HARRISON ELEMENTARY
science art fair

Science Fair Information Packet

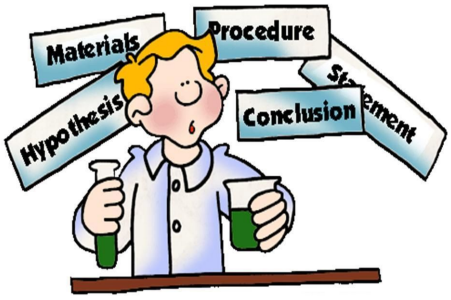
Everything you need to know about doing a great science project is inside this packet. You'll be able to discuss the contents with your parent(s) or guardian(s). There is a timeline designed to keep you on target. We hope you will find the science fair to be an exciting and rewarding experience.

- Students in 4th, 5th and 6th grades should be doing most all of this by themselves.
- Students in 2nd and 3rd grades should be able to do many parts.
- Students in Kindergarten and 1st grade will need to help for most of the project.

HARRISON ELEMENTARY est. 1930

You are surrounded by science. Everything uses some form of Science to make it work. The chair you sit on was made by some person. All the tools used to build it are because of knowledge from science and technology. Someone had to know what shape to make the saw and how sharp the teeth are to cut wood, right? How did they know to make one saw for wood and a different one for metal? Why does the wood saw have big teeth and the metal saw have small teeth?

Science is asking questions and finding answers. A science project, simply put, is the process of asking a question you have about something you are interested in, hypothesizing what the answer might be, researching for information on that topic, experimenting, inventing, collecting or doing in-depth research, analyzing your results, and coming to a conclusion.



What your accomplishment will mean for you?

- Gaining self confidence
- Proving you can do it
- Learning new things
- Knowing what the scientific method is and how it can help you.

Helpful Hints for Students

- Start EARLY, don't wait until the week before it is due.
- Plan it out. It will be much more fun if you spread the time out over several days per week or several weekends, and you won't have to race to get it done!
- Check with your parent if you want to use a website for research. Not all websites give correct information.
- This is to be a fun process. "Success" is a completed project where you had fun and learned a lot.

You might want to follow these steps:

Week 1 - Decide on your Problem – what you want to solve. Collect and read information (research) about your topic and start a journal.

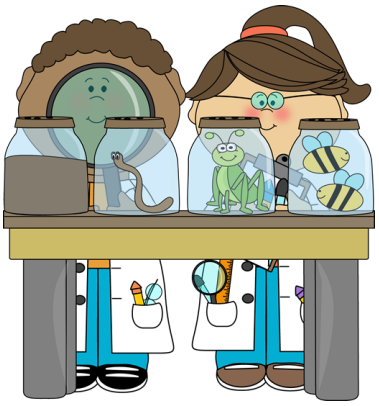
Week 2 – Work the steps of your project. Collect materials and follow your procedure. Run your experiment, build your invention, model, collection or display, and continue your research

Week 3 – Think about the results of any experiments, draw conclusions, and make your charts or graphs.

Week 4 – Write your summary and make your display.

Remember to keep adding to a journal along the way to help record your research and results… just like a scientist!

Types of Science Projects



A Collection/Display/Model:

Collect and organize or build something of interest, answering questions related to observations made while exploring your world.

Examples of display or collection projects can be:

- Types of Rocks
- Types of Leaves
- Types of Fish

Examples of models could be:

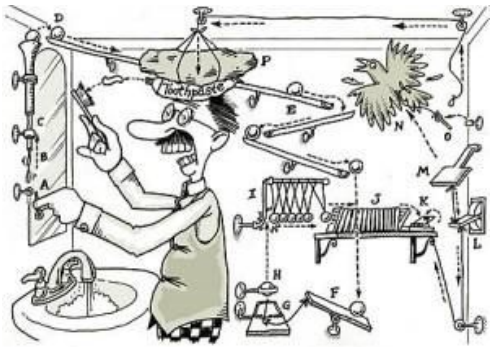
- A Bee Hive
- How a Lava Lamp Works
- The solar system

An Experiment:

The experimental project shows testing being done and the gathering of data using The Scientific Method. It includes asking a question, doing some preliminary research, making a hypothesis, planning and conducting your experiment and drawing a conclusion.

