Adventure Science Center

SCIENCE FAIR

STUDENT AND GUARDIAN PACKET

TABLE OF CONTENTS

A MESSAGE TO PARTICIPANTS

Dear Parents/Guardians and Students,

Welcome to Adventure Science Center's first annual public Science Fair! I am very excited to have you participate in this year's inaugural festivities. I hope that this fun, educational experience is one that you and your student will not only enjoy but will remember for a lifetime.

In effort to set you and your science fair participant up with success, we've put together this handbook detailing information about the fair event, how to create a successful project, criteria for judging, helpful resources, etc.

Please read this information carefully, and keep it for future reference!

Should you have questions that are not answered by the handbook, please don't hesitate to contact me. You may reach me at jmoeller@adventuresci.org, or (615) 401-5082.

I look forward to seeing you at the fair!

Sincerely,

Jason Moeller
Adventure Science Center Learning Specialist
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WHAT IS A SCIENCE FAIR?

A Science Fair is an exhibition of science projects. Each project in the fair is prepared and presented by a student.

By working on these projects, students have the opportunity to experience scientific practices while pursuing a topic that they find interesting.

The goal of science fairs is to interest students in both science and engineering. They also give students practice speaking in public.

To successfully compete in Adventure Science Center's Science Fair, students need to complete the following tasks.

1. Ask a testable question.
2. Design an experiment that can answer the question.
3. Run the experiment three times to answer the question.
4. Create a poster-board display that shows the question, the experiment, and the experiment results.
5. Create a model of the experiment that can be displayed with the poster board.
6. Give a ten-minute presentation about their project to a science fair judge.

IMPORTANT DATES

SATURDAY, APRIL 22ND: Last Day for Registration. Project titles, topics, and descriptions are included in this registration. If there is an issue with a title, topic, or description, an Adventure Science Center staff member will reach out to you via email.

TUESDAY, APRIL 25th - Any changes to your project title, topic, and description must be submitted by 5:00 PM. Participants **may not change** their project title, topic, and description after this time.

SATURDAY, APRIL 29th: Registrants will receive detailed information about the fair. This will include their project numbers, where their project will be located, and the exact time of their presentation.

SATURDAY, MAY 13th: The day of the Science Fair!

EVENT INFORMATION

DATE OF THE FAIR: Saturday, May 13th, 2023

TIME OF THE FAIR: 8:30 am – 2:00 pm

LOCATION: Adventure Science Center – 800 Fort Negley Blvd, Nashville, TN 37203

PARKING: Adventure Science center has two parking lots in front of the building. Parking is free.

SCIENCE FAIR ENTRY FEE: $20.00 per project

ADMISSION: The Science Fair entry fee includes one participant and one adult. Students under the age of 16 must be supervised by an adult for the entirety of the event.

PARTICIPATION: Adventure Science Center Science Fair serves K-8th grade students. Student projects are organized into three age ranges: K-2nd grade, 3rd-5th grade, and 6th-8th grade.

Students are expected to be at their project at least 10 minutes prior to their presentation time. Students and their chaperone are not required to be present for the entire science fair event timeline. Projects can be collected between 12:00 pm – 2:00 pm.

