: to discover cause and effect relationships** by asking questions, carefully gathering and examining the evidence, and seeing if all the available information can be combined in to a logical answer.
- Even though we show the scientific method as a series of steps, keep in mind that new information or thinking might cause a scientist to back up and repeat steps at any point during the process. A process like the scientific method that involves such backing up and repeating is called an iterative process.
- Whether you are doing a science fair project, a classroom science activity, independent research, or any other hands-on science inquiry understanding the steps of the scientific method will help you focus your scientific question and work through your observations and data to answer the question as well as possible.

General Science Fair Information/How-Tos

A SUCCESSFUL SCIENCE FAIR ENTRY MUST INCLUDE AN INDEPENDENT VARIABLE THAT YOU ARE TESTING.

A variable is any factor, trait, or condition that can exist in differing amounts or types. An experiment usually has three kinds of variables: independent, dependent, and controlled. The independent variable is the one that is changed by the scientist.



General Science Fair Information/How-Tos

• Steps of the Scientific Method	• Detailed Help for Each Step
• **Ask a Question:** The scientific method starts when you ask a question about something that you observe: How, What, When, Who, Which, Why, or Where? • For a science fair project some teachers require that the question be something you can measure, preferably with a number.	• Your Question
• **Do Background Research:** Rather than starting from scratch in putting together a plan for answering your question, you want to be a savvy scientist using library and Internet research to help you find the best way to do things and insure that you don't repeat mistakes from the past.	• Background Research Plan Finding Information Bibliography Research Paper
• **Construct a Hypothesis:** A hypothesis is an educated guess about how things work. It is an attempt to answer your question with an explanation that can be tested. A good hypothesis allows you to then make a prediction: "If _____*[I do this]* _____, then _____*[this]*_____ will happen." • State both your hypothesis and the resulting prediction you will be testing. Predictions must be easy to measure.	• Variables Variables for Beginners Hypothesis
• **Test Your Hypothesis by Doing an Experiment:** Your experiment tests whether your prediction is accurate and thus your hypothesis is supported or not. It is important for your experiment to be a fair test. You conduct a fair test by making sure that you change only one factor at a time while keeping all other conditions the same. • You should also repeat your experiments several times to make sure that the first results weren't just an accident.	• Experimental Procedure Materials List Conducting an Experiment
• **Analyze Your Data and Draw a Conclusion:** Once your experiment is complete, you collect your measurements and analyze them to see if they support your hypothesis or not. • Scientists often find that their predictions were not accurate and their hypothesis was not supported, and in such cases they will communicate the results of their experiment and then go back and construct a new hypothesis and prediction based on the information they learned during their experiment. This starts much of the process of the scientific method over again. Even if they find that their hypothesis was supported, they may want to test it again in a new way.	• Data Analysis & Graphs Conclusions
• **Communicate Your Results:** To complete your science fair project you will communicate your results to others in a final report and/or a display board. Professional scientists do	• Final Report Abstract Display Board

General Science Fair Information/How-Tos

- Steps of the Scientific Method
- Detailed Help for Each Step

Science Fair Judging

almost exactly the same thing by publishing their final report in a scientific journal or by presenting their results on a poster or during a talk at a scientific meeting. In a science fair, judges are interested in your findings regardless of whether or not they support your original hypothesis.

Throughout the process of doing your science fair project, you should keep a journal containing all of your important ideas and information. This journal is called a laboratory notebook. See the Science Buddies resource Science and Engineering Project Laboratory Notebooks for more information.

You can find this page online at: https://www.sciencebuddies.org/science-fair-projects/science-fair/steps-of-the-scientific-method

General Science Fair Information/How-Tos

Local regional fair information

For students in grades 4 and 5, the Pikes Peak Regional Elementary Science and Engineering Fair is held in April, usually at Mitchell High School. The fair is for students in grades 4 and 5 who win at their school science fairs in the categories of Biology, Physical, Health and Behavioral, Consumer Science or Engineering Design. Interested participants can contact Darian Founds at darian.founds@d11.org for more information.

For grades 6-12, Pikes Peak Regional Science Fair occurs just 8 days after the PPLD fair. But registration will close on January 24, 2018, before the PPLD fair!

The PPRSF is open to all 6th - 12th grade students in any educational setting (public, charter, private or home school) in Elbert, El Paso, Park or Teller County.

Interested families should access their website for registration, guidelines and information on their website.