Examples of experiments can be:

- The Effect of Pulleys on Lifting Weight
- Which Paper Towel is the Strongest
- What Substance Makes the Best Lubricant



An Invention:

Everything we use, work with, or wear is engineered. Someone had to think of how to design that object to solve a particular problem. For this project you find a problem, create a plan, build the invention and test it to see if it solves the problem.

Examples of Inventions could be:

- Inventing a machine that brushes your teeth for you
- Inventing an alarm clock that shakes you out of bed
- Inventing a new kind of bicycle helmet

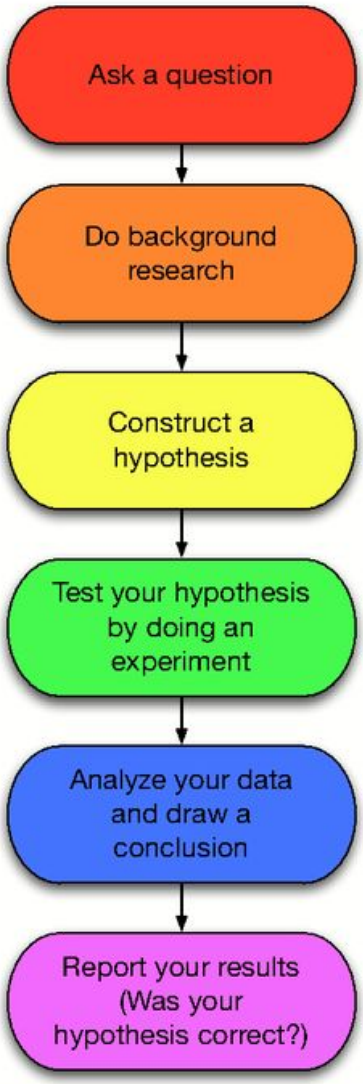
A Research Project:

Someone has already found the answer to your question/problem, and you will look for their answer/solution by reading books, talking to experts, and gathering information from other sources. Your display board may have drawings, photos, charts graphs, etc..

Examples of research projects can be:

- Research different creatures that live in the sea
- Research how scientists discovered penicillin
- Research how scientists discovered that the earth is round

What's the Scientific Method?



The following is a graphic which shows each step of the scientific method. Your project, regardless of which type, should follow the scientific method as closely as possible, and include as many of these steps as possible. During the process of completing your project, keep detailed notes in your science journal. This will help you keep track of your steps, procedure, data, and results found during your project.

Week 1: Decide on a Question or Problem and Do your Research

Once you have found a general scientific topic that interests you, your next step will be to decide on a question to explore, or a problem to solve. To give you a good starting point, consider the following examples:

1. What is the effect of _____ on _____?

    What is the effect of sunlight on the growth of plants?

    What is the effect of temperature on the size of a balloon?

2. How does _____ affect _____?

    How does humidity affect the growth of fungi?

    How does the color of a material affect the absorption of sunlight?

3. Which/what _____ is/does/makes_____?

    Which paper towel is the most absorbent?

    What detergent makes the most bubbles?

Now it's your turn. Write your question below, or in your journal:

_____

_____

_____

While you are thinking about your question or problem, you should also be doing research. Research is how you will become an expert on your topic. You may see what other scientists have discovered about your topic already, and what questions remain unanswered. If your project is a research project, this will be the most important part of your preparation, so be sure to keep careful notes of your sources. Your research may include:

1. READING about your topic, in books, magazines and online. Take note of any new scientific terms you learn. Write them down and use them. Also remember to keep track of all the items you read by writing them down in your journal. These will be your "sources" of information.
2. DISCUSSING your topic with others. You can discuss your project with your parents, other students, and other adults you know, including experts in your scientific field. If you know a scientist, ask them if you can interview them (if you can, get a picture of yourself during the interview).

As you continue your research you should be ready for the next step….forming your HYPOTHESIS….

Week 2: Form your Hypothesis and Work the Steps of your Project

By now you will have finalized your question or problem and done most of your research. It is time to form your hypothesis, if applicable, and work your project.

Your "hypothesis" is where you predict or guess what will happen if you test your question/problem. Your hypothesis is an educated guess, based on your research and your scientific expertise. Even if you are not doing an experiment, after you complete your research you should have an idea of what you expect to see at the conclusion of your project, based on your initial question/problem, and what you have learned from your research.

