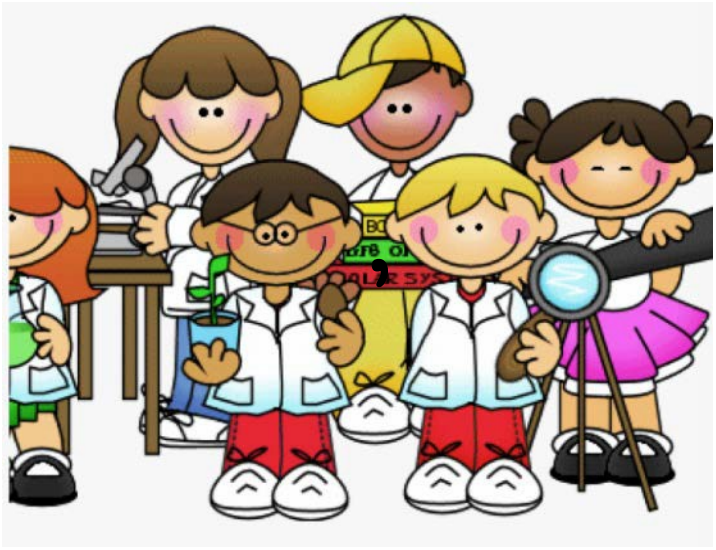
Exciting News!!!!! PASD is having an Elementary Science Fair (grades 2-5) on May 11, 2021[1] at Barkley ES

To help you get ready to participate, here is the...

most helpful, kid-friendly project planner, the...



Elementary Science Fair Planning Guide

Just follow these steps and you can create a great project!
Before you begin, find an adult to help you! Have them sign here:

_____

Adult sponsor, thank you so much for agreeing to help!
You MUST register your budding scientist by 4/15/21
using this QR code (to the right) or by emailing
Emily McGady at: mcgadye@pasd.com

This guide was originally created by: Lora & Tim Holt at the EPISD

[1] The event will occur outside (weather pending) and will follow all socially distanced protocols.

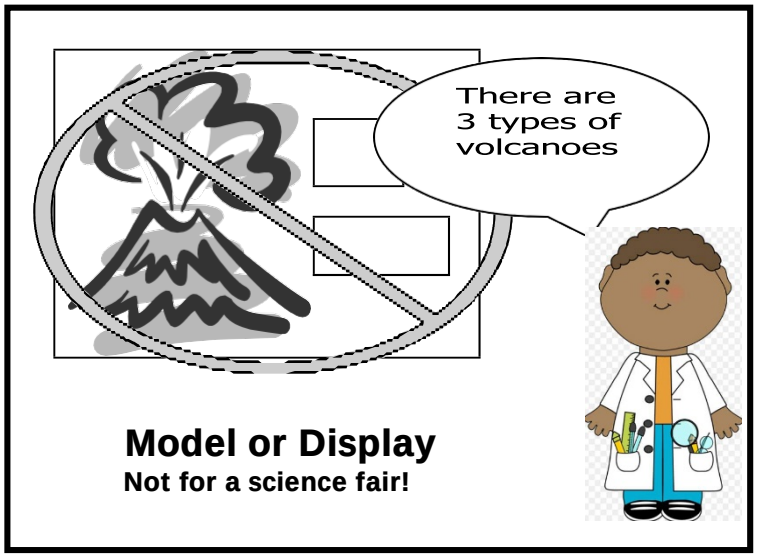
Elementary Science Fair Planning Guide

Table of Contents

PLEASE NOTE: YOUR PROJECT TOPIC, TITLE & CATEGORY IS DUE ON 4/30/21
PLEASE SEE PG. 12 FOR MORE INFO

Types of science fair projects

There are two types of science projects: models and experiments. Here is the difference between the two:



A Model or Display:

Shows how something works in the real world, but doesn't really test anything

Examples of models or displays might be: "The Solar System", "Volcanoes," "Tornadoes in a bottle"