SCIENCE FAIR EVENT DAY TIMELINE

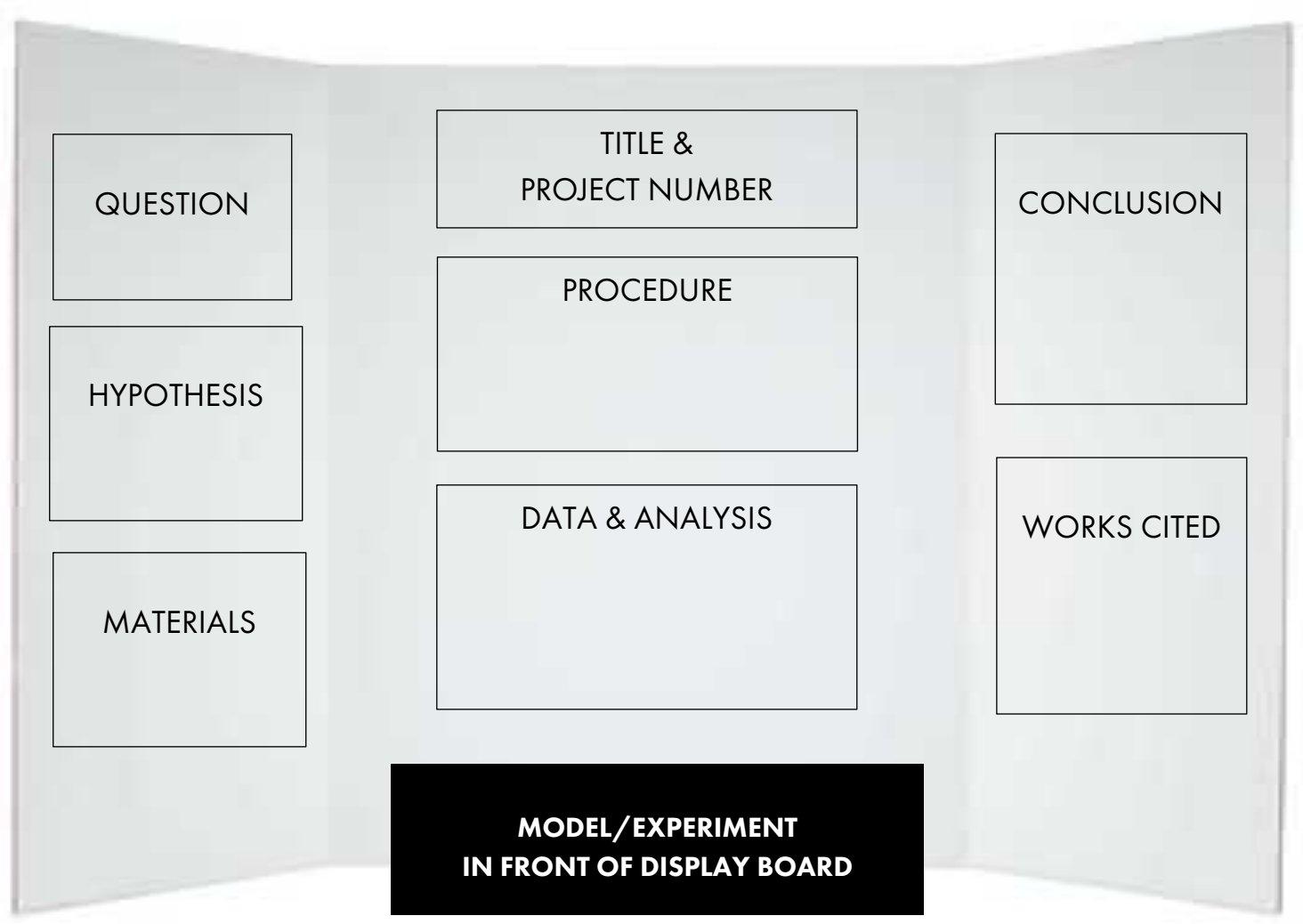
8:30 am – 9:30 am	Check-in - Participants and chaperones drop off/set up student projects.
9:30 am – 10:00 am	Judges arrive, are briefed, and are given their assignments. Marketing photographs students with projects.
10:00 am – 12:00 pm	Judging Session. Judges will judge all projects during this time. Marketing will be taking photographs at this time.
12:00 pm – 12:30 pm	Lunch Break.
12:00 pm – 2:00 pm	General Adventure Science Center guests may view projects. Volunteers will monitor guest interaction with student projects. Students may choose to be present with their project to share details with visitors. Students may also collect their projects at this time.
12:30 pm – 1:30 pm	Judges will compile scores.
1:30 pm – 1:45 pm	Award Ceremony in Jack Wood Hall
1:45 pm – 2:00 pm	Final tear down of science projects. Projects must be collected by 2:00 pm.

