2023-2024
Arundel Homeschool Support Group (AHSG)

Science Fair Guidebook

www.arundelhomeschoolers.com

Revision 12/2023

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Introduction

Thank you for joining us! We hope that this guidebook will be a complete reference guide to help you from beginning to end of your science fair project.

Much of this document is taken from parts of previous judging materials. References are cited where known, but it was unfortunately impossible to track down all the original authors of this material. Our thanks go to all those who have gone before in running this science fair in the previous years (we have some records going back to 2006!)

Because this guide is taken from multiple sources, some of the pages are aimed toward the parents and some are aimed toward the students. Hopefully it will be helpful to all. If you have any questions, please email ahsgsciencefair@gmail.com.

Our Goals

We want the students to **be excited about science** in all its many forms. We want them to l**earn how to share that excitement** with others, and to **be able to present their information** in a logical manner. That includes being able to share in writing (report), images/media (display board) and to be able to discuss the information with others (in-person judging).

Science is often a collaboration, sharing information for the good of many. So, rather than a competition against other students, we want the students to be competing against themselves to do the best possible job.

With so many categories, it isn't ideal to have only a single student in one category (who may or may not have done a great job) who wins first place, while in another category, ten students have done great work but only three of them have their work acknowledged.

So, instead of awarding 1st, 2nd, 3rd in a category, each student will be graded **individually** on how well they meet the criteria for their own project, with three levels of potential awards given based on their project alone. Every student has the opportunity to win the top award for their own project. Award types will vary depending on the current year's budget.

In addition, there may (or may not) be a few special awards given, but these are completely at the judges' discretion.

What do I do in a Science Fair Project?

Every science fair has its own focus and differences, and others are more academically rigorous. Keep this in mind if you also do projects elsewhere. For the AHSG science fair, you will select a part of science that interests you, then learn and explore more about that topic. There are several different ways you can do this, whether as an experiment, demonstration, research or other type of project. (These are explained in Science Fair Categories**,** later.)

Once you have determined your project, you will do work and learn about your project, documenting what you do as you go (often in a laboratory notebook or journal).

At the end of your project, you will create a display board showcasing your project, following the restrictions for size and content. This display should highlight the important parts of your project and allow visitors to understand your project given a few minutes observation. Some types of project may have additional types of displays.

You will also create a written report and an abstract summarizing your research, using the provided guidelines, for the judges to read.

On the day of judging, you will give a 3-5 minute oral presentation to the judges about your project, then be ready to answer their questions as they look at your visual display and written report. (More information on the details of what to bring to judging is provided later in this document.)

What are some other resources that can help me?

We have included many links and information in this document, but in general, these additional references are useful:

- **Science Fair Handbook: The Complete Guide for Teachers and Parents by Anthony D. Fredericks and Isaac Asimov** - this book contains many suggestions and was a resource when creating the original science fair categories and guidelines.

- **Science Buddies** (www.sciencebuddies.org) - this website has a lot of great information about science fairs and choosing a science project.

- **Purdue OWL®** (https://owl.purdue.edu/) - this website has a lot of great information about how to write, how to properly use citations, etc. This may be a good resource for writing your science report.

One final resource that we used for creating this document was **Not Just Another Science Fair: A Handbook and More for Science Fair Organizers by Laura Vasquez, David M. France, and Kim M. Perkins**. While this was a great resource for us, it contains much that is specific for creating a science fair, and might not be as useful to you. Similar information for students and teachers is available at the Science Buddies website linked above.

Science Fair Checklist

PLEASE read the other sections of this handbook that detail what goes into each step of this process!

- ☐ Complete the online **Registration Form** by the **Registration** deadline.
  - NOTE: No project needs to be selected at this time.

- ☐ Decide on your project category and topic.
- ☐ Read the judging form and guidebook sections for your category so you know what to do.
- ☐ If using human or vertebrate animal subjects, complete Human/Animal Project Certification Form.

- ☐ Complete the online **Project Selection Form** by the **Project Selection** deadline.
  - ☐ Finalize your project category and title.
  - ☐ Inform organizers if electrical supply is needed.
  - ☐ Submit completed Human/Animal Project Certification Form (if applicable).

- ☐ Do the science project
  - ☐ Do background research, noting information about your sources.
  - ☐ Design and follow through with your project tasks.
  - ☐ Keep records in your lab notebook/logbook (Collection, Experiment, Eng. Design).
  - ☐ Obtain signed Human Participant Consent forms (if using human subjects).

- ☐ Communicate your results
  - ☐ Write a report about your project
  - ☐ Write an abstract (6th grade and up)
  - ☐ Create a display board
  - ☐ Prepare a 3-5 minute oral presentation about your report

- ☐ Participate in Science Fair judging
  - ☐ Dress appropriately
  - ☐ Be prepared for oral presentation
  - ☐ Bring your Visual Display (max size: 48”w x 36”d x 48”h)
    - ☐ Including collection, demonstration or other display materials
    - ☐ Follow the restrictions for allowable equipment and material.
  - ☐ Bring two copies of your Written Report
  - ☐ Bring specific items for your type of project (as listed)
    - ☐ These might include lab notebook, logbook, collection, demonstration items, model, apparatus, completed engineering design item, etc.
  - ☐ Suggestion: bring backup items like tape or glue for repairing displays if needed.
  - ☐ Bring a bag lunch (students and parents and siblings too!)

Registration, Schedule & General Housekeeping

Registration Process

Registration will be done electronically with links available on the AHSG website. Information on registration opening and closing dates will be communicated via Facebook and the AHSG website. www.arundelhomeschoolers.com (look for the "Homeschool Science Fair" tab).

To participate in the 2024 AHSG Science Fair, participants should follow these steps:

1. Complete the **Registration Form** by the Registration deadline of **January 26, 2023**. (Late registration MAY be available until February 16, subject to availability. Late registration has a higher fee, and will be closed early if participation is full.)
   Registration only indicates a desire to participate. Information on the category and topic of the student's project will be gathered later.

2. Pay registration fees. **Payments must be received at the time of your registration.**

3. Complete the **Project Selection Form** by the Project Selection deadline of **February 16, 2023**.
   This will be approximately one month prior to the science fair. At this point, the student should have already been working on their project and be able to provide information on the project category as well as a name for the project and a short summary.

   - Complete and submit the **Human/Animal Project Certification Form** (if applicable). *Only students with human or animal subjects in their experiment are required to fill out this simple form.*

4. Be available and ready to present projects in person on the date of the Science Fair.

Volunteer Judges Needed

All our judges are volunteers. Some are the adult family members of students involved (care is taken to never allow a student to be judged by their own family member). Others are scientists and professionals from the community who donate their time and effort. Please be sure to show your appreciation to these judges.

The AHSG science fair cannot function without our volunteer judges. If you would be willing to judge, or know someone who would, please have them contact ahsgsciencefair@gmail.com. No advance training is needed, and they will be using the judging forms provided at the back of this handbook.

Science Fair Date

Saturday, March 16, 2024

Science Fair Location

Grace Lutheran Church
2503 Belair Dr.
Bowie, MD 20715

Science Fair Website

Go to www.arundelhomeschoolers.com and then click "Homeschool Science Fair"

Science Fair Day Schedule

9am	Doors will open for set up.
10am-12pm	Judging for all grade levels. *Note: Participants may be accompanied by one adult during judging.*
12pm-1pm	Judges tally scores. Participants and families eat the lunches they brought. Project displays open to view.
1pm	Awards ceremony.
2pm -3pm	Additional opportunity for families and participants to view project displays.
3pm-4pm	Cleanup by everyone participating.

Bring Your Own Lunch

Please note that all participants and visitors, family members, etc., are responsible for providing their own packed meal. We will have a room set aside for families to eat while the judging is completed.

Please do not bring any items that are likely to stain (such as red dye drinks), as we are guests in the facility.

Fees

The fees this year will be $10 for AHSG members and $15 for non-members, or $20 for all late registrations. If there are more than three participants in a family, the maximum registration fees will be $30 for AHSG member families and $45 for nonmember families or $60 for all late registrations. In most cases, these fees will be non-refundable, as the money is used for purchasing awards and paying for science fair expenses. Exceptions may be made on a case-by-case basis only.

Bad Weather and Rescheduling

In the event of inclement weather, or other cancellation reasons (due to pandemic, shutdowns, etc.) information will be provided to participants about alternate arrangements via the email used during registration, as well as being posted on Facebook and if possible the AHSG website.