Examples of a hypothesis:

- Question/Problem: Which brand of paper towel is more absorbent (holds more water)?
- Hypothesis: I think brand X will be more absorbent based on my research which shows brand X is thicker, and people I interviewed said it was a better brand.

- Question/Problem: How does temperature affect the size of a balloon?
- Hypothesis: I think as the temperature goes up inside the balloon, it will expand, assuming the amount of air remains the same.

Now it's your turn. Write your hypothesis here, or in your journal:

_____

_____

_____

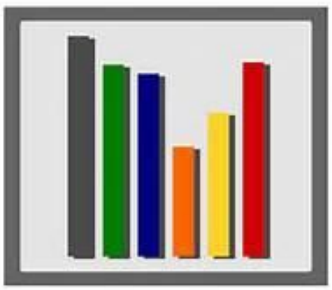
Also at this time you should begin actually working your project. This can mean collecting materials for a collection, building your model or display, building your invention, or running your experiment. If you are doing an experiment, you should keep in mind that you will not be running the experiment at the time of the science fair, so document your experiment with notes in your journal and pictures.

Some suggested steps for running your experiment/project are as follows:

1. **Gather your materials** – Make sure you have all the things you need to run your experiment. If you need the help of an adult to get some of the items you need, make sure you ask them at this time. You may want to take pictures of your materials before the experiment is run, or your model/collection/invention is built, for later use on your display board.
2. **Write your procedure** – This is like writing the recipe for making your favorite dish. Scientists write the procedure of their experiments so that if another scientist wants to try the same experiment at a later date, they can follow the same steps. Again, remember to write these steps in your science journal and take pictures if that would be helpful.
3. **Identify your variables** – Variables are factors that can stay the same or change in an experiment. It is important that you are aware of whether or not your experiment (or model/collection/invention/ display) has any variables which are important to your question/problem or hypothesis. For example, if your experiment is to test your hypothesis that the amount of light that a plant receives will affect its growth, and you plan to have one plant receive 2 hours of light per day and one plant receive 8 hours of light per day, the amount of sunlight is your independent or manipulated variable. If the two plants otherwise have the same amount of soil and water, than soil and water are your controlled variables.
4. **Test, test, test** – Be sure to run your experiment several times. Three (3) times is the minimum recommended, but you can run more, if possible. The more, the better. You want to make sure that your results are the same each time your repeat the experiment. If you are doing an invention, test your invention multiple times to see if it works as expected. Even if you are doing a research project, you can "test" it by re-reading what you have written, and making sure your writing is consistent.
5. **Collect Data** – Collecting data means writing down your observations during your project. You can take notes in your science journal, take pictures, or make drawings. Use whatever method of recording data which will allow you to use that data later, especially on your display board. Many scientists use the data they collect during experiments to create graphs, or charts, which show the results in an easy to read manner. Be sure to keep your data well organized.
6. **Draw a conclusion** – Regardless of the type of project you are doing, you should have some kind of a conclusion. If you are running an experiment, your conclusion may be the final outcome of the experiment, either confirming your hypothesis or not. If you built an invention, your conclusion may be that it works as expected. If you are doing a research project or collection/model/display, your conclusion may be a summary of what you learned.
7. **Understand Application** – You should consider whether your project can be useful in a real life situation or in the "real world". Think about whether your scientific discovery can be used to solve a problem or make something better. This is what scientists do all the time.

Week 3: Finalize your Experiment, Gather Data, Begin Creating Your Charts, Pictures and other Items for your Display Board