WHAT DOES A GOOD PROJECT LOOK LIKE?

A good project will have three components. First, students should have a display board that details their project. The information that goes onto the board, and its placement, is reflected in the image below. Pictures on the board are also encouraged!

Second, students should have a model that they have made for the project or an experiment that they have used during the project. Students should place the model/experiment in front of their display board.

Third, students will give a presentation to the judges on the day of the science fair. Students will use their model/experiment during their presentation.



WHO WILL JUDGE MY PROJECT?

Adventure Science Center will select its judges from staff, volunteer corps, and members of Nashville's scientific community. We strive to select the best judges who will judge each project equally and without bias.

To ensure a lack of bias, judges will not receive any information about a project's topic or the student before judging each project. They will only receive the project number, project location, and judging time.

HOW WILL MY PROJECT BE JUDGED?

Judges will use a rubric (see page 10) to assign points based on four categories.

1. Display Board – can earn a maximum of 80 points.
2. Model or Experiment – can earn a maximum of 10 points.
3. Oral Presentation – can earn a maximum of 10 points.
4. Judge's Decision – used to break ties, can earn a maximum of 1 point.

A judge may award a maximum of 101 points to a project. The detailed point breakdown is below.

Title: Worth 5 Points

Students will receive 5 points if they have the following.

- The projects must have a descriptive title that tells a viewer what their project is.
- The title should be in the top middle of the poster board.
- The title should be easily readable from 10 feet away.

Students will not receive any points if one of these items is missing.

Question/Problem: Worth 5 points

Students will receive 5 points if they have the following.

- The projects must attempt to answer a scientific, testable question.
- The question should be on the left wing of the poster board and located at the top of that wing.
- The question must be easily readable from two to three feet away.

Students will not receive any points if one of these items is missing.

Hypothesis: Worth 10 points

Students will receive 10 points if their project has the following.

- Students must pose a hypothesis to their question. A hypothesis is a proposed explanation to their question.
- The hypothesis must be testable. Students must be able to design an experiment that can answer the question.
- The hypothesis should be on the left wing of the poster board and located in the middle.
- The hypothesis must be easily readable from two to three feet away.

Students will not receive any points if one of these items is missing.

Materials List: Worth 5 points

Students will receive 5 points if their project has the following.

- Students must give a detailed list of all materials used in the project.
- Students must have a picture of their materials.
- The materials list should be on the left wing of the poster board and located at the bottom.
- The materials list should be easily readable from two to three feet away.

Students will not receive any points if one of these items is missing.

Procedure: Worth 15 Points

Students will receive 3 points for each of the following.

- The procedure should be in the middle segment of the poster board, and easily readable from two to three feet away.
- The procedure is written as a step-by-step recipe for the project.
- The judge should be able to repeat (duplicate) your project by reading the procedure and following the steps. No steps should be missing from the procedure.
- The procedure explains how to use all the materials in the project.
- Photographs of the procedure must help illustrate the steps.

Data and Analysis: Worth 20 points

Students will receive 4 points for each of the following.

- The data and analysis section should be at the bottom of the middle section of the poster board. This section should be easily readable from two feet away.
- Students must show that they have run each experiment/test at least three times to improve the accuracy of their data.
- Students must have collected information about their project (data). Data may either be a numerical measurement (such as height, to give an example) or an observation.
- Students must display their gathered data in an easily readable format, such as a graph, table, or chart. Photographs are also encouraged here.
- Finally, students must also provide a written description of what their data means and why it is important. This is called data analysis.

Conclusion: 12 points

Students will receive 3 points for each of the following.