If at all possible, the science fair will be rescheduled. If it becomes impossible to reschedule, AHSG will offer the virtual option for individual judging of each project.

Virtual Judging Option

The intent of the science fair is to have in-person interactions with the students being able to present to several judges and show their project to many other students in the community. But we also want to give all students a chance to at least present their project.

If something unforeseen comes up that would prevent the student from attending during judging, accommodations can be made for them to present to an alternate judge either virtually or at another time. **It is the responsibility of the student's family and the student to reach out to request this option if needed.** Those taking advantage of the virtual option are still eligible for the individual awards, but should not expect to be eligible for any special awards.

Electrical Supply

Very limited electrical outlets may be available during the science fair judging. It is best if your project is self-contained. However, if your project will require an electrical supply, you must inform the Science Fair Committee (via email at ahsgsciencefair@gmail.com) so that arrangements can be made to place your display near an outlet if possible. Any outlets will be available on a first-come, first-served basis.

Ethics

Students are expected to be ethical in all aspects of their project. This includes not claiming others' work as their own, obtaining consent of human subjects prior to the experiment, and making sure all human and animal subjects are not subject to harm or undue stress.

Students are expected to do their own work. They are permitted (and encouraged) to obtain advice and information from others, but must make project decisions on their own and collect and analyze their own data. Students may use adult assistants to carry out potentially dangerous or difficult activities.

The focus of the science fair is the students and their current projects. Do not show off any previously earned awards, do not bring any samples to distribute, do not promote external events, companies, or individuals.

Science Fair Categories

This section goes over what the categories include and an overview on what they should be bringing to the science fair. There are more details in other sections later.

Please note that most of the examples given are from Asimov & Frederick's Science Fair Handbook, and are mostly taken from the 4th-5th grade level. There are many, many other possibilities, and the students should work at their own grade level and capability.

Experiments

The goal of an experiment is to **confirm or deny a possible answer** to a science question (hypothesis) **by performing repeatable tests.**

"The type of project most often presented at science fairs is the experiment. These presentations allow students to pose a problem, design an experiment to investigate that problem, record and report their results, and make conclusions based upon those results. The final project is a display of steps the student took, any successes or failures, and the implications of the data." (Asimov & Fredericks, 2001, 30).

An experiment follows the steps of the scientific method. You construct a hypothesis, test with an experiment, then analyze the data and draw conclusions. One thing is changed in order to see how the result changes. (See Differences between a Demonstration and an Experiment, later.)

Repeating experiments

For experiments, you will need to perform the entire experiment at least three times. **Doing it multiple times shows that the experiment results are repeatable and that your results aren't a mistake.** This doesn't mean only running three tests where you change one thing each time. Instead, it means running multiple (usually at least three) tests where everything is EXACTLY the same, then changing one thing and running multiple (usually at least three) additional tests with that change, etc.

Examples of experiments:

- Test the response of yeast to real and artificial sweeteners
- Use a reaction to show which foods contain starch.
- Test materials to find which ones make good insulators.

A test series might consist of growing plants where at least three plants are watered with water, at least three plants are watered in vinegar, and at least three plants are watered with a solution of plant food and water. Having additional test subjects makes it easier to determine what is happening.

Another example might be measuring insulating materials. Measuring three (or more) samples of the same material and comparing them with three (or more) samples of another material would allow you to average the data that you get to determine if they are really different or if something else is going on. Or, you might compare a large number of different samples, but do the same measurement multiple times on each sample to be sure that you get the same results (and eliminate error).

Basically, you want to be able to complete the entire test in such a way that you are sure that you didn't introduce error, that you can be sure your results are produced from good data, and that someone else could do the same thing and get the same results that you did. Since there are so many different topics available, this might be slightly different for each type, but the main thing is to demonstrate repeatability.

What to do in your experiment

The process for creating and executing an experiment is well documented, and we recommend reading through the ScienceBuddies.org website to lead you through choosing and performing an experiment from start to finish. Their Science Fair Project Guide will guide you through the Scientific Process step-by step.

You will start by asking a question, do background research, construct a hypothesis, test the hypothesis, then analyze your data and draw a conclusion. Then you will share your results by creating a detailed report. Experiment reports generally follow a specific format. Information on exactly how to write this report is available later in this document.

Your display at the science fair will include your report, your lab notebook, and a trifold display board with information about your project. DO NOT bring your actual experiment. You may bring pictures of the experiment, but the actual experimental setup should remain at home. Be sure to comply with the restrictions on what items may be brought to a display.

Demonstrations (& Models)

The goal of the demonstration or model is to **illustrate** (show) **a scientific principle or fact**.

"In this type of project students demonstrate a particular scientific principle or fact. The demonstration should be self-contained; that is, observers can operate or manipulate any controls, switches or devices needed for the demonstration. Students may wish to demonstrate how something works, a science phenomenon, or how something is created naturally or in the lab" (Asimov & Fredericks, 2001, 30). This includes models.

If possible in your demonstration, have your display set up so that the attendees can operate the demonstration themselves. This may not be feasible depending on the type of demonstration.

Examples of demonstrations:

- Using a graduated cylinder, measure the volume of several objects.
- Set up a box with two holes in it (for hands to reach in) containing unknown objects. Participants reach inside and try to guess what the objects are by feeling them.
- Construct the two types of circuits (serial and parallel).
- Construct a model of the solar system or volcano.

In a demonstration, you aren't creating a hypothesis and trying to determine changes, but rather showing how known science works. In the above example of circuits, you are showing the differences in how serial and parallel circuits work by having a demonstration that allows participants to flip switches and observe the differences. But there are ways to turn many demonstrations into experiments. (See Differences between a Demonstration and an Experiment in this document.)

For your demonstration report, you should explain why you chose this, what it is, and why it is important. Your report should include information about the scientific principle or fact behind the demonstration/model, and an explanation of what is happening. You should also include a step-by-step description of how to do the demonstration (or make the model), including all the materials needed. Your conclusion might include why this is important or how it is used. You should also think about how this project affects further studies. Is there something else that you want to do as a result of doing this project?

For the display board, be sure to include step-by-step instructions for how to do the demonstration. Include information on the science behind the demonstration as well.

For the demonstration itself, you should be able to do the demonstration without outside assistance. If at all possible, you want to allow the judges and other attendees to be able to do the demonstration themselves as well.

Be sure to comply with the restrictions on what items may be brought to a display, and be sure that your demonstration is safe for visitors to be around.

Research

The goal of Research is to **answer a question** about science **using primary sources.**

"In a research project, the student investigates a chosen area of science by consulting *primary* sources. That is, students will need to consult reading materials from libraries, museums, government agencies, and the Internet. In addition, they should interview experts: scientists, health care workers, county agents, shop forepersons, and so on. Encourage on-site investigations at labs, factories, a printing plant, a farm, or a fish hatchery. The intent is for the student to explore a scientific area in depth and detail and to report findings in a vivid, interesting way through the project" (Asimov & Fredericks, 2001, 31).

Examples of research projects:

- How is a chemist useful to the cosmetic industry?
- How are rocks and minerals used in everyday life?
- What is photosynthesis?
- What causes _____?

There are many types of research projects. For science fairs and for younger ages, research projects are sometimes simply investigating and presenting known science in an interesting way. No experiments are performed in this type of project.

For older students (high school and college), research projects are a way to present your own ideas or answer questions about a subject along with the current knowledge available. This level of research paper usually makes a statement or claim about a topic or presents a question that needs an answer. The body of the report then presents facts and data drawn from many credible sources and leads to a conclusion that summarizes how the data given supports the claim given or answers the question presented.

Even though there are multiple ways to do a research project, all research projects ultimately boil down to answering a question. If someone is making a claim, it still involves a question. For example, if they state that their position is that Global Warming is caused by _____, what they are really saying is "IS Global warming caused by ____? I think it is" and then gathering data to support their position.

For a research report, the introduction should be primarily focused on the question itself. What is the question? Why is this an interesting topic to you? Why are you asking the question? Why is it important or significant? These are the sorts of questions to think about when writing the introduction, though depending on your report they may fit better in the body.

In the body of the report, you should give the sources you referenced and what they have to say about the question. What is their answer to the question? If the sources provided different data, you might analyze the data, or just go over their different answers to the question. Also be sure to explain any major terms or definitions that might confuse readers.

Think about the sources as well. Do they know what they are talking about? Do they have any potential biases or conflicts of interest? Are they a good source?

In your conclusion, you will want to be sure to summarize the answer that you found to your question, and what you learned. Your answer should be supported by the data you found. You should also include information on what else you can learn about the topic in the future. You might have ideas for things you want to research, or ideas that you think that researchers should investigate about the topic.

