

WEST VIRGINIA SCIENCE & ENGINEERING FAIR PROJECT GUIDE

High School Students
Grades 9-12

March 28, 2020



West Virginia DEPARTMENT OF
EDUCATION

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2019-2020

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Introduction

The purpose of this booklet is to provide information on how to complete a science fair project. Ideas are given on how to choose, develop, and display a project, as well as how to prepare for judging. Although a lot of hard work goes into preparing a project, remember that the purpose of a project, which reflects you and your interests, is to provide you with an enjoyable learning experience, so above all enjoy working and doing science because SCIENCE IS FUN!

Steps to a successful project:

1. Understand the rules:

Before you start your project, familiarize yourself with the science fair guidelines in this packet. Read the list of the important things you need to know, checking off each item as you read. Ask your teacher to explain anything you do not understand.

2. Pick your topic:

Get an idea of what you want to explore! Choose a topic for your project that deals with an area of science that interests you. You can find ideas in books, magazines, textbooks etc. List the categories or ideas that you have selected and pick a specific topic.

3. Research your topic:

Go to the library or internet and learn everything you can about your topic. Look for the unexplained or unexpected. Talk to professionals in the fields that you are interested in or email companies. Take notes on what you learn and keep track of the sources you use with a bibliography.

4. Organize:

Organize everything you have learned about your topic. Next, create a question and hypothesis based on the information you have learned.

5. Plan your experiment:

Once you have a project idea you must design an experiment. Next create a plan in which you list all the materials and steps in your experiment. Design an experiment that can be done in the amount of time that you have. Discuss this with your teacher to make sure that you are on the right track.

6. Complete your “paperwork”:

Use a calendar to identify important dates. Leave time to fill out your forms and review with your teacher. Also, leave time to write a paper and put together a display

7. Conduct your experiment & take photographs:

During experimentation take detailed notes on what you see and do. Keep a research journal, including dates and times as needed. Take photographs, not including faces, of your experiment and the results. Make sure to change only one variable at a time in your experiment and start with a control experiment where nothing is changed. High school students should include an adequate number (10 or more) test subjects in the control and experimental groups. Note any changes you made in your results.

8. Examine your results:

When you complete your experiments, examine and record your findings. Use a chart, graph, table, etc. to record your results. Did your experiment go as you planned? Why or why not? Was your experiment performed with the exact same steps each time? Remember, gaining the understanding of unusual or unexpected results is not a scientific failure, but an important lesson to learn.

9. Draw Conclusions:

Answer the following conclusions: Which variables are important? Did you collect enough data? Do you need to conduct more experimentation? Did the results support your hypothesis? If your results did not, what happened? Remember an experiment is done to prove or disprove a hypothesis.

10. Prepare a report:

Prepare a report on what you learned and how you learned it. First start with a rough draft, going into as much detail as possible so another person could repeat your experiment. Leave plenty of space between lines so corrections can be made if needed. A good report will include 1) a title, 2) acknowledgments of who helped, 3) an introduction of your topic, 4) discussion of your problem, 5) list of all materials, 6) your step by step procedure, 7) observation and results, 8) conclusions, and 9) bibliography.

11. Design your display:

Now that your research and scientific report is done, you must now create a display to show what you have done. Neatness, clarity, and organization are keys to a successful display. Check spelling, punctuation, grammar, and the accuracy of your information.

Your display material does not need to be expensive. You will need a free-standing backboard. It can be poster board, fabric on a frame, cardboard, plywood, Masonite, etc. Make sure that it stays within the measurements specified in the rules. Use color, creativity, and care as you organize a creative display.

Your display may include whatever objects that are not excluded by the rules. Your display should include title, question, hypothesis, report, list of materials, procedure, observations, conclusions, and abstract. Refer to the back of this booklet for the list of items that may NOT be included in your display and an illustration of a display.