- The conclusion should be on the right wing of the poster board, at the top. It must be easily readable from two feet away.
- The student makes a claim (a statement that their hypothesis is correct or incorrect).
- The student supports the claim with data gathered in their experiment.
- The conclusion is a reasonable one and makes sense with the collected data.

Works Cited: 8 points.

Students will receive 8 points if they have the following.

- The works cited must be on the right wing of the poster board and located at the bottom.
- The works cited must be easily readable from two feet away.
- Students must list at least three (3) resources that they used to gather information. These may be books, legitimate internet sources, or interviews.

Model/Example: 10 points

Students will receive the following points for their model/experiment.

- 10 points: The experiment/model is well-designed, works perfectly, and is relevant to the student project.
- 8 points: The experiment/model works reasonably well and is important to the student project.
- 6 points: The experiment/model explains the project with limited effectiveness.
- 4 points: The experiment/model does not help explain the idea, does not work, or detracts from the presentation.
- 2 points: The student does not have an experiment or model to show off.

Presentation: 10 points

Students will receive the following points for their presentation.

- 10 points: The student is professional, engaging, and well-rehearsed. The student is well prepared for questions.
- 8 points: The student is confident, rehearsed, and loud enough to be clear. They may use notes but otherwise does well.
- 6 points: The student has a clear plan, but requires prompting to maintain volume, frequently reads from notes, and may struggle with questions.
- 4 points: Student is unclear, does not appear to have rehearsed, is quiet, or struggles with questions. The student does some things well but struggles with others.
- 2 points: Student is unprepared for the presentation.

Judge's Decision: 1 Point

For exceptional projects deserving of extra recognition, a judge may an extra point to a project. The judge may also use this point to break a tie. The judge must provide his or her reasoning for awarding the extra point on the scoresheet.

ARE THERE PRIZES IF I WIN?

Yes!

All participants will receive a science fair participant ribbon. After all, everyone worked extremely hard on their projects, and invested significant time and effort into learning science!

In addition, there will be special ribbons for projects that take first, second, and third place in each age group: K-2nd, 3rd-5th, and 6th-8th grade. Even with the Judges Decision point, ties are a possibility. In the event of a tie, all tied projects will receive a special ribbon.

JUDGING RUBRIC

Judges, please refer to the rubric explanation for details on how to award points. Please **circle** the number to award points to the project, and tally your points at the bottom of the page.

Title: 5 Points	5				0
Question/Problem: 5 Points	5				0
Hypothesis: 10 Points	10				0
Materials List: 5 Points	5				0
Procedure: 15 Points	15	12	9	6	3
Data and Analysis: 20 Points	20	16	12	8	4
Conclusion: 12 Points	12	9	6	3	0
Works Cited: 8 Points	8				0
Model/Example: 10 Points	10	8	6	4	2
Presentation: 10 Points	10	8	6	4	2
Judges Decisions: 1 Point	0				1

TOTAL POINTS _____ Place extra comments on the back.

OK, I'M INTERESTED - WHAT ARE THE RULES?

1. Safety comes first! Students must recruit one adult to help with the project. That adult must supervise all experiments. If there are dangerous aspects of the experiment, such as the use of sharp tools or electricity, the adult must help.

2. Students should always wear personal protective equipment such as protective goggles, gloves, and clothing that covers bare skin.

3. Students should always keep their area clean.

4. Students should never eat or drink during an experiment unless the experiment specifically calls for digestion. If there is food or drink involved, make sure the area and food are clean, and that there are no chemicals around.

5. Students should not touch, taste, or inhale chemicals or chemical solutions.

6. Students should wash their hands before and after doing an experiment, especially if they have handled chemicals.

7. Students should dispose of all waste properly.

8. Students should respect all life. Students may not perform an experiment that will harm a person or animal. If an animal is involved in an experiment, the student must get permission from Adventure Science Center first.

9. Students should use safety on the internet. Students should never write to anyone without their adult knowing about it, and their adult must know which websites they will be using for the project.