Be sure to properly cite (give credit to) all of your sources so that it is clear which data came from them and which is your own input.

Your display board will primarily consist of information from your report. You should be sure to clearly show your topic (question) and the answer you came up with, along with interesting data, quotes, images, etc, from your sources.

Collection

The goal of a collection is to **illustrate** (show) **the diversity of a set of items**.

"Collections are an assembly of items such as seashells, birds' nests, or telephone parts that show variety and diversity within a chosen area of science. Usually, collection projects will result from a hobby or other free-time activity. Collections need to include as many samples as possible to represent the magnitude of the topic" (Asimov & Fredericks, 2001, 31).

Besides the obvious collections that are normally considered, a collection project could also consist of collecting and presenting information about a topic with multiple parts, but only if the project didn't fit better in another category. A collection should have multiple items to view, minimum of 8. In the case of an information collection, images and explanations of each item in the collection are needed. A logbook is used to keep track of data regarding the collection.

Examples of collections:

- Collections of common minerals found in the area.
- Collections of seashells
- Draw and label the parts of the heart from several different animals
- An information collection of the various inventions of Thomas Edison.

Note: Please be aware that some items are not permitted to be displayed at science fairs and keep this in mind when choosing your collection. See Safety Regulations: Display Restrictions for details. If you have a collection that is not permitted to be displayed at the science fair, you may bring photographs of your collection instead.

If you don't already have a collection, do some research to determine what you want to collect. You will also need to know how to store and display your collection. You will need to know where to go to legally get objects to add to your collection (and do so!) Don't forget to keep a record of your items in your collection logbook!

Keep in mind that you need to have legal permission to take items. Don't just go to your neighbor's yard or a public park and take items for your collection without permission first.

For your collection report and display, be sure to think of the important parts of your collection to share. In the introduction or early in the report, you will want to say why you picked that type of item to collect. Your collection should include at least 8 specimens, but ideally many more.

There should be variety in your collection, showing differences in size, shape, color, etc. as appropriate. In your report and display, you will highlight any particular specimens of interest, stating what makes them unique or special. For example, certain features, or the location or situation they were collected from.

Your report should explain any science behind the differences, such as what makes the differences, or how those differences are useful.

In your conclusion, you should have information on what you learned during the process of collecting the items, and have some idea of what you can do in the future (such as specific items you want to add to your collection, or locations you want to visit that you think might have specimens).

Your display should also include your collection. You need to think through how this will be displayed. Many collections should be displayed inside a sealed case so that there is no possibility of any bacteria or pests being transferred to a new location. Collections should be displayed in a way to prevent any transmission of disease and to prevent breakage and loss of collected specimens. Be sure to avoid bringing any prohibited items.

Apparatus

The goal is to **illustrate** (show) **the use/function of a scientific tool or implement**.

"In this type of project students display some kind of scientific apparatus or instruments and describe their use or function in detail. The project should enumerate the importance of the apparatus for both scientists and the general public. Descriptions of how each apparatus is used within or outside the scientific community would also be appropriate" (Asimov & Fredericks, 2001, 31).

Examples of apparatus:

- Construct a homemade thermometer.
- Construct a balance
- Explain how a generator produces energy.
- Display a microscope and explain how it works and why it is important to science.

The Apparatus category deals with the equipment that scientists use. The scope is limited to a scientific apparatus or instrument (as in something used in a lab), rather than applied science/technology such as an insulin pump. A student might be interested in how, exactly, a microscope works, or in the history of how they came to be.

The report should include why they picked this and what they knew about it before starting the project. The report could include information about the history (who invented it? When? How has it changed over the years?) of the apparatus. It should include information on the use/function of the apparatus, and explain why it is needed and who uses it. You should also give information about the science involved in the use, function, and/or design of the apparatus. Make sure to include how to use it, and why it is important.

If you built this apparatus yourself, you should give information on how you built it, including the design and materials. If this is something that already existed, you should give information on the manufacture (Where was it made? Who made it?) You might possibly include how it was made, if that fits into the scope of your report.

For your display, you should include the apparatus itself if possible. If that is not possible, be creative with a substitute so that you have something to show, and have photos of the actual apparatus.

The display board should include highlights of the project and explain the apparatus' use. Depending on the apparatus, you might also consider including an image with parts labeled. Be sure to include information on how the apparatus relates to science somewhere in your display.

Make sure that your apparatus is SAFE for the people around. If it has rapidly moving gears or belts, they should be shielded to keep people from becoming entangled in them. Think through what needs to be done to keep others safe.

Engineering Design Project (formerly Inventions)

The goal is to **solve a problem** by designing a **process** or a **physical item.**

For an Engineering Design Project, a problem is identified, then a solution is created to solve that problem. Typically many changes are made during the design process as you test the possible solutions and refine and change to optimize the final product. This category has been known as Inventions in the past, but can include more than a physical product.

Have you thought of a way some process could be done better? Have you thought of some new piece of equipment which could simplify an action? In this type of project students display a new device or process that they have engineered and describe its use or function in detail. The project should enumerate the importance of the invention, and explain the design process used to come up with the final result, along with any other ideas considered during the process.

Further information about the engineering design process can be found at the following links:

Science Buddies: Engineering Design Process
Science Buddies: Comparing the Engineering Design Process and the Scientific Method

Examples of Engineering Design Projects:

- Create a device to sound an alarm if your basement floods.
- Determine a new process to speed up lines at amusement parks.
- Create a device or process to quickly identify bad bulbs in a holiday light string.

For your report, your introduction should include a statement of the problem and an explanation of why it is a problem.

Your report should include research into how people have tried to create a solution to this problem in the past or currently. If no one has tried to solve this problem before, why haven't they? If they have tried before, how is your idea different or improved?

You should include a description of the design process used. What testing did you do? What prototypes? How did they change as a result of your testing? How did you check to see if your solution would solve the problem? What limitations does the design have?

In your report's conclusion, you should restate the problem and describe how your solution solves the problem. Does it fully solve the problem? Is it a good solution or not? What ideas do you have to further improve this design in the future?

For your display, you should have the item you created and your lab notebook. Your display board should have information on the problem, design process, testing, design changes, and final solution. You may want to include photos of the testing or previous prototypes.

Be sure that your designed project is safe for those around.

What Category is My Project?

You may have a great idea for a project, but not be clear about which category your project fits under. Re-read the descriptions and think of ways that your project would fit each category. Take a look at the Differences between a Demonstration and an Experiment section if you need help determining the differences between demonstrations and experiments. Also see the goals for each type of category below for guidance. If you need further help, ask others to assist or you can ask the Science Fair committee for guidance.

What is the Goal of My Project?

Experiment: The goal is to **confirm or deny a possible answer** to a science question (hypothesis) **by performing repeatable tests.**

Research: The goal is to **answer a question** about science **using primary sources.**

Collection: The goal is to **illustrate** (show) **the diversity of a set of items**.

Demonstration/Model: The goal is to **illustrate** (show) **a scientific principle or fact**.

Apparatus: The goal is to **illustrate** (show) **the use/function of a scientific tool or implement**.

Engineering Design Project: The goal is to **solve a problem** by designing a **process** or a **physical item.**

Differences between a Demonstration and an Experiment

"A demonstration is something built or done to **show that an event happens** or to **explain some scientific principle**. It lacks some things that would make it an experiment. A demonstration is usually missing a variable, a measurement, or both. By adding these two key elements and following the scientific method, a demonstration can often be made into an experiment." (Vazquez et al., 1994, 63)

"All things that can change in an experiment are called variables. A manipulated variable [also known as an independent variable] is one that is changed on purpose for the experiment. The responding variable [also known as a dependent variable] changes because of the alteration made to the manipulated variable. Controlled variables are all the other conditions that one attempts to keep the same while the manipulated variable is changed. If more than one variable changes at a time, it is usually not possible to tell which change caused the result." (Vasquez et al., 1994, p. 62)

NOTE: An experiment must have something that is changed (manipulated variable) and a measurement." (Vazquez, France, and Perkins 1994, 152)

For Students: Doing your Science Project

Once you have selected your science project topic, it is time to actually do the work. You will want to make sure you have the time to do any research needed as well as to gather materials and perform any experiments. **Do NOT wait until the last second!**

Background Research

You should start by doing some research about your project. This helps you learn the best way to be able to go about doing your project. You can also learn about the history of the science involved. Don't forget to keep track of your sources and where each piece of information came from for your resource list in your report later!