12. Prepare for judging:

Your project will be judged using a point system based on six areas. These areas are: scientific thought, creative ability, understanding, clarity, dramatic value, and technical skill.

The oral presentation is an important part of the judging process. During your presentation you should discuss

- why you chose your topic,
- how you gathered your information,
- how you tested your hypothesis,
- what observations you made,
- and what conclusions you reached.

You may want to write note cards or refer to parts of your display to plan what you are going to talk about. Rehearse what you are going to say, DO NOT READ your presentation. The presentation should only take 3-5 minutes. Practice in front of your family and friends. Keep in mind the judges are looking for a student who has learned from their research and experiment.

Although it is natural to be a little nervous about presenting, remember that the judges are not there to trick or embarrass you. They are interested in you and what your project is all about, so be pleasant, courteous and enjoy yourself. Above all, show them that you are proud of what you have accomplished!

WV Science & Engineering Science Fair Project Guide

The WVSSEF is affiliated with the International Science and Engineering Fair, and high school students must follow the ISEF rules and guidelines; see <http://bit.ly/ISEFrulesforms>. If you are new to the ISEF, you are encouraged to use the ISEF Rules Wizard at <http://bit.ly/ISEFwizard> to help with understanding paperwork required for your project. **If your project will use human participants; vertebrate animals; potentially hazardous biological agents; or hazardous chemicals, activities, or devices, please visit the ISEF's Forms page at <http://bit.ly/ISEFrulesforms> and follow instructions for submitting forms for prior approval of research and accessing forms required to be submitted with your project.**

Eligibility/Limitations

- A student must be selected by a regional feeder fair to the State West Virginia Science & Engineering Fair (WVSEF).
- Each student is only allowed to enter one project. That project may include no more than 12 months of continuous research and may not include research performed before January 2019.
- Team projects must have no more than three members. Teams competing at WVSEF must be composed of the original members who competed at the WVSEF regional feeder fair.
- Projects that are demonstrations, 'library' research, informational projects, or 'explanation' models are not recommended or appropriate for WVSEF.
- All sciences and engineering disciplines are represented at ISEF.
 - » Elementary and Middle School projects compete in one of the 18 categories of the WVSEF.
 - » High School projects compete in one of 22 ISEF categories.
 - » Review a complete list of categories and sub-categories with definitions here - <http://bit.ly/ISEFcat>
- Projects that do not have completed paperwork prior to the submission deadline may be allowed to exhibit but will not be considered for any of the awards.

