Preston County Science Fair

The Preston County Science Fair Program is conducted for the purpose of encouraging and motivating science students to learn more about science and to use the scientific method by conducting a controlled scientific experiment and organize a written science report.

The ultimate goal is to teach students what science is and how scientific information and the scientific method is utilized in problem solving.

Awards are the recognition aspect of the program; however, it must be stressed that each and every student who has completed a project is a winner. The greatest award is gaining a better understanding about the scientific method of solving problems.

The rules and guidelines are based on teacher input and National Science Fair guidelines.

Categories

Categories reflect WV Science Curriculum Framework. The subjects listed under each category are only a sampling of possible subjects from these categories. If you are unsure which category your project comes under, call the fair coordinator.

Division: Projects are organized into three divisions by grade level. **Division I** (Elementary), **Division II** (Middle School) and **Division III** (High School).

Type: Individual, Small Group or Class Project: Finally, projects are classified according to type.

Individual means that only one person worked on the project. **Small group** means that no more than 4 students worked on the project. A **class project** is defined as involving one-half of the class or more. Class projects are entered by division but not by category.

Consumer Science: Consumer product testing and/or design.

Chemistry: Organic, inorganic, chemical compounds, household chemical, etc

Earth/Space/Environment: Environmental problems, astronomy, geology, meteorology, etc.

Life Science: Plants, animals, life processes, humans, health, etc.

Physics: State of matter, energy and power, simple machines, heat and temperature, electricity and magnetism, acoustics, etc.

PRESTON COUNTY SCIENCE FAIR RULES

1. **Who May Enter:** Elementary (5^{th} grade), middle school (7^{th} grade), and high school (9^{th} – 12^{th} grades) who are entered in public or private school in Preston County.
2. **Entry Blanks**: Must be typewritten or printed (use black ink).
3. **Project**: All work must be done by exhibitors themselves: Sponsors may help in planning and advising, but parents, teachers, and friends must not take a hand in the actual performance of the research or the design or construction of the final exhibit. The use of power tools for the construction of the exhibit is exempt. Parents may help with this item, but the use of power tools to construct a display for children too young to use them safely is discouraged. ***__Participant can only participate in one project/presentation!!__**
4. **Familiarity with Topic**: All exhibitors are expected to be completely knowledgeable about their projects and able to answer questions regarding their research and the construction of their exhibits.
5. **Installation**: All installations must be done by the exhibitors themselves. Assistance may be used for transporting, if physical size or weight of a project is such that assistance is required. Exhibitors may also obtain help from adults or friends with packing and/or unpacking of a project only. All exhibits, once set-up, must remain at the fair until the awards presentation unless removal is authorized by the fair director.
6. **Safety**: "When in doubt, do without." Any exhibit using harmful, poisonous, explosive or chemical materials, or moving or electrical apparatus with potentially dangerous conditions will not be accepted.
7. **Contents of the Exhibits**: **Do not bring…. (Photographs of experiment is allowed!!!)**
   - Living organisms (plants, animals, microbes, bacteria)
   - Dried plants
   - Taxidermy specimens or parts
   - Preserved vertebrate or invertebrate animals
   - Human / animal parts of body fluids: exceptions: teeth, hair, nails, and dried animal bones
   - Liquids of any kind (laboratory chemicals and WATER). Label your bottles to indicate what is inside.
   - Poisons, drugs, controlled substances, hazardous substances or devices (firearms, weapons, ammunition, reloading devices….)
   - Dry ice or other sublimating solids
   - Loose sharp objects (pins, tacks, knives, scalpels, needles, syringes, etc.) unless firmly intact on the project
   - Empty tanks that have previously contained combustible liquids, or gases, unless purged with carbon dioxide
   - Open top cell batteries (i.e. batteries with removable cap/can see acid inside if removed)

- Breakable objects (beakers, test tubes, slides, etc.) unless they are firmly attached to the project
- Electrical or hot apparatus that is not properly insulated (must be UL approved electrical materials, i.e. extension cords/surge suppressers)
- Photographs or other visual presentations depicting vertebrate animals in other than normal conditions
- Awards, business cards, medals, accomplishments, phone, or fax numbers