Complete Your Human/Animal Project Forms

If you are using animals or humans as subjects in your experiment, you need to be sure that you are doing so ethically.

For experiments using animals or humans, this involves checking with a qualified scientist BEFORE you start your experiment. You want them to verify that your proposed experiment will not involve inhumane or unethical treatment of the subjects. Fill out the Human/Animal Project Certification Form and have the scientist sign it for you to verify this. This form is due at the time that your experiment is chosen.

In addition, human subjects should be provided (and sign) a consent form that tells them what the risks are of participating in the experiment. These signed "Human Participant Consent Forms" should be brought with you to judging and be provided to the judges upon request.

Record Your Steps

If you have an **experiment** or an **engineering design project**, you will be using a lab notebook to record your data. You should start using the lab notebook immediately. See the section Keeping A Laboratory Notebook/Journal for details.

If you have a **collection**, you will create a logbook. See the section Keeping a Logbook for details.

For any other type of project, you may want to record what you have done as well, but it is not required for the science fair. But recording what you do is a good habit to have. It will help you remember what you did and make it easier to write your report later.

Do the Work

No matter what sort of project you have, you will actually have to do the project. Read the sections in the guidebook that refer to your category along with the judging form to make sure that you have done everything you need to do. You don't want to miss anything by accident.

For experiments, you will need to perform the entire experiment at least three times. **Doing it multiple times shows that the experiment results are repeatable and that your results aren't a mistake.** This doesn't mean only running three tests where you change one thing each time. Instead, it means running multiple (usually at least three) tests where everything is EXACTLY the same, then changing one thing and running multiple (usually at least three) additional tests with that change, etc.

For engineering design, you may also need to run tests repeatedly. If one concept fails you may need to redesign before testing again, but the final solution should be tested at least three times if possible to be sure that it works.

For the other types of projects (collection, demonstration, apparatus, and research), you will gather the information, parts, or devices that you need to build or collect, and do the project that you designed.

Share What You Learned

Once you have finished your actual project, you will share what you have done. You will write a report that tells all about your project. The report will be the most complete record of what you have done. For grades 6-12, you will also write an "abstract" which is a short summary of your project.

Once your report is done, you will create a display board that highlights the best parts of your project. These are all the things about your project that someone just walking by should know, since they probably won't read your report.

You also need to prepare a 3-5 minute oral presentation for the judges. This just means a short speech where you talk about your project and tell the judges everything you think they should know. After you are done, they will ask you questions about your project.

Read this Guidebook

This two page overview is just to help you get started. Please be sure to check out the other sections of this guidebook to get more details on what you are supposed to be doing.

Especially note:

- The section on your category and what it requires.
- The judging form for your category.
- The detailed instructions on what you need to bring to judging.

Be sure to have fun!

Giving and Getting Assistance

Adults: What level of help is appropriate?

As homeschool parents or guardians, this can be very tricky. You are both the child's teacher AND their parent. As the teacher, you need to explain how to do a science fair project, especially if they have never done one before. But as the parent you need to let them do a lot of the work on their own.

You need to balance teaching them with letting them do things on their own. This can be a difficult balance to find. But this is also a great time for your kids to build skills that they might not have had before.

Keep in mind that depending on the child's age, more or less help is appropriate. For example, you wouldn't expect a kindergartener to be able to use the internet or the library to get resources in the same way a high school student would. A younger child might need a parent to read to them, or to type their report for them, but the words that should go in the report should come from the child, not the adult. A younger child might need help to print things for their display, but should be able to decide on their own what order they should go on the display board.

Your goal is to have the child be learning and be able to do things on their own. The goal is NOT to have the prettiest board or the most well written report.

Take the opportunity to explain, help, and build the skills they will need. Learning how to use word processor software to write reports, database software to generate graphs, and how to organize their thoughts to share with others are all parts of this process.

One tip is to use examples other than their own project when helping them to learn, so that they can then apply it themselves to their own project.

This link is for parents whose children are part of a traditional school, but has some information on what is the right level of help for a middle-school student. How to Help Your Science Student. The page says that there is a point where you need to ask the teacher for help. Keep in mind that YOU are the teacher and be sure to give your child the skills they need to succeed.

Students: What level of help is appropriate?

You need to do as much of the work for your science project as you can on your own. But that doesn't mean that you can't ask for help when you really need it!

You CAN:

- ask someone to proofread your paper and display and give you suggestions for how to make it better. (YOU decide if you are taking those suggestions, though!)
- ask someone to type the words you say (if you can't use a computer yet).
- ask someone to help you learn how to use a computer program (for writing words or making charts, for example)
- ask someone to help you with dangerous parts of your project that needs adult assistance (for instance, chemicals or spray glue)
- ask someone questions to help you learn about the science you are doing.

You CANNOT:

- have someone write their own ideas and sentences and pretend that they are yours.
- have someone else do your experiment completely for you.
- have someone else design and create your display.

Can you think of other things that are clear that you can or cannot do? Let us know at ahsgsciencefair@gmail.com and those may make it to the guidebook list next year! If you aren't sure if something is permitted, you can always ask the science fair committee for clarification.

Presentation & Display

General Information

Your presentation at the science fair will contain three elements:

1. Oral Presentation (3-5 minutes, plus questions)
2. Visual Display (maximum size 48”w x 36”d x 48”h)
   - Tri-fold poster
   - Demonstration equipment/model (if applicable)
   - Collection (if applicable)
   - Apparatus (if applicable)
3. Written Report (bring two copies!)
4. Lab notebook (Experiment or Engineering Design) or logbook (Collection)

You will usually create these in reverse order (first the lab notebook or logbook, then the written report, then the visual display, and finally the oral presentation), but the judges may see them in any order.

Please consult the end of this document for judging forms. Viewing these will help you know what the judges will be looking for when evaluating your project.

Required Presentation Components for Each Category

	Tri Fold Poster Display	Lab Notebook	Logbook	Written Report	Abstract (6-12 grade only)	3-5 Minute Oral Presentation	Other
Experiment	✓	✓		✓	✓	✓	
Demonstration (& model)	✓			✓	✓	✓	Demonstration equipment & materials (or model)
Research	✓			✓	✓	✓	
Collection	✓		✓	✓	✓	✓	Collection (appropriately displayed)
Apparatus	✓			✓	✓	✓	The apparatus itself
Engineering Design Project	✓	✓		✓	✓	✓	The designed object

Oral Presentation

A significant part of your science fair experience is the ability to communicate clearly about what you learned and did.

Prepared Presentation

You should create and present a short (3-5 minute) explanation (speech) of your project to the judges, and be prepared to answer their questions afterwards. Your explanation should discuss the science behind the project. Don't just tell what happened, but also tell why it happened, or interesting things about it. When the judges come to your table, they may say something like "tell me about your project." This is when you will give the explanation.

Dealing with Questions

You may also want to think about the types of questions people might have about your project and the answers you would give. If you don't understand the question or don't know the answer, it is perfectly fine to say "I don't know" or to ask for more clarification on the question. It is much better to be honest than to try to make something up!

There will also be a lot of interest in what you did, how you did it, etc., from other students and parents, so plan to hang around near your project to talk about it afterwards. During the judging period, stay with your project so the judges can easily find you. You will have a chance to look at the other students' projects before judging begins and after judging ends. Take advantage of that time to see all the other great projects!

Appearance and Attitude

Dress nicely for the science fair judging. A pair of slacks and a button-down shirt or polo shirt or similar level of business casual dress is appropriate for the AHSG science fair.

When presenting anything, you will make a better impression if you are clean and well groomed. Be sure to take care of your face and hair, but the most important thing is your attitude and smile. Be positive!

Make sure that your voice is clearly audible to the judges so they can hear your replies. You don't want to mumble. This is especially important if you are wearing a mask.

Visual Display

Display Board

This is your chance to make an impression using color, lettering, photographs, etc. You should have a free-standing project board to stand on the table to which you are assigned. Project boards are usually 3-sided and constructed of cardboard or foam. They are commonly available in 40”w x 28”h and 48”w x 36”h variations.

Choose a catchy or descriptive title for your project, and include other major elements of your experiment. Include enough information so that guests can tell what the project was about in a short amount of time. Include charts, pictures, graphs - anything that will make your project clearer to the observer. Save very detailed explanations for the written report.

If you were required to write an abstract, be sure to include that information on your display board as well!