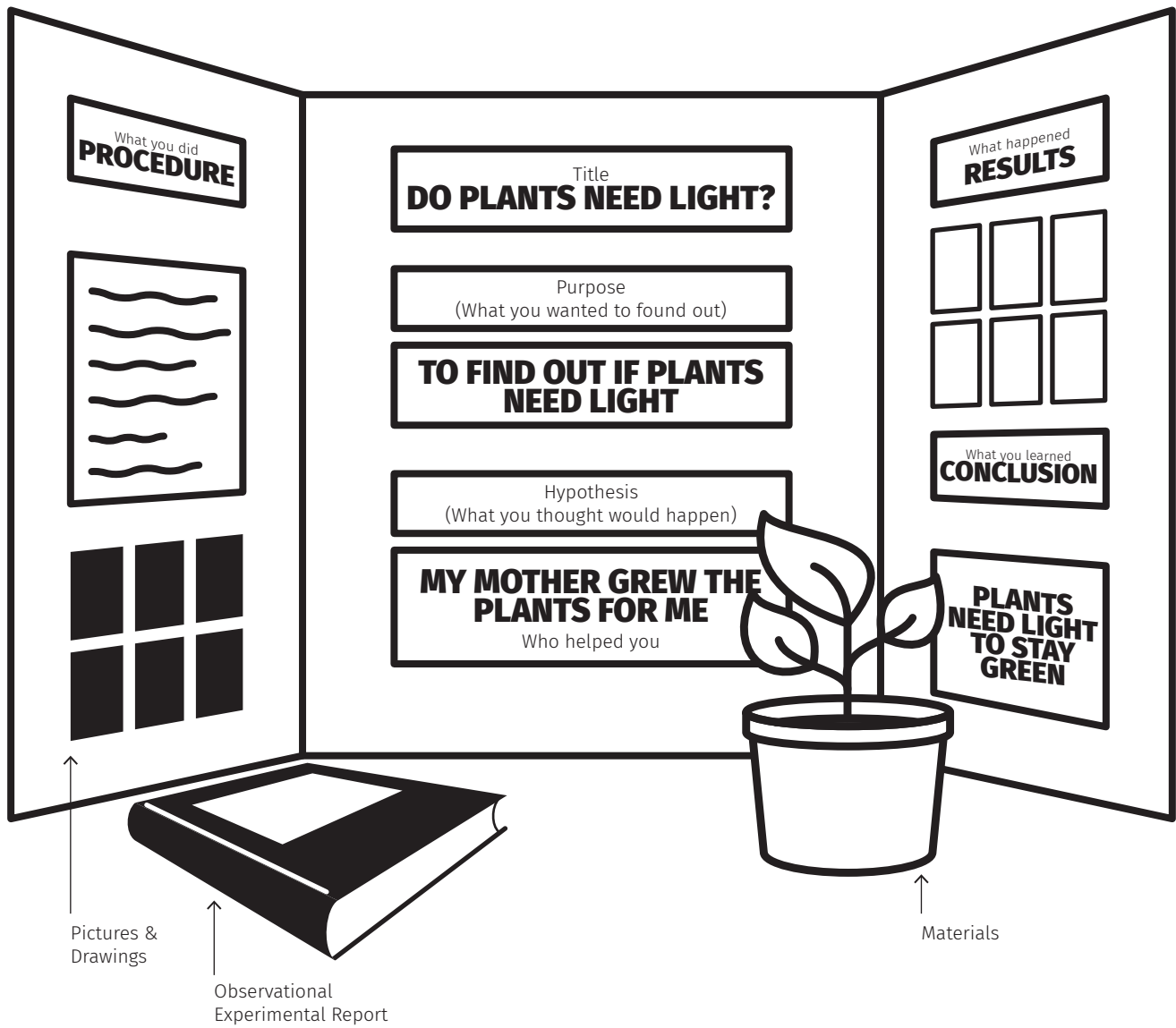
IMPORTANT to REMEMBER

- Individuals and teams in the same categories and in the same programmatic levels (elementary, middle school, and high school) compete against each other.
- ~~No student or school names should appear on abstracts or projects.~~ (Updated January 9, 2020)
- No student's or participant's facial photos may appear on projects.
- Fair directors have final say on matters not covered in fair rules.