10. Any project that involves drugs, firearms, or explosives is NOT permitted.

11. Any project that breaks any local, state, or federal laws is NOT permitted.

STUDENT PROJECT IDEAS

Now for the fun part – picking a project! Sometimes, though, the hardest part is figuring out what you want to do! To get your brain started, here are some topics that you could explore.

Kindergarten – 2nd Grade

Anatomy – Who enjoys sour food more – kids, or adults?
Botany – What will happen if a plant does not receive sunlight?
Botany - What will happen if we give a plant milk/juice instead of water?
Chemistry – Does temperature affect sugar crystal formation?
Chemistry – Food coloring and milk – How will different types of milk react to dish soap?
Physics – Does sound travel better in a solid or a gas?
Physics - Will different liquids like oil float on top of water, or will they sink?
Physics - Can static electricity make a balloon "sticky"?
Physics – Will air pressure affect the way a ball bounces?
Zoology – Do ants have favorite flavors?

3rd – 5th Grade

Anatomy – Can the color of a food or drink affect a person's perception of its taste?
Biology – Do air conditioner filters collect bacteria?
Botany – Under what conditions do potatoes sprout the fastest?
Chemistry – What happens to gelatin when pineapple and gelatin meet?
Geology – What are the three families of rocks, and how do they form?
Physics – Does the color of clothing affect its temperature?
Physics – Does a dark fridge prevent food from spoiling?
Physics – Will different amounts of water in a wine glass change the pitch if I rub the glass?
Physics – Do electronic devices emit radiation?
Zoology – Can I train a cat the same way as a dog?

6th – 8th Grade

Anatomy – Does your tone of voice influence other people's ability to remember what you say?
Biology – Does eye color affect peripheral vision?
Biology – How does acid rain affect aquatic ecosystems?
Botany – How do different pH levels affect bean growth?
Botany – What happens to a plant when no nitrogen-fixing bacteria are in a growth medium?
Chemistry – Which solution is best at cleaning tarnished coins?
Chemistry – What is the best metal for a cooking pot?
Physics – What is the best design for a solar cooker to cook a hot dog?
Physics – At what diameter does an aluminum boat sink?
Oceanography – What effect does water depth have on a wave (Tsunami) velocity?

If none of these ideas sound good, don't worry! We suggest exploring Science Buddies Topic Selection Wizard, a tool designed to help students choose a topic. That tool can be found at bit.ly/science-fair-topics.

We have also included an additional resources guide on page 15 of this packet. Many of those resources also have project ideas.

Good luck, and have fun!

ADDITIONAL RESOURCES

EDUCATION.COM: https://www.education.com/science-fair/ - A great website site with project ideas.

NASA JET PROPULSION LABORATORY: https://www.jpl.nasa.gov/edu/teach/activity/how-to-do-a-science-fair-project/ - These videos are a great resource for students, and feature a short how-to video for every step of the scientific process. Students will gain insights into how scientists conduct their experiments.

NATIONAL ENERGY EDUCATION DEVELOPMENT PROJECT: https://www.need.org/sciencefair – Known as NEED, this organization has a nice page that provides some ideas for projects.

SCIENCE BUDDIES: https://www.sciencebuddies.org/ - As mentioned previously, this site has a wonderful topic selection tool. Once you have your topic, you can use this site to get help with research, setting up the experiments, and completing them.

SCIENCE FAIR CENTRAL: https://www.sciencefaircentral.com/ - Built by The Home Depot and Discovery Education, this is an outstanding website for project ideas, a detailed project steps guide, and presentation tips.

SCIENCE BOB: https://sciencebob.com/science-fair-ideas/science-fair-resources/ - A nice page with basic information, the real benefit of this site is the link to over 50 science websites to help with research.

WALL STREET JOURNAL: https://www.wsj.com/articles/how-to-survive-the-school-science-fair-1442943084 – A nice article that is aptly titled "How to survive the school science fair." Although this isn't a school, and isn't required, this resource has some tips on how to make science fair projects less stressful.