One (of many) possible ways to organize your information on the display board might be:

Left Panel	Center panel	Right Panel
Abstract Problem/purpose Hypothesis Procedure	Title Illustrations Graphs/Charts	Results Conclusions

The information shown on your display will vary depending on your type of project. Not all projects will have the same parts (for example, a collection is unlikely to have a hypothesis), but the display should have relevant information for your actual project. A demonstration would contain the instructions to follow to do the demonstration. Look at the judging forms to see what the judges will be expecting to see!

Keep in mind that the top center panel is going to be the place that people look at first, but then they read from left to right. You will want to have your title at the top center, and something to grab visitors attention so that they want to stop and look at the rest of the display as well.

Be sure the title is large enough to read from 10 feet away, and that the text on your display is all large enough to read from 3-4 feet away.

When laying out your display, don’t glue or tape anything down until you are SURE where you want everything to go. Cut out the various parts first and move them around, so you can see what works best, and arrange things so that they are relatively even. You don’t want to have one section of your display really crowded but leave blank spaces elsewhere!

Other Display Elements

You may also want to have items to display on the table in front of the display board. There might be other items that make sense and enhance your project, but you will only be judged on the items that are required and requested. Please see the judging forms for details.

For an **experimen**t, you should ONLY have pictures and your lab notebook. No equipment, chemicals, samples, etc. We do **not** want to see your actual experimental setup. You will bring your lab notebook instead. Photos on the display board are highly recommended.

For a **demonstration or model**, you would display the actual demonstration equipment or model.

For a **research** project, you would have no other display elements other than the display and written report (covered in another section).

For a **collection**, you would have the items you collected and your logbook.

For an **apparatus** project, you would have the apparatus.

For an **engineering design project**, you would have the final product (unless it contains any of the non permitted items), and your lab notebook.

Please keep in mind that your entire display must fit on the table given (approx 48" wide x 30" deep) and not contain any of the restricted items. For larger projects, contact the Science Fair coordinators for approval.

Display Considerations, Restrictions, and Prohibited Items

Students should think of others when planning their display. If the item is likely to make a mess or hurt people or other things, do not bring it. There will be many young children attending the fair and they are likely to bump into tables or try to touch items on display. Also, do not bring items that are going to distract or annoy people (such as sirens, flashing lights, etc.) Anything using electricity or moving parts must be set up in a way to protect people and the surrounding area.

Some specific items that are not allowed in the display: spillable liquids, sharp items, hazardous chemicals, hazardous materials, hazardous devices, flames, highly flammable materials, unsecured glass, biological contaminants, fungi, bacteria, deceased specimens with decay, food, live animals, anything potentially spillable or breakable, and any objects that present a hazard to people or other displays. Use your common sense, please. This is not a comprehensive list. The science fair committee has the final say on any questionable items.

Please be aware that if you want to take your science project to another fair, they may have different rules. Many adhere to the ISEF rules found here, which are much stricter than those at the AHSG science fair.

Written Report

Font and Paper

Use 12 point Times New Roman font, double spaced, with 1" margins and page numbers on every page. Handwritten is acceptable for elementary age if neat and legible, or parents may type what the student dictates. You should bring two copies of the report to judging, printed on white paper. One copy of the report you will keep with your visual display for guests to read, and the judges will take the other copy of the report back to the judging room for reference. Please just staple the report, no additional cover is needed.

Report Length

The body of the report should be approximately 1-2 pages for elementary school students, 3-5 pages for middle school students, and 5-8 pages for high school students. (The title page and references are not included in this page count.) Keep in mind that you need to neither be too short (and thus not explain well) nor be too long (and lose the interest of the reader). Include whatever charts and other materials are needed for clarity and interest.

General Report Guidelines

Your written report will vary depending on the type of project and the age of the student completing it. The following are general guidelines of what is expected, but are most applicable to an experiment.

If you have a project which isn't an experiment, the format of your report may be very different. You should always have a title page and references or bibliography, but the body of the paper will be tailored to the type of project you chose. **See the section on your category and your category judging form for more suggestions.**

For example, if you picked a research project on a disease or medical problem, you would find out the history of the disease (when it was discovered, how, who it affects, etc.). You might get into the biochemistry of it (what is the method of infection, what are the current treatments, what research is being done on it, etc.). There are many ways to explore the topic you choose.

You want to have enough information to explore the topic in a general way and then get down into specifics, possibly with some new, current discoveries.

Guidelines: Written Report for Elementary School Experiments

The content is much the same as for the middle school grades (shown later) but in a simpler format. You can look at that section for suggestions. The written report should be 1-2 pages with a chart or graph and include the following:

1. What is the question I want to answer? (Purpose)

2. What do I think the results will be? (Hypothesis)

3. What materials did I use? (Materials)

4. What did I do to answer the question? (Procedure)
    a. What did I change?
    b. What changed as a result of what I did?
    c. What things did I keep the same?

5. What is the answer to my question? (Results and conclusions)

6. What books or other information did I use to help me? (References/Bibliography)

7. Thank anyone who helped you with advice or suggestions. (Acknowledgments)

Reminder: If you are not doing an experiment, the report will be slightly different. Modify the report to fit the type of project you are doing. See your category page for details.

Guidelines: Written Report for Middle & High School Experiments

Middle School: (3-4 pages)

High School: (5 or more pages; higher quality of research; more academic sources)

Reminder: If you are not doing an experiment, the report will be slightly different. Modify the report to fit the type of project you are doing. See your category page for details.

1. **Title Page**

   This page should have the name of your project, the author, and the date the report was completed (or the date of the science fair).

2. **Abstract**

   This is a 250-word or less summary of the experiment, including introductory information, the purpose, basic procedure, results, and conclusion. This abstract should also be placed on your tri-fold display.

3. **Introduction / Purpose / Hypothesis / Background Research**

   In this section, explain the general nature of your project. What are you trying to find out? What variables are you testing? What is your hypothesis? In this section you should also include any background research (with appropriate citations) that you did leading up to your experiment.

4. **Methods / Materials and Equipment / Procedure**

   Carefully explain how you went about your investigation. If it is an experiment you should tell what you changed, what changed as a result of what you did, and what you kept the same.

   You should explain your procedure so thoroughly that someone else could read your paper and duplicate your experiment. Provide a complete list of equipment, materials, chemicals apparatus, etc. You may wish to illustrate any complicated setup that you used.

5. **Results / Discussion / Analysis**

   Report your results in a clear and organized manner. In addition to a straightforward display of the data in rows and columns, use graphs and diagrams. Include any failures, errors or results that you don't understand.

6. **Conclusions**

   Explain, interpret and evaluate your data. What do the results show? Do the results support your hypothesis? It is OK if they don't! What do your results mean? You might comment on ways you could improve your experiment. Do your results suggest any new questions which might be followed up by another experiment?

7. **References / Bibliography**

   List all of your references in the form of a bibliography.

8. **Acknowledgments**

   Thank anyone who provided you with advice or suggestions.

Citing Sources

For middle and high school, **every** source of information used in the report should appear in the bibliography/reference list. When information from those sources is used as quoted or paraphrased information within the document, a citation (whether in-line or footnote) should reference the original source of that information.

For high school reports, we expect to see complete parenthetical/in-line (APA) or footnote citations (Chicago Style) for all quoted AND paraphrased information, as well as a bibliography/reference list at the end. Basically, any information that you did not know prior to doing your research must have a citation.

Middle school students should do parenthetical/in-line (APA) or footnote (Chicago Style) citations as well as they can, and provide a bibliography/reference list at the end.

Elementary students may simply have a bibliography/reference list at the end of their document.

You should use a standard citation style (APA, MLA, and Chicago are the most commonly used) for both the parenthetical/in-line/footnote citations and the bibliography or reference list. If you write for other organizations, you will need to learn the style that they prefer. For example, many mechanical engineering scientific papers use a variation of Chicago style, while most social sciences use APA format. MLA is primarily used for English and humanities and is not used for science. You may have a style that you are using in your schoolwork already. If so, you may use it. If you are unsure, use APA for the science fair.

Purdue University's Online Writing Lab (OWL) is a good resource for learning why, when, and how to cite sources. OWL also has Style Guides for each of the different citation style. Style guides are for more than just citations. They also provide a guideline on font size, page margins, and other parts of readability. However, for the science fair, please follow the guidelines in the Font and paper section. Please visit and read these links to learn how to properly cite:

- Style Guide Overview
- APA Style Introduction
  - APA Formatting and Style Guide
  - APA Poster
- Chicago Manual of Style 17th Edition
  - Chicago General Format
- MLA Style Introduction
  - MLA General Format

Avoiding Plagiarism

Plagiarism is taking the words of someone else and presenting them as if they were your own. The other person worked hard to create those words, and taking credit for them yourself is wrong. Take the time to learn why, when and how to cite your sources correctly to avoid accidental and purposeful plagiarism. Please visit these links to learn more:

- FAQs
- Common Knowledge and Attribution
- Best Practices to Avoid Plagiarism
- Should I Cite This

Keeping a Logbook

Logbooks are used for collections. The collection logbook would list the date, time, and place of where the item was collected and a description of the item. Also assign a specimen number if appropriate. You can use the specimen number to keep track of your items.