Pikes Peak Regional Science Fair information retrieved from:
https://pprsf.zfairs.com/?f=9f5d6b78-c61d-4900-80c8-5da873b4ef9e

- Registration for the 2018 Pikes Peak Regional Science Fair (PPRSF) fair is now open.
- The 2018 PPRSF will be held on Saturday, February 24th, at UCCS.
- Students with questions should contact the PPRSF at pprsf.colorado@gmail.com
- The 2018 edition of the Intel ISEF rules can be found in this document: 2018 ISEF Rules and Guidelines with Forms.pdf
- The PPRSF is an ISEF affiliated science fair. All projects must meet the requirements set up by the Intel International Science and Engineering Fair (Intel ISEF), a program of Society for Science & the Public (SSP), the world's largest international pre-college science competition. The complete guidebook of 2018 rules and guidelines can be found at: https://student.societyforscience.org/intel-isef-forms.
- Registration for the 2018 PPRSF is now open. Registration will close on January 24, 2018.
- Students are required to have projects approved by the PPRSF SRC or a school SRC before experimentation begins. Please check with us at pprsf.colorado@gmail.com if you have questions.

General Science Fair Information/How-Tos

State Fair Information

If you win at regionals, you can attend the state fair! The following information was retrieved from: http://www.csef.colostate.edu/Parents.html

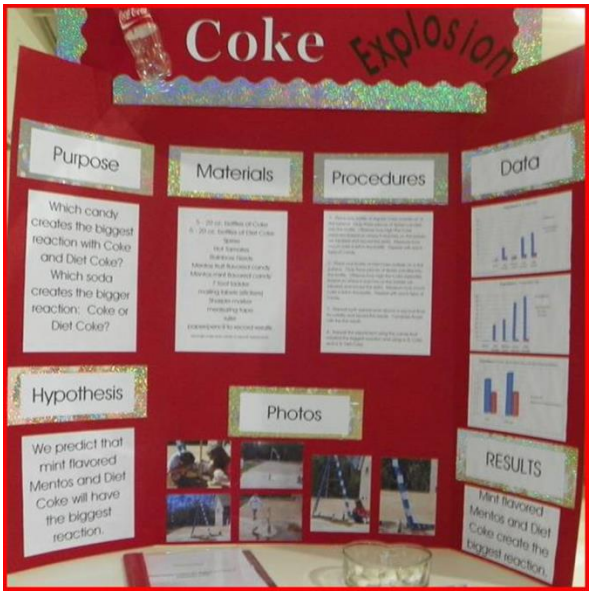
The 63rd Colorado Science and Engineering Fair (schedule) will be held April 5 - 7, 2018, in the Lory Student Center at Colorado State University in Fort Collins. If you are helping your student with a project as an Adult Sponsor or Designated Supervisor, please visit the Forms, Rules & Guidelines page for details on what forms and/or reviews are required.

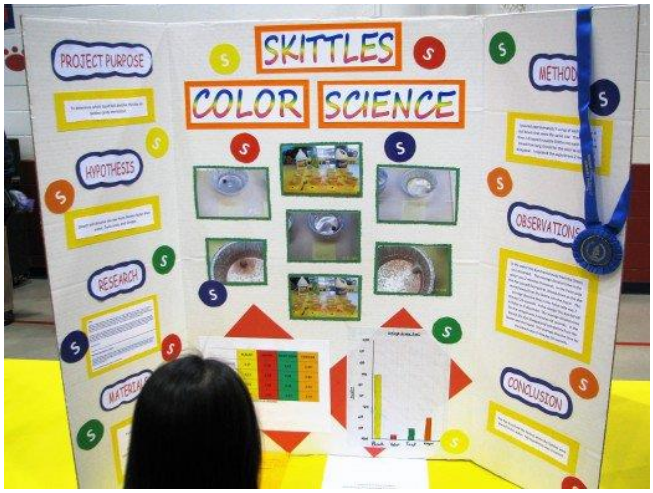
The complete details for this fair can be found here:
http://www.csef.colostate.edu/Parents.html

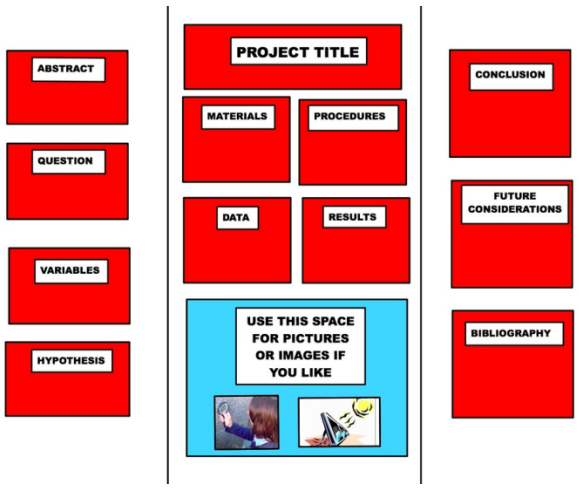
General Science Fair Information/How-Tos