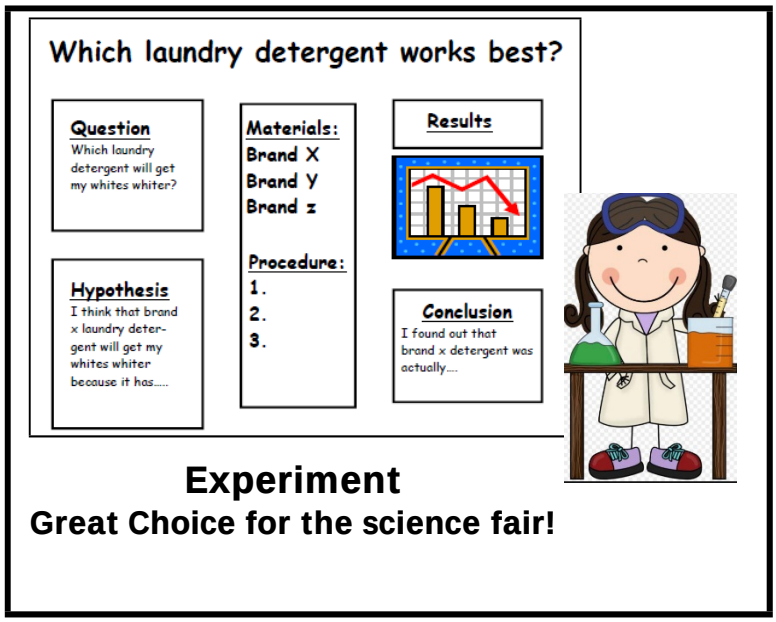
An Experiment:

It includes a test and the gathering of data.

Examples of experiments can be: "The Effects of Detergent on the Growth of Plants", "Which Paper Towel is More Absorbent" or "What Structure can Withstand the Most Amount of Weight"

You can tell you have an experiment, if you are testing something several times and changing a variable to see what will happens.

We'll talk about variables later....

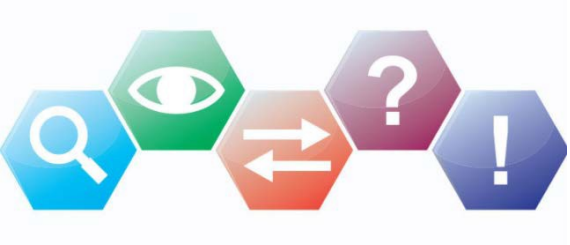


So, what will you do: a display/model or an experiment?

Write it here: _____

Of course, an Experiment!!! Why? Well, they are interesting and fun and they take you through the **SCIENTIFIC METHOD,** which is one-way real scientists investigate questions they have in real science labs and it is what judges are looking for!!

What is the scientific method?



It is a set of steps that you can use to solve a problem!

Find a problem

and start by asking a question

Research the problem

to find out more

Make a hypothesis

by predicting what might happen

Do the experiment

to test your hypothesis

Gather data

from doing your experiment several times.

Organize your data into tables & graphs

so it's easy to see the results

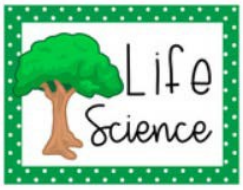
Form a conclusion

did you prove or disprove your hypothesis?

Write about what you learned

and how the information can be used

Before you begin, choose a category that interests you...



All great projects start with great questions, so read through the list and pick a category you want to explore. There are four to choose from: life, physical, Earth & consumer science.

- Life Science This category deals with all animal, plant and human body questions. Remember, that it is against science fair rules to hurt an animal during an experiment. If you are dealing with animals (including humans), please let an adult help you. It is okay to do experiments on plants, as long as they don't belong to someone else.

Life science also includes: studying behaviors, so you can also try, taste tests, opinion surveys and animal behavior training. (Please remember all human participants must remain anonymous)

- Physical Science This category is for people who like trying to figure out how things work, for example, you might explore: electricity, magnetism, sound or light. This category often lends itself to the question, "How does it work?" and "What if I do this to it, will it still work?" *Remember, to ask an adult first (and always make sure there is an adult with you when you prepare to test anything.)*

Physical Science also includes a study of what makes up matter and how different matter reacts to each other. *Again, if you are experimenting with possibly dangerous things, an adult needs to help you*!

- Earth Science This deals with the Earth or objects in space. This includes studying weather, Geology (which is the study of everything that makes up the Earth, like rocks, fossils, etc.), and the study of all that is in space, including the stars, our sun and our planets. Unfortunately, this topic is also where most kids get confused and try to do a model instead of an "experiment," so be careful!!! **Models are not allowed.**

- Consumer Science This often involves testing & comparing consumer products for their quality.

Now it's your turn

Skip ahead to pg. 15 if you need more time, help or &/or ideas

Choose a science fair category that you would like to explore:

My favorite category was _____

(choose one: life, physical, Earth or consumer science)

and I want to do an experiment involving _____

_