If you have items that were previously collected, use your best recollection to list where and when it was collected. If you can't remember, write "unknown." If at all possible, put the best information you have (summer of 2020, for instance). You will then have this logbook to use for future additions to your collection.

Keeping A Laboratory Notebook/Journal

Experiments and Engineering Design Projects should have a laboratory notebook or journal as part of the design process and judging. This section goes over how to create a lab notebook.

Note: This section was preexisting in the science fair documents, and we have no record of who created it for proper attribution. Another resource is the Science Buddies page Science and Engineering Project Laboratory Notebooks.

Each scientific research organization will have its own guidelines or requirements for keeping scientific laboratory notebooks. Record keeping is an essential part of training for science.

A properly kept lab notebook is a permanent record of your experiments, on which any paper summary report or display is based, and should provide enough information so that you or someone else can repeat the experiment. A lab notebook can never have too much detail! You will bring your lab notebook to the fair with you, so you can refer to it as you speak with the judges.

For professional scientists, following the guidelines or requirements can demonstrate that they were the first to do a certain experiment, and can be used to support patent applications and to defend against accusations that data were falsified.

The following are important guidelines that are often used:

1. A notebook must have numbered, permanently bound pages. AACC College bookstore has paper books, with just a few pages that work. They are designed for taking exams. However, I found that one can make a well sized book by taking about 5 to 10 pieces of graph paper, folding them in half and stapling them together with a slightly thicker cover (index weight paper or construction paper). Or use 5 to 10 pages of unfolded graph paper to make a larger format book for younger writers. A spiral bound notebook is not acceptable because pages can easily be removed. Three-ring binders and similar binders that allow the movement of pages are also not acceptable.
   [You could also purchase a composition notebook that is permanently bound and manually add page numbers. The important thing is that it must be obvious if a page has been removed.] Number the pages before you start. In some labs, it is permissible to use only the front of the page (that is, the right side of the open book) and save the left for attaching computer printouts, photographs or other loose material. In this case, number only the right-hand pages.

2. Use the front of the first page to write the title of your project; the name of the scientist performing the project; the date the project was started (including research); the date the project was finished (filled in when finished); the grade of the scientist.

3. The next two pages should be reserved for a table of contents so that it will later be easier to locate tests or other material entered in the notebook. To indicate that you are not skipping pages, put the title, "Table of Contents" on that second page. The first entry on the page should be "Table of Contents…. pp 2-3"
4. The notebook should be filled from front to back chronologically and without skipping any pages. The date of the entry should be recorded on every subsequent page.

5. All material written in the book should be recorded using a pen to prevent the temptation to erase.

6. When correcting an error, do not erase or scribble over the error. The entry should be marked out with a single line so that the original entry can be read by someone reviewing the notebook. It is a good idea to initial the correction. If you are adding comments ("dropped contents down the sink", "none of these cultures had any growth", "results for this experiment are found on page x"), date and initial the comments.

7. If you leave a line or part of a page empty, fill the space with large x's or diagonal lines. Crossing out blank lines and the blank bottoms of pages lets individuals who later review the book know that you were not planning to add material at a later date.

8. All work should be recorded in the notebook as it is done. Do not write measurements or other data on scrap paper and recopy it. As one does lab work, initial written work is often not neat, but it must be included in the notebook to validate the date it was done. At a later time (thus typically entered on pages found later in the notebook), the experiment can be summarized more neatly. The notebook, then, will contain both (1) an initial entry including the steps of the procedure, calculations used in preparation, result readings, etc, that are recorded on the day(s) an experiment is actually run and (2) a formal write-up of the experiment, which is typically entered one to two days later, that will describe the experiment fully to others who might later read the notebook.

9. Because different batches of chemical supplies can actually change results in experiments, the supply company, the catalogue number, and the lot number of each critical chemical should be recorded in the notebook.

10. When graphs, computer-drawn figures, photographs or other loose sheets are included in a notebook, they must be permanently fixed into the notebook, using staples, glue or scotch tape.

11. In your summaries, do not focus on supporting the hypothesis, but on accurately drawing conclusions from the experiment. It is not important if, at times, data are frequently refuting the hypotheses: eliminating false hypotheses is essential to getting a clearer idea of the true underlying mechanism. Do not overlook an observation because it seems quite unusual. Sometimes scientists have become famous by pursuing some odd observation that other labs also saw but chose to ignore because it seemed too unusual or was not the main focus of their work.

References

Asimov, I., & Fredericks, A. D. (2001). *Science Fair Handbook*. Good Year Books.

Vazquez, L. M., France, D. M., & Perkins, K. M. (1994). *Not Just Another Science Fair: A Handbook and More for Science Fair Organizers*. Good Year Books.

Forms

The following pages contain the waivers and judging forms for this year's science fair.

Animal & Human Project Forms

2023 AHSG Science Fair Human/Animal Project Certification Form
2023 AHSG Science Fair Human Participant Consent Form

Sample Judging Forms

- Apparatus
- Collection
- Demonstration
- Engineering Design
- Experiment
- Research

AHSG Science Fair Human/Animal Project Certification Form

Part 1: Research Proposal (To be completed by the student)

Student Name: _____

Address: _____

_____

What is the question and purpose of your study?

_____

_____

_____

_____

This study includes (as subjects): □ Humans □ Vertebrate animals

Describe your experimental procedures with as much detail as possible. Include where you will be doing the experimentation. Attach additional pages if necessary.

_____

_____

_____

_____

_____

_____

_____

Part 2: Certification: (To be completed by a qualified scientist. That is, someone who possesses an earned doctoral degree in science or medicine or someone with a lesser degree and equivalent experience and/or expertise in a field relevant to the experiment subject.)

"I certify that I have reviewed and approved the research proposal above. This project does not involve the inhumane or unethical treatment of the subject matter. I am a qualified scientist with a working knowledge of the technique to be used by the student in this research project."

Scientist Name:_____

I am qualified to approve this research proposal due to: (explain your educational background, earned degree, relevant experience, etc.) _____

_____

Signature: _____ Date:_____

AHSG Science Fair Human Participant Consent Form

- One form must be filled out per study participant.
- The student researcher may fill out the first page and then make copies, but the signatures on the second page must be signed for each form individually.
- All completed forms must be neatly collected and on hand during presentation and judging.

Section 1: To be completed by the student researcher and provided to study participants.

Student Researcher Name: _____

Title of Project: _____

Purpose of Project:

_____

_____

_____

As a participant, you will be asked to:

_____

_____

_____

The time required to participate is _____.

Potential risks, if any, are:

_____

_____

_____

Benefits of participation are:

_____

_____

_____

Confidentiality of participants is maintained by

_____

_____

Student Scientist Safety Precaution Statement

As a student researcher, I will follow safe guidelines and expectations held by the scientific community while conducting my research. I will take the following precautions to mitigate the risk of exposure for participants:

- Consideration of virtual or online options for research
- Following face covering and social distancing recommendations by the governing authorities where the research is conducted
- Requiring participants to wash hands before and after the study
- Cleansing of materials being used by participants

By signing this form, I am attesting that I have provided true and accurate information about the study and its risks and benefits to the participants, and will protect their safety and personal information.

Student Researcher Signature: _____ Date: _____

Section 2: To be completed by the study participant. If the participant is a minor, a parent or guardian signature giving permission to participate is required.

Voluntary Participation and Consent

Participation in this study is completely voluntary. If the participant decides not to participate there will not be any negative consequences.

Please be aware that if a person decides to participate, the person may stop participating at any time and may decide not to answer any specific question.

By signing this form, I am attesting that I have read and understand the information in sections 1 and 2 above and I freely give my consent/assent to participate or permission for my child to participate.

_____ _____

Parent or Guardian Printed Name Date

_____

Parent or Guardian Signature

Sample Judging Form: Apparatus

AHSG Science Fair Scorecard : Apparatus

Apparatus: The goal is to illustrate (show) the use/function of a scientific tool or implement.