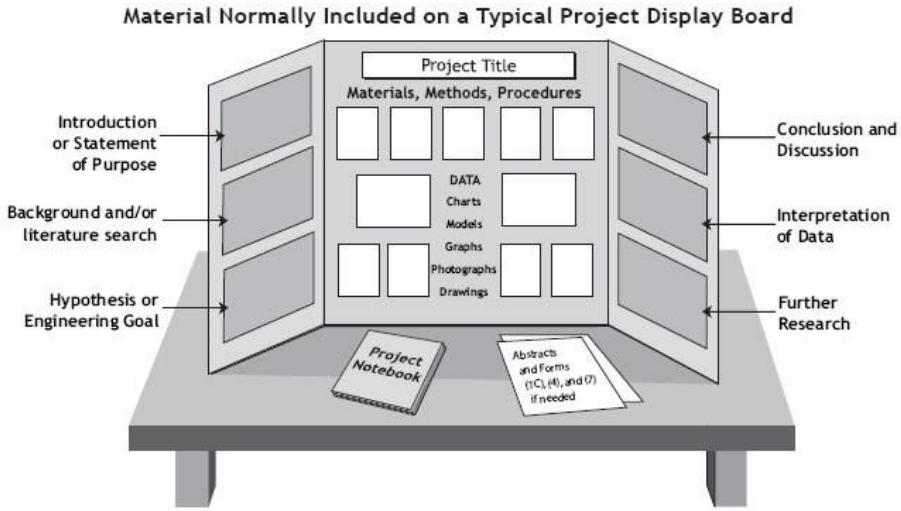
By this week, you should be completing your model/collection/display, completing the running of your experiment, completing the building of your invention, or finishing up the writing of your research project.



Create graphs, charts, drawings, pictures and written items which you will be using on your display board.

Week 4: Create an awesome display and write a summary.

This is an example of a neat looking Science Fair Display Board. It is just an example. Depending on your information and the amount of pictures, tables and graphs, you may have a different layout. Just make sure it is neat.



Hint: When you have decided what you are going to put on your display, lay the unglued display on the floor and look at it carefully. Have family and friends look at it and ask their opinions. Then glue everything into place.

At last... the final step to complete your science project. It is to write a brief summary about your scientific experience. Just describe your project and what you did. Also explain your results and what your learned.

Please note: It is possible you will only present to one judge so please be sure your presentation is well practiced. Presentation times will be limited to 4-5 minutes. Make your display board is as comprehensive as possible.

The PTA has free blank display boards available for students - pick one up at the front office after your project is approved.

What the Judges are Looking For

A lot of kids are nervous about talking to a judge. Imagine the judge is a fellow scientist who just wants you to share what you learned...

But just so it's not such a mystery, we've listed all the stuff that is the judges will be looking for and what you should do to get the maximum points.

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What the Judges are looking for:	Total Possible Points:	What you should do:
1. Question/problem – did the student formulate a scientific question or problem which is suitable for their grade level?	5	Introduce yourself, point out the title of your project and tell the judge why you chose to study this topic. If applicable, state the problem or question that made you pick this particular project.
2. Research/Background- did the student consult an appropriate number of sources (preferably 3 or more) regarding their question or problem? Did the student cite their sources?	5	If you have one, hand a copy of your report to the judge so that they can review your research. Talk about your sources. To get the maximum points, you should have at least 3 sources.
3. Hypothesis – did the student create or prepare a hypothesis which guided the experiment or invention project? If the student chose a collection/model/display, or research paper, was there an overall scientific inquiry which guided the project?	5	If you performed an experiment, tell about your hypothesis, or what result you expected to find. If you did an invention, state the expectation you had regarding your invention. If you did a collection or research project, state the general science theme of your project, or what you expected to find out or show the judges.
4. Experiment – did the student carry out a successful experiment? If the project was an experiment, did the student use good scientific procedures? Was there a control or variable to the experiment? If a collection/model/display, did the student show an understanding of scientific principles? If the student invented something, was the invention useful in resolving the student's question or problem? If a research project, did the student's topic exhibit a thorough review of a scientific topic?	5	If you performed an experiment, tell about the steps you took to do it, emphasizing the scientific method. For all other types of projects, explain your steps and the materials you used. Use all those fancy science words you learned. They love that.
5. Analyze data and draw conclusion – Did the student accurately analyze data generated by their project? Was the data presented in a manner so that it can be determined whether the student's conclusions are clearly related to the data? Did the student explain any inconsistent data, or show creative scientific thinking to	5	Be sure to explain what your data means. Make sure your graphs, charts, lists, and written notes are neat and organized. Be ready to explain what you observed and how you came to your conclusions based on your observations. If your project was a collection/model /display or research project, be ready to explain how you gathered data throughout the process of creating the project.