SCIENCE FAIR STUDENT CHECKLIST

Your student has read the rules, grabbed an adult for safety, and picked a project! Now what?

Have your student cross off the steps below to complete the project!

1. The student plans a timeline
    a. This will help keep the student from having to do everything at the last minute and removes the temptation for the adult to step in and do the project. We suggest putting a date for each of these steps to help them stay on track.

2. The student registers and pays for the science fair.
    a. The registration and payment are due on Saturday, April 8th. This step may be completed on Adventure Science Center's website at TBD

3. The student writes their question.
    a. What is it that the student wants to discover doing this project? What question does the student want to answer?

4. The student researches their topic and question.
    a. The student should look at books, news articles, and websites, make observations by looking at things, and talk to people to find out as much as possible about their topic. Students should write down any ideas they have, and where they got them. This will help in citing their resources later.

5. The student forms a hypothesis.
    a. What does the student think is going to happen? Based on what the student learns from research, what do they think the results of their experiment will be? After doing the experiments, students may find that their hypothesis is wrong. This is fine, and normal in science!

6. The student plans their project.
    a. Students must come up with a plan to test their hypothesis. They must determine what experiments they need to do, what models/designs they need to build, and how they will measure their results.

7. The student collects their materials.
    a. Students should find a safe place to store the materials, and let other family members know what they are doing. This will prevent materials from being thrown away by accident.

8. The student runs their experiments/tests.
    a. Remember – the more times a student runs an experiment, the more accurate the results will be! Students should run each experiment or test at least three times, and get an average.

9. Students should then record their data.
    a. As students do their experiments, they will need to write down or voice record what they saw or discovered. Students must organize this information in an orderly manner.

10. Students should make a conclusion.
    a. A conclusion is a claim (a statement that their hypothesis was correct OR incorrect) supported by the data gathered. In other words, what did the student learn from their experiment/test?

11. Students should construct their science fair display.
    a. Students may use the diagram on page six to see exactly what they need and where it needs to go. For additional information on how displays will be judged, information on the rubric is on pages 7-11.

12. Students should prepare and practice their presentations.
    a. Students should be able to tell the judge how they did their project and what they discovered. Students should know their information well enough that they do not have to read it from the display.

13. Finally, students, relax! You will do a GREAT job!

ORAL PRESENTATION ADVICE

Many students get nervous speaking in public. This is especially true when speaking to a judge! Just remember that they are a fellow scientist who just wants to see what you have learned.

Students, relax and have fun. This is your moment in the sun! However, if you are still nervous, here are some helpful tips.

1. Look sharp, feel sharp, be sharp. Dress nicely that day, be polite, and speak clearly. You will show that you have confidence.

2. Do not forget to look at your audience.

3. Introduce yourself, and point to the title of your display. Tell your audience why you chose to study this topic.

4. State your problem that you studied (your question). Tell them your hypothesis, and why you chose this as your hypothesis.

5. Tell the judge what you learned while researching your topic. Talk about the sources (books, websites, and interviews if you did any) that helped you learn.

6. Tell about your project and explain the steps you took to conduct your experiment or test. Be sure to mention all of the materials involved, and point out pictures if you took them!

7. Show the judge that you tested your experiment at least three times.

8. Show your data (graphs and/or charts). Make sure you explain what your data means. Point out the labeled parts of your graphs/charts so that you show the judge that you know what it means, and that you know how to read it.

9. Tell the judge if your data supported your hypothesis, or if the data proved your hypothesis wrong. Let the judge know if the results surprised you, or if you knew what would happen because of your research. Remember – it is ok if the data proved your hypothesis wrong! This happens in science all the time!

10. Use good vocabulary, especially by using words from the Scientific Method like: Problem, Hypothesis, Procedure, Results, and Conclusions.