Student Name: _____

Project Title: _____

Division: K-2 3-5 6-8 9-12 **Project Number:** _____

Judges: This form will be provided to students after the fair so they know what they did well and ways they can improve.

Scoring must be age appropriate: 5= Excellent 4= Very Good 3= Good 2= Fair 1= Poor 0= Absent

Communication (20 pts)	
Student's 3-5 minute oral presentation makes sense and explains the overall project.	5 4 3 2 1 0
Student is able to give clear, concise, thoughtful answers to questions.	5 4 3 2 1 0
Student communicates effectively with a positive attitude and appropriate personal appearance.	5 4 3 2 1 0
Student demonstrates interest and enthusiasm for the project.	5 4 3 2 1 0
Display (20 pts)	
Tri-fold display is legible when standing at a reasonable distance and is well organized.	5 4 3 2 1 0
Tri-fold display explains use and contains highlights of the project, such as history, parts, etc.	5 4 3 2 1 0
Apparatus (or appropriate subsitute) is displayed with information to explain use/parts/etc.	5 4 3 2 1 0
Information on how the apparatus relates to science is included in the display.	5 4 3 2 1 0
Report (40 pts)	
Written report is neatly handwritten OR typed in Times New Roman 12pt font and has a title page.	5 4 3 2 1 0
Introduction is well written and relevant to the topic. *In addition, for grades 6-12, the 250-word or less abstract gives a clear summary of the project.*	5 4 3 2 1 0
Report explains why the student chose this apparatus and what they knew about it previously.	5 4 3 2 1 0
Report shows the use/function of the apparatus, and explains why it is needed and who uses it.	5 4 3 2 1 0
Report covers science principles involved in the use, function, and/or design of the apparatus.	5 4 3 2 1 0
For student built apparatus, information on build process (design, materials, etc.) is included. For existing apparatus, information on manufacture (where/who, possibly how) is included.	5 4 3 2 1 0
For grades K-5, the report includes a list of sources used and age appropriate citations. *For grades 6-12, the report uses full citations and contains a list of references.*	5 4 3 2 1 0
Conclusion is well written, summarizes what was learned, and appropriately wraps up the report.	5 4 3 2 1 0
General (20 pts)	
Student understands science relevant to the project. (Age appropriate)	5 4 3 2 1 0
The project is a result of the student's own work. (Age appropriate)	5 4 3 2 1 0
Student clearly identifies why apparatus is important.	5 4 3 2 1 0
Student identifies future development for the apparatus (other uses, new improvements, etc.)	5 4 3 2 1 0
Total Score (out of 100)	_____
Award Level Given (circle one): Bronze (0-59) Silver (60-79) Gold (80-100)	
Judge's comments to the student (use back for more notes if needed)	
The best things about your project are: Your project could have been improved by:	

Sample Judging Form: Collection

AHSG Science Fair Scorecard : Collection

Collection: The goal is to illustrate (show) the diversity of a set of items.

Student Name: _____

Project Title: _____

Division: K-2 3-5 6-8 9-12 **Project Number:** _____

Judges: This form will be provided to students after the fair so they know what they did well and ways they can improve.

Scoring must be age appropriate: 5= Excellent 4= Very Good 3= Good 2= Fair 1= Poor 0= Absent

Communication (20 pts)	
Student's 3-5 minute oral presentation makes sense and explains the overall project.	5 4 3 2 1 0
Student is able to give clear, concise, thoughtful answers to questions.	5 4 3 2 1 0
Student communicates effectively with a positive attitude and appropriate personal appearance.	5 4 3 2 1 0
Student demonstrates interest and enthusiasm for the project.	5 4 3 2 1 0
Display (25 pts)	
Logbook is completed appropriately and provides an accurate record of collected items.	5 4 3 2 1 0
Collection items (or photos of) are displayed in a way that is neat and logical (or creative).	5 4 3 2 1 0
The collection includes sufficient specimen variety to demonstrate diversity.	5 4 3 2 1 0
Tri-fold display is legible when standing at a reasonable distance and is well organized.	5 4 3 2 1 0
Display includes enough information for visitors to understand the purpose of the collection.	5 4 3 2 1 0
Report (35 pts)	
Written report is neatly handwritten OR typed in Times New Roman 12pt font and has a title page.	5 4 3 2 1 0
Introduction is well written and relevant to the topic. *In addition, for grades 6-12, the 250-word or less abstract gives a clear summary of the project.*	5 4 3 2 1 0
Report explains why they chose this collection and what they learned.	5 4 3 2 1 0
Report includes information about the collection process and explains major terms and definitions.	5 4 3 2 1 0
Report includes science information relating to the diversity of the collection.	5 4 3 2 1 0
For grades K-5, the report includes a list of sources used and age appropriate citations. *For grades 6-12, the report uses full citations and contains a list of references.*	5 4 3 2 1 0
Conclusion is well written, summarizes what was learned, and appropriately wraps up the report.	5 4 3 2 1 0
General (20 pts)	
Student understands science relevant to the project. (Age appropriate)	5 4 3 2 1 0
The project is a result of the student's own work. (Age appropriate)	5 4 3 2 1 0
The student highlights particular specimens of interest in either the display or report or both.	5 4 3 2 1 0
The student identifies future collection goals (specimens, locations, other science, study ideas, etc.)	5 4 3 2 1 0
Total Score (out of 100)	_____
Award Level Given (circle one): Bronze (0-59) Silver (60-79) Gold (80-100)	

Judge's comments to the student (use back for more notes if needed)

The best things about your project are:

Your project could have been improved by:

Sample Judging Form: Demonstration

AHSG Science Fair Scorecard : Demonstration

Demonstration: The goal is to illustrate (show) a scientific principle or fact.

Student Name: _____

Project Title: _____

Division: K-2 3-5 6-8 9-12 **Project Number:** _____

Judges: This form will be provided to students after the fair so they know what they did well and ways they can improve.

Scoring must be age appropriate: 5= Excellent 4= Very Good 3= Good 2= Fair 1= Poor 0= Absent

Communication (20 pts)	
Student's 3-5 minute oral presentation makes sense and explains the overall project.	5 4 3 2 1 0
Student is able to give clear, concise, thoughtful answers to questions.	5 4 3 2 1 0
Student communicates effectively with a positive attitude and appropriate personal appearance.	5 4 3 2 1 0
Student demonstrates interest and enthusiasm for the project.	5 4 3 2 1 0
Display & Demonstration (25 pts)	
Tri-fold display is legible when standing at a reasonable distance and is well organized.	5 4 3 2 1 0
Display includes step-by-step directions for the demonstration(or model build), incl. materials needed.	5 4 3 2 1 0
Demonstration is repeatable, and ideally can be done by visitors to experience the science personally. Or, for a demonstration using a model, visitors are able to view and manipulate the model.	5 4 3 2 1 0
Display includes information on the scientific theory (why does it work/why is it important, etc.)	5 4 3 2 1 0
Student is able to perform the demonstration during judging without outside instruction.	5 4 3 2 1 0
Report (35 pts)	
Written report is neatly handwritten OR typed in Times New Roman 12pt font and has a title page.	5 4 3 2 1 0
Introduction is well written and relevant to the topic. *In addition, for grades 6-12, the 250-word or less abstract gives a clear summary of the project.*	5 4 3 2 1 0
Report includes why they chose this, why it is important, and what they learned.	5 4 3 2 1 0
Body discusses scientific principle or fact being demonstrated and explanation of what is going on.	5 4 3 2 1 0
Report includes description of how to do the demo/model, and materials needed to do it.	5 4 3 2 1 0
For grades K-5, the report includes a list of sources used and age appropriate citations. *For grades 6-12, the report uses full citations and contains a list of references.*	5 4 3 2 1 0
Conclusion is well written, summarizes what was learned, and appropriately wraps up the report.	5 4 3 2 1 0
General (20 pts)	
The overall demonstration project clearly shows a scientific principle or fact.	5 4 3 2 1 0
Student understands science relevant to the project. (Age appropriate)	5 4 3 2 1 0
The project is a result of the student's own work. (Age appropriate)	5 4 3 2 1 0
Student identifies ways to pursue further studies as a result of this project.	5 4 3 2 1 0
Total Score (out of 100)	_____
Award Level Given (circle one): Bronze (0-59) Silver (60-79) Gold (80-100)	
Judge's comments to the student (use back for more notes if needed)	
The best things about your project are:	
Your project could have been improved by:	

Sample Judging Form: Engineering Design

AHSG Science Fair Scorecard : Engineering Design

Engineering Design Project: The goal is to solve a problem by designing a process or a physical item.