8. **Size:** No exhibit may exceed 36 inches' side to side, 30 inches from front to back, or 60 inches in height.
9. **Electricity**: 110-115 volt outlets are available on a limited basis. Use 100-115 volt heavy duty switches approved by the National Board of Fire Underwriters. Use a momentary contact switch unless continuous power is absolutely necessary. Electrical power will be supplied to projects only during installation and judging. Power will not be on during the fair's public hours. Wiring must conform to the highest standards – tape or solder electrical joints properly; guard against exposed wires and shorts circuits. Take no chances on fire and injury to visitors. Bring your own extension cord. In matters of electricity, the Science Fair Director's ruling will be final.
10. **Research Plan**: Before beginning any project involving vertebrate animals, human subjects, DNA or tissue research involving pathogenic agents, or controlled substances, students must submit an ISEF Research Plan and the proper ISEF Certification forms for approval by the Science Fair Director. Forms are available from the Science Fair Director. Forms are available at csa.clpgh.org/prsef.
11. **Marking Your Exhibit**: Your tittle must be on the front of your exhibit in letters at least one inch high. Because lengthy titles may be truncated in our publications, we recommend that they by kept to 25 letters or less. No exhibits will bear any visible name or exhibitor or school prior to judging.
12. **Removing Your Exhibit**: After the fair closes, exhibits must be removed.
13. **Overall Quality**: The Science Fair Director will eliminate exhibits that are unsuitable in subject matter or treatment, potentially dangerous, in violation of any of the rules contained herein or otherwise below standard. The director may also transfer exhibits to another category that she feels is more suitable and in which he feels the project has a better chance of success.
14. **Previous Entries**: A continuation of a project that clearly demonstrates additional and more advanced work will be accepted and is encouraged.
15. **Collections**: Borrowed or purchased collections may not be used. Personal collections must bear a label telling how, where, and when collected by the exhibitor, and must be protected by glass or screen.
16. **Maintenance**: Exhibit is responsible for keeping exhibits in good working order for the duration of the fair.
17. **Individual, Small Group and Class Exhibits**: Exhibits may be completed individually, small groups up to 4 students, and class project (one-half of the class or more) however, only 4 people will be able to present the day of the fair.

18. **Official Judging:** This will be scheduled by the Science Fair Director. If there is a need to change this time, consult with the director.
19. **Awards:** All exhibits will be judged on a 100 points scale. All students will be judged in their category. A medal will be given in each to the exhibitor with the highest score. Ribbons will be second, third, and honorable mention.

Ties for first, second, or third place awards are not permitted. Honorable mention awards for exemplary projects will be granted upon the judges' recommendation.

SCIENTIFIC RESEARCH AND THE SCIENTIFIC METHOD

Scientific research tries to solve or answer a question about people and the world in which we live. When choosing your topic, give careful thought to how your research will enhance the world and its inhabitants. Good scientists, both young and old, use scientific method to study what they see in the world for cause and effect. By following the five steps below, you can produce a superior scientific experiment.

1.
2. Identify a problem or situation.
3. Make an educated guess at a solution. This is your hypothesis.
4. Experiment and gather information and results.
5. Analyze the information (data) gathered.
6. Make conclusions based on your results; remember that the purpose is to test your hypothesis.

Judges will look for evidence that the scientific method has been followed in the course of research. Although the organizers of the fair feel strongly that entering in the fair is worthwhile at any level and that winning an award is not the only or best reason for entering the fair, we also feel strongly that students who do not conduct proper scientific research are unlikely award recipients.

DEVELOPING A SUCCESSFUL PROJECT

These are suggestions for a good project and should not be interpreted as rules for our fair.

A science project may be described as your attempt to answer a scientific question using methods employed by professional scientists. A good science project requires at least the following steps.

1. Do a science project, not a book report! Projects that merely relate information copied from a book are not projects and do not belong in the fair. Originality, well-researched study, and neat and effective exhibits are all keys to a successful project.

2. Choose a specific problem that you are capable of investigating thoroughly. Don't choose a subject you are not equipped to study fairly, but at the same time, do choose one that will challenge your imagination and abilities. If you don't ask and attempt to answer a question with your project, perhaps you should think it through again.
3. Come up with an original hypothesis or intelligent guess at the solution to your problem. Devising such an idea and not just taking a "shot in the dark" requires wide reading on the subject and sincere interest. You should be able to back up your hypothesis and demonstrate your reasons for suggesting it; show why you think it could be the answer to your problem.
4. Devise an experimental technique that will challenge and test your hypothesis through experimentation (data collection). Keep your information in a Project Data Book to be displayed.
5. Analyze your results and display your analysis in some easily readable and understandable manner. Tables are usually good for conveying numbers, and graphs are excellent for showing changes. These two media, as well as photographs, allow you to convey large amount of information in a relatively small space.
6. Make sound conclusions from your data. In making conclusions, be cautious but not timid. If you believe your data substantiate or weaken your hypothesis, say so. Tell why and list any sources of error that may have influenced your results. The conclusion is the final step in the scientific method and is essentially the reason you did the project. Don't gloss over it or simply restate your hypothesis, adding that it seems to be true or not. Take the time to properly wrap up your project.
7. Keep the entire project as specific as possible. A project on new energy sources may fulfill all of the above requirements, but another project dealing specifically with a single type of solar cell will probably do better. Keep your "work ratio" – amount of work you do per area of science explored – as high as possible by doing a lot of work on a very specific topic. You will learn more by doing a lot of work on a specific topic than by doing the same amount of work on a variety of topic.
8. Try to show that your project has a meaningful application in the real world. Projects that deal with very abstract thinking or ideas totally in pure science often seem to be missing one final step. Pure is important, but in general, a project that can be applied is often better accepted than one that cannot be.
9. Write a report! Your science report should contain a statement of the title, table of contents, introduction, experiment, discussion, conclusions, acknowledgement, and references. Include also any special problems or surprises you had, acknowledgments of major help received and reference sources.
10. Plan your exhibit after the project is completed. Your exhibit should be a display version of your report. Significant graphs, photos, apparatus, etc., should be displayed in a logical manner that can be clearly understood by the judges and visitors. Keep it neat and durable, and avoid the temptation to be "cute."