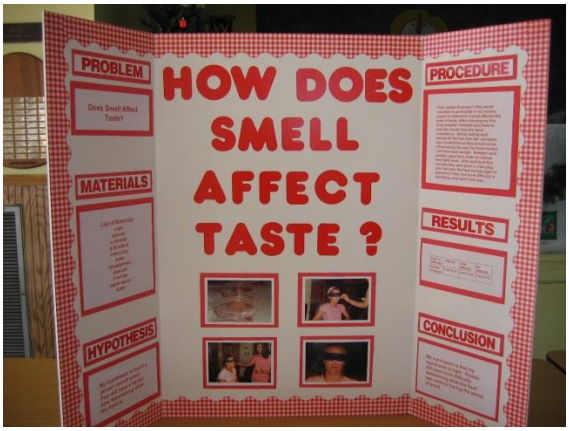
Boards are presented with the same general format

EXAMPLES









General Science Fair Information/How-Tos

Ideas from: https://www.sciencebuddies.org/science-fair-projects/topic-selection-wizard/recommendations

This site allows you to choose preferences, age, ability, etc., and then provides recommendations for projects. Go directly to the site to see additional ideas and information.

Examples:

The Fluffiest Muffins: Flour Type and Muffin Density

Here's a project idea for all of you bakers out there. What happens if you try your favorite muffin recipe with different types of flour [**THIS IS YOUR INDEPENDENT VARIABLE!**] (e.g., white, whole wheat, rye, soy, etc.)? Think of ways you can measure the results. How would you measure the density of a muffin? A kitchen scale would definitely be useful for this project, both for measuring the results and for portioning out the batter for equal-sized muffins. What other measures might be of interest? (Nakajima, 2005)

How High Can You Throw a Baseball? A Tennis Ball? A Football? A Golf Ball?

Rubber Band Elasticity and Temperature

How much force does it take to drive a nail through different types of wood?

Bouncing Basketballs: How Much Energy Does Dribbling Take?

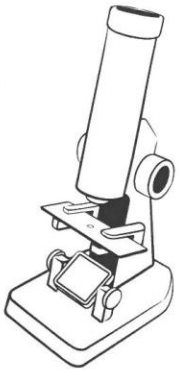
There are hundreds of ideas on this great site!!

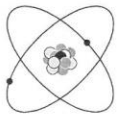
General Science Fair Information/How-Tos

Science Fair Project Ideas

Often, the most challenging part of a Science Fair project is getting started! Here are a few topics that you might be interested in. Look over this list and use it as a springboard for developing an investigative question of your own! See what sparks your interest and go with it. The more fascinated you are by the topic, the more you will enjoy the project!

- Do plants grow better in water or soil?
- Do plants grow faster in sunlight or darkness?
- Does gravity affect the direction in which plants grow?
- Which brand of popcorn leaves the most unpopped kernels?
- Which conserves heat the best—paper, aluminum foil, or cotton?
- Do ladybugs prefer certain colors?
- Which uses more water—taking a bath or taking a shower?
- Do new tennis balls bounce higher than old ones?
- Which color absorbs the most sunlight?
- Can bubbles be different shapes?
- Which type of glue has the strongest hold?
- Is yawning contagious?
- How reliable are eyewitness reports?
- Which socks keep your feet the warmest?
- Which carpet cleaner works best?
- What effect does temperature have on a magnet?
- How does salt affect the boiling point of water?
- Will vegetables stay fresher in the refrigerator or out?
- Can sugar or salt keep an apple from rotting?
- What is the best way to remove a stain?
- Do flowers stay fresh longer in cold water or warm water?
- What do magnets attract?
- Which objects float in water?
- How do different types of music affect the growth of plants?
- Do objects float better in salt water or fresh water?
- Which brand of paper towel is strongest?
- Which takes longer to freeze—hot water or cold water?
- How do different types of music affect your heart rate?
- Which liquids can best help a seed to sprout and grow?
- Which rusts a penny faster—soda or orange juice?
- Which kind of cheese grows mold the fastest?





Good luck! We look forward to seeing all your great projects at the PPLD Homeschool Science Fair!

Compiled by K. Brown 11/2017