WV Science & Engineering Science Fair Project Guide To-Do List

- __ 1. Choose your category.
- __ 2. Develop a topic, question, and hypothesis.
- __ 3. Research your question.
- __ 4. Be sure your experiment design has been approved by your teacher & the science fair review committee.
- __ 5. Gather your materials & set up your experiment.
- __ 6. Record your data and observations in a journal as you experiment.
- __ 7. Organize data in charts or graphs to be analyzed for conclusions.
- __ 8. Write your abstract including your question, hypothesis, materials, procedure, results and conclusion using **no more than 250 words on the approved form**.
- __ 9. Organize a display board for your project that is **no bigger than 30 inches or 76 centimeters front to back, 48 inches or 122 centimeters wide, or 108 inches or 274 centimeters tall**.
- __ 10. Be sure your project has a title, question, hypothesis, list of materials, procedure, observations, conclusion, a report, and a list of sources used to gather information
- __ 11. Be sure your display shows what and how you have learned about your topic. You may show this using pictures, graphs, charts, etc. A collection or model may be displayed if it follows Science Fair guidelines.
- __ 12. Do all the work yourself. You may receive direction or guidance from others; if you do- include who helped you in your report.
- __ 13. Be sure your report includes a title, background information on your topic, description of the experiment, summary of your results, a list of who helped you, and a bibliography.
- __ 14. Put together a 3-5-minute presentation for the judges. Substitutes or video/audio presentations are not permitted.
- __ 15. Be sure your project adheres to safety restrictions and display regulations. The following are prohibited at all levels of competition (school, county, regional, and state):
 - a. Live animals;
 - b. Flames, highly flammable materials, or sources of heat (hot plates, etc.);
 - c. Dry ice;
 - d. Weapons and ammunition (including toys and replicas);
 - e. Sharp items (for example, syringes, needles, knives);
 - f. Tobacco products;
 - g. All hazardous substances or devices (for example—chemicals, poisons, and drugs);
 - h. Batteries with open-top cells (for example—car and motorcycle batteries);
 - i. Any item prohibited by county or WV Board of Education Policies; and
 - j. Any item that the fair coordinator deems unsafe or inappropriate for public display.

Displaying a Science Fair Project



WV Science & Engineering Science Fair Project Guide

Bibliography

Please remember to keep a record of all sources from which you gather information. Your bibliography should be organized with the following information to show where you found the information. Sources in alphabetical order by the first word in each entry.

Information for a Bibliography

Book: Author, Title, Place of printing: Publishing Co., Date, Pages

EXAMPLE:

Shippen, Katherine B., A Bridle for Pegasus, New York: Biking Press, 1991, pp. 28-42

Encyclopedia: Author, "Title of article," Name of encyclopedia, Year, Volume, Page

EXAMPLE:

Piccard, Don, "Balloon," The World Book Encyclopedia, 1994, Vol.2, pp. 39-44

Magazines: Author, "Title of article," Name of magazine, Volume: Number, Pages, Date

EXAMPLE:

Lewis, C., "The Navy Unveils Rockets," Aviation World, Vol. 68: No. 6, pp., 49-51, November 3, 1958

Internet: Author (if known), "title of article or webpage," web address, date documented

EXAMPLE:

_____, "NASA Space Shuttle Launches," <http://science.htc.nasa.gov/shuttle/missions.html>, September 11, 2000

Media: Program title, type of media, date

EXAMPLE:

60 minutes, Television, Cable GS Communications Channel 7, September 10, 2000

Interviews: Name of person, Position, Company, Location, Date interviewed

EXAMPLE:

John C. Jones, Lawyer, Jones & Sons, Martinsburg, WV, August 15, 2000

Additional information about bibliographies in MLA format may be found here - <https://style.mla.org/>

WV Science & Engineering Science Fair Registration Process

The registration process for school and county fairs will be determined by the school or county fair coordinator.

County fair coordinators are responsible for registering projects for regional fairs using the **WV Science & Engineering Fair Online Registration System** at <https://wvde.us/wvsef/>. Use of this system is mandatory. Detailed information on the use of the Online Registration System will be provided to county and regional fair coordinators.

Regional fair coordinators are responsible for registering projects for the West Virginia Science & Engineering Fair. Detailed information on the registration process will be provided to regional fair coordinators.

It is the responsibility of the fair coordinator (county or regional) to ensure the accuracy of registration information (student names, project titles, category selections, etc.) prior to submission.

At the West Virginia Science & Engineering Fair, students are not required to register or “check in” on the day of the fair. Upon arrival, students may proceed directly to their assigned project numbers and assemble their projects. Project numbers will be posted to <https://wvde.us/wvsef/> at least one week prior to the fair date.

Required Forms for ALL high school projects:

- ___ Abstract- see guidance in ISEF Rule book <http://bit.ly/ISEFRulesforms>
- ___ ISEF Adult Sponsor Checklist (1)
- ___ ISEF Student Checklist (1A)
- ___ ISEF Research Plan (1A2)
- ___ ISEF Approval Form (1B)
- ___ WVSEF Rules Agreement Form for High School

Additional Forms May Be Necessary - see the ISEF Rules Wizard at <http://bit.ly/ISEFwizard>

- ___ Form when using human subjects
- ___ Form when using vertebrate animals
- ___ Form when using Potentially Hazardous Biological Agents
- ___ Form when using Hazardous Chemicals, Activities, or Devices

Additional information about the West Virginia Science and Engineering Fair may be found here – <https://wvde.us/wvsef/>.

WV Science & Engineering Science Fair Judging Form

Project Title: _____

Project Category: _____

Project Number: _____

Criteria:

Scientific Thought (30 Points)

- Is the problem concisely stated?
- Are the procedures appropriate and thorough?
- Is the information collected complete?
- Are the conclusions based on the data/observations made during the investigation?
- Are the conclusions accurate?

Comments: _____

Creativity: (20 Points)

- How unique is the project?
- Is it significant and unusual for the age of the student?
- Does the project show ideas that were determined by the student?

Comments: _____

Understanding: (15 Points)

- Can the student explain what he or she learned during the research?
- Can the student answer questions about the topic?
- Did the student use appropriate literature/sources for research?

Comments: _____

Clarity: (15 Points)

- Are the problems, procedures, data, and conclusions presented logically?
- Can the objectives be understood by non-scientists?
- Are the written materials clear and articulate?

Comments: _____

Dramatic Value: (10 Points)

- How well did the student present the project?
- Is the proper emphasis given to important ideas?
- Is the display visually appealing?

Comments: _____

Technical Skill (10 Points)

- Was the majority the work done by the student?
- Is the project well-constructed?
- Does the written material show attention to grammar and spelling?

Comments: _____

Total Points (based upon 100 points)

The West Virginia Science & Engineering Fair

2020 Rules Agreement Form for HIGH SCHOOL STUDENTS

I grant the West Virginia Department of Education (WVDE) the right to use my image for the creation of marketing materials that will be used in a variety of formats, including but not limited to, television, print and online. I understand that I must be 18 or older to participate without the permission of a parent or guardian. I understand that this permission does not include use of my image by other parties for any other purpose that is not affiliated with WVDE. I waive any right that I may have to inspect and/or approve the finished product or products or the editorial or advertising that may be used in connection with this project. I understand that I will not be paid for my participation in this project.

_____	_____
WVSEF Participant Name	
_____	_____
WVSEF Participant Signature	Date
_____	_____
WVSEF Participant Parent/Guardian Signature	Date

As a participant in the West Virginia State Science and Engineering Fair (WVSEF), I have read the 2020 International Science and Engineering Fair (ISEF) rules. I understand that all scores will be kept confidential following the WVSEF and will not be released.

I understand that the Grand Prize Winner (or Winning Team) is eligible to participate in the Intel ISEF in Anaheim, CA. during the week of May 10-15, 2020. The winner (or winning team) must be accompanied by one (1) adult academic advisor. Thus, if the winner of the WVSEF is an individual project, the winner and one (1) adult academic advisor are eligible to travel. If the winning project is a team project, the winning team plus one (1) adult academic advisor, are eligible to travel.

It is the responsibility of the WVSEF to pay ISEF registration fees. Winners will be assisted in making transportation and lodging arrangements for the winner (or winning team) and adult academic advisor prior to the ISEF. **All transportation and lodging booked by outside parties will not be reimbursed.** Information regarding all travel and transportation will be provided to the winners at the WV State Science & Engineering Fair.

_____	_____
WVSEF Participant Name	
_____	_____
WVSEF Participant Signature	Date
_____	_____
WVSEF Participant Parent/Guardian Signature	Date
_____	_____
WVSEF Adult Sponsor's Signature (Teacher)	Date



Steven L. Paine, Ed.D.
West Virginia Superintendent of Schools