explain the results obtained?		
6. Report results – Did the student show an understanding of the conclusion of the project and any real life connections? Were the results of the project accurately reported through the use of data (in the form of graphs, charts, notes), models / collections / displays, or research papers? Were the ideas generated throughout the project well represented on the display board?	5	Make sure you sound like an expert on your topic. Use as much of your science vocabulary as you can. Become familiar with any charts, graphs, models, collections, displays, research papers or other data that you used in your project. Be able to explain what the results of the project mean, and how they apply to real life situations.
7. Display – was the overall display neat, organized, well thought-out? Was it clear that the student had done the grade-appropriate amount of work on the creation of the display? Did the student seem familiar with the display and able to discuss the different sections?	5	Become familiar with your display. Make sure you did as much of the work on the display as you could. Keep it as neat and organized as possible. Be proud of your display!
8. Overall Interest and Scientific Value of Project – did the student show a genuine interest in the scientific nature of the project. Did the student seem fully engaged in the project?	5	Just show the judges how much you enjoyed doing this project and learning about science. What did you learn? Did your participation in the science fair make you more interested in science? Are you planning to be a scientist when you grow up?

Total points possible = 40

Science Fair Rules

Aw!, you mean there are rules? Of course there are. We have to be safe.

Safety Rules First

1. Number one rule... think safety first before you start. Make sure you have recruited your adult to help you.
2. Never eat or drink during an experiment and always keep your work area clean.
3. Wear protective goggles when doing any experiment that could lead to eye injury.
4. Do not touch, taste or inhale chemicals or chemical solutions.
5. Respect all life forms. Do not perform an experiment that will harm an animal.
6. All experiments should be supervised by an adult!
7. Always wash your hands after doing the experiment, especially if you have been handling chemicals or animals.
8. Dispose waste properly.
9. Any projects that involve drugs, firearms, or explosives are not permitted.
10. Any project that breaks district policy, and/or local, state or federal laws are not permitted.
11. Use safety on the internet! Never write to anyone without an adult knowing about it. Be sure to let an adult know about what websites you will be visiting, or have them help you search.
12. If there are dangerous aspects of your experiment, like using sharp tools or experimenting with electricity, please have an adult help you or have them do the dangerous parts. That's what adults are for, so use them correctly. (Besides, it makes them feel important!)

Science Fair Rules

1. Students can work individually or as a member of a team of two (or more if teacher approved).
2. Adults can help; in fact we want them to get involved. They can help gather materials, supervise your experiment and even help build the display. They just can't be with you during the judging.
3. Experiments or inventions are recommended over collections/models or research projects. It is more difficult to score highly with research projects or collections/models, but it can be done. You will be judged on the use of the Scientific Method and the scoring rubric.
4. You cannot perform the experiment live. You will only be judged on your presentation and board. You can mount things on your board in a type of 3D display, but remember that your board has to be able to stand by itself, so don't get carried away. If you do mount things on the board, try not to mount something expensive that you bought and make sure you have things mounted securely so they don't fall off. YOU MAY NOT MOUNT ANY FOOD OR ORGANIC MATERIALS!
5. Displays must be on display boards or can be made with cardboard. They can be no longer than 100cm in height, 180 cm in length and 75cm deep. They must stand alone. See the display making page if you need a diagram.
6. Limit your presentation to 4-5 minutes for speaking and the rest for the judges to ask questions.
7. No recording or transmitting devices are permitted. (no tape recorders or secret walkie talkies, cell phones or other James Bond toys.)
8. Respect all adults involved in the fair... especially the judges!
9. All decisions of the judges and science fair committee are final.

Websites

If you completed everything in this packet you probably have a terrific science fair project. But...If you still need more ideas, here is a list of websites that you can check out:

Science Buddies
www.sciencebuddies.org
Click on the "Parents" or "Students" tabs for lots of great ideas and information

Discoveryeducation.com: Science Fair Central
http://school.discoveryeducation.com/sciencefaircentral/index.html
This site provides complete guides for parents and students, with lots of examples and great ideas for projects.

Education.com elementary school science project ideas
http://www.education.com/science-fair/elementary-school/
Click on the projects to get step by step instructions.

All science fair projects
www.all-science-fair-projects.com
Informational ideas and instructions on hundreds of science fair projects.

Try Science
http://www.teacherstryscience.org/kids-experiments
Science resource for home that gives you labs to try and helpful links all related to science.

Science Kids
http://www.sciencekids.co.nz/experiments.html
This site gives you lots of ideas for experiments.