GETTING STARTED

Before you begin, please note that research refers to library research and information gathering. Experimentation refers to work done in the field or laboratory after forming a hypothesis.

1. Pick Your Topic: Get an idea of what you want to study. Ideas might come from hobbies or problems you see that need solutions. Limit your topics, as you have little time and resources. You may want to study only one or two events.
2. Research Your Topic: Go to the library and read everything you can on your topic. Observe related events. Gather existing information on your topic. Look for unexplained or unexpected results. At the same time, talk to professionals in the field, write to companies for information, and obtain or construct needed equipment.
3. Organize and Theorize: Organize everything you have learned about your topic. At this point you should narrow down your hypothesis by hypothesis by focusing on a particular idea. Your library research should help you.
4. Make a Timetable: As you narrow your ideas, remember to choose a topic that not only interests you, but can be done in the amount of time you have. Get out a calendar to make important dates. Give yourself plenty of time to experiment and collect data-even simple experiments of not always go as you might expect the first time. After you have finished your experiments, you will probably need a few weeks to write a paper and put it together an exhibit.
5. Plan Out Your Research: Once you have a feasible project idea, you should write out a research plan. This plan should explain how you will do your experiment and exactly what it will involve.
6. Consult Your Teacher: Discuss your research plan with your teacher.
7. Conduct Your Experiment: Give careful thought to designing your experiments. As you conduct your research and experiments. Keep detailed notes of each and every experiment, measurement, and observation in project data book. Do not rely on your memory. Remember to change only one variable at a time when experimenting, and make sure to include control experiments in which none of the variable are changed. Make sure you include sufficient numbers of test subjects in both control and experimental groups.
8. Examine Your Results: When you complete your experiments, examine and organize your findings. Did your experiment give you the expected results? Why or why not? Was tour experiment performed with the exact same steps each time? Are there other causes that you had not considered or observed? Were there errors in your observations? Remember that understanding errors and reporting that a suspected variable did not change the results can be valuable information.
9. Draw Conclusions: Which variables are important? Did you collect enough data? Do you need to do more experimenting? Keep an open mind- never alter results to fit a theory. Remember, if your results do not support your original hypothesis, you still have accomplished successful scientific research. An experiment is done to prove or disprove a hypothesis.

WHAT YOU MUST BRING TO THE SCIENCE FAIR

- **Project Data Book**
- **Abstract**
- **Science Report**
- **Presentation Board**

Be Ready to Present

- Understand your research. You will be interviewed by the judges, and you should be able to communicate your research effectively.

Project Data Book

- A project data book is your most treasured piece of work. Accurate and detailed notes make a logical winning project. Good notes show consistency and thoroughness to the judges and will help you when you write your research paper.

Abstract

- After finishing research and experimentation, you are required to write a maximum 250 word, one-page abstract. An abstract should include: a) purpose of the experiment, b) procedures used, c) data, d) conclusion, and e) project category and number. It also may include any possible research applications. The abstract should focus on work done and should not include:
  a) acknowledgments, or b) work or procedures done by a mentor.

WHAT DO THE JUDGES LOOK FOR?

In particular, judges evaluate 1) how well student followed the scientific method; 2) the detail and accuracy of the notes; and 3) whether the tools /equipment were used in the best possible way.

Overall, judges look for well-thought out research. They look for the significance of your project in its category, as well as how thorough you were. Did you leave something out? Did you start with four experiments and finish only three because of lack of commitment?

The judges are not to interrupt any student who has a prepared speech. However, students who can speak freely and confidently about their research is acceptable. Here are some obvious questions and often ask questions outside the normal scope to test your insight into your research.

1. Why did you decide on this topic?
2. What is the purpose, hypothesis, procedures, results, and conclusions of your project?
3. Which variable did you change?
4. For each value of the variable that you changed (the independent variable), how many trials did you do?
5. What response did you observe or measure?

6. What are some of the things you were careful not to let change (the constants) as you did the experiments?
7. In your experiment, what was the control? What sample did you use to compare the others against?
8. In doing your library research, what related research did you find that was helpful to you in conducting your project?
9. What would you do differently if you were to do the project again?
10. What didn't you do?
11. What would be your next step? What might you do in the future to continue your project?