Student Name: _____

Project Title: _____

Division: K-2 3-5 6-8 9-12 **Project Number:** _____

Judges: This form will be provided to students after the fair so they know what they did well and ways they can improve.

Scoring must be age appropriate: 5= Excellent 4= Very Good 3= Good 2= Fair 1= Poor 0= Absent

Communication (20 pts)	
Student's 3-5 minute oral presentation makes sense and explains the overall project.	5 4 3 2 1 0
Student is able to give clear, concise, thoughtful answers to questions.	5 4 3 2 1 0
Student communicates effectively with a positive attitude and appropriate personal appearance.	5 4 3 2 1 0
Student demonstrates interest and enthusiasm for the project.	5 4 3 2 1 0
Display (20 pts)	
Tri-fold display is legible when standing at a reasonable distance and is well organized.	5 4 3 2 1 0
Display includes information on problem, design process, testing, design changes, and final solution.	5 4 3 2 1 0
Lab notebook includes information on design process and records all testing and design iterations.	5 4 3 2 1 0
Display includes finished product or process. May include previous prototypes if appropriate.	5 4 3 2 1 0
Report (35 pts)	
Written report is neatly handwritten OR typed in Times New Roman 12pt font and has a title page.	5 4 3 2 1 0
Introduction is well written and relevant, and includes statement of problem and why it is a problem. *In addition, for grades 6-12, the 250-word or less abstract gives a clear summary of the project.*	5 4 3 2 1 0
Report includes research on past/current other solutions to this problem, or why there aren't any.	5 4 3 2 1 0
Report includes description of design process, any testing, prototypes, changes made, etc.	5 4 3 2 1 0
Report explains how student tested the solution and checked to see if it solved the problem.	5 4 3 2 1 0
For grades K-5, the report includes a list of sources used and age appropriate citations. *For grades 6-12, the report uses full citations and contains a list of references.*	5 4 3 2 1 0
Conclusion is well written, restates problem and determines if the solution fully solves the problem.	5 4 3 2 1 0
General (25 pts)	
Student understands science relevant to the project. (Age appropriate)	5 4 3 2 1 0
The project is a result of the student's own work. (Age appropriate)	5 4 3 2 1 0
Student understands applications and limitations of designed prototype/process.	5 4 3 2 1 0
Student identifies how the design was refined over time and why changes were needed.	5 4 3 2 1 0
Student identifies ways that this design could be improved more in the future.	5 4 3 2 1 0
Total Score (out of 100)	_____
Award Level Given (circle one): Bronze (0-59) Silver (60-79) Gold (80-100)	
Judge's comments to the student (use back for more notes if needed)	
The best things about your project are: Your project could have been improved by:	

Sample Judging Form: Experiment

AHSG Science Fair Scorecard : Experiment

Experiment: The goal is to confirm or deny a possible answer to a science question (hypothesis) by performing repeatable tests.

Student Name: _____

Project Title: _____

Division: K-2 3-5 6-8 9-12 **Project Number:** _____

Judges: This form will be provided to students after the fair so they know what they did well and ways they can improve.

Scoring must be age appropriate: 5= Excellent 4= Very Good 3= Good 2= Fair 1= Poor 0= Absent

Communication (20 pts)	
Student's 3-5 minute oral presentation makes sense and explains the overall project.	5 4 3 2 1 0
Student is able to give clear, concise, thoughtful answers to questions.	5 4 3 2 1 0
Student communicates effectively with a positive attitude and appropriate personal appearance.	5 4 3 2 1 0
Student demonstrates interest and enthusiasm for the project.	5 4 3 2 1 0
Display (20 pts)	
Tri-fold display is legible when standing at a reasonable distance and is well organized.	5 4 3 2 1 0
Tri-fold display shows the hypothesis, data, method, and conclusions.	5 4 3 2 1 0
Lab notebook shows recorded data and observations taken at the time the experiment was performed.	5 4 3 2 1 0
Lab notebook shows that sufficient data has been collected to justify student's conclusions.	5 4 3 2 1 0
Report (35 pts)	
Written report is neatly handwritten OR typed in Times New Roman 12pt font and has a title page.	5 4 3 2 1 0
Introduction is well written and includes purpose/hypothesis and background information. *In addition, for grades 6-12, the 250-word or less abstract gives a clear summary of the project.*	5 4 3 2 1 0
Body of the report includes test procedure including methods and materials and equipment.	5 4 3 2 1 0
Test data is clear and complete and arranged in an organized manner (labeled tables or graphs, etc.).	5 4 3 2 1 0
Report includes discussion and analysis. Results are explained, analyzed, and compared (as needed).	5 4 3 2 1 0
For grades K-5, the report includes a list of sources used and age appropriate citations. *For grades 6-12, the report uses full citations and contains a list of references.*	5 4 3 2 1 0
Conclusion is well written, summarizes what was learned, and appropriately wraps up the report.	5 4 3 2 1 0
General (25 pts)	
Student understands science relevant to the project. (Age appropriate)	5 4 3 2 1 0
The project is a result of the student's own work. (Age appropriate)	5 4 3 2 1 0
Student performed the full experiment multiple times in order to show repeating results.	5 4 3 2 1 0
Student identifes possible sources of experimental error and evaluates if the results were conclusive. This includes identifying whether the hypothesis was confirmed or denied, or if more data is needed.	5 4 3 2 1 0
Student identifies future plans (further experiments, refinements, other implications, etc.)	5 4 3 2 1 0
Total Score (out of 100)	
Award Level Given (circle one): Bronze (0-59) Silver (60-79) Gold (80-100)	
Judge's comments to the student (use back for more notes if needed)	
The best things about your project are: Your project could have been improved by:	

Sample Judging Form: Research

AHSG Science Fair Scorecard : Research

Research: The goal is to answer a question about science using primary sources.

Student Name: _____

Project Title: _____

Division: K-2 3-5 6-8 9-12 **Project Number:** _____

Judges: This form will be provided to students after the fair so they know what they did well and ways they can improve.

Scoring must be age appropriate: 5= Excellent 4= Very Good 3= Good 2= Fair 1= Poor 0= Absent

Communication (20 pts)	
Student's 3-5 minute oral presentation makes sense and explains the overall project.	5 4 3 2 1 0
Student is able to give clear, concise, thoughtful answers to questions.	5 4 3 2 1 0
Student communicates effectively with a positive attitude and appropriate personal appearance.	5 4 3 2 1 0
Student demonstrates interest and enthusiasm for the project.	5 4 3 2 1 0
Display (20 pts)	
Tri-fold display is legible when standing at a reasonable distance and is well organized.	5 4 3 2 1 0
Display clearly shows the research topic (question) and the answer, with supporting data.	5 4 3 2 1 0
Images and data are included to improve visual interest and are clearly labeled.	5 4 3 2 1 0
Display information is presented in a way that allows visitors to understand without reading the report.	5 4 3 2 1 0
Report (40 pts)	
Written report is neatly handwritten OR typed in Times New Roman 12pt font and has a title page.	5 4 3 2 1 0
Introduction is well written and relevant to the topic. *In addition, for grades 6-12, the 250-word or less abstract gives a clear summary of the project.*	5 4 3 2 1 0
Report explains why they asked this question/their interest in the topic.	5 4 3 2 1 0
Body includes data/information from credible sources that answer the question/research topic posed.	5 4 3 2 1 0
Body includes information on signficance/importance of topic & explains major terms & definitions.	5 4 3 2 1 0
For grades K-5, the report includes a list of sources used and age appropriate citations. *For grades 6-12, the report uses full citations and contains a list of references.*	5 4 3 2 1 0
Student's final answer to their question/research topic is supported by the data collected.	5 4 3 2 1 0
Conclusion is well written, summarizes what was learned, and appropriately wraps up the report.	5 4 3 2 1 0
General (20 pts)	
Student understands science relevant to the project. (Age appropriate)	5 4 3 2 1 0
The project is a result of the student's own work. (Age appropriate)	5 4 3 2 1 0
Sources are credible, authoritative, & reliable. Student identifies potential biases/conflicts of interest.	5 4 3 2 1 0
Student identifies areas for future research. (Their own/ideas for researchers/ongoing research, etc.)	5 4 3 2 1 0
Total Score (out of 100)	_____
Award Level Given (circle one): Bronze (0-59) Silver (60-79) Gold (80-100)	

Judge's comments to the student (use back for more notes if needed)

The best things about your project are:

Your project could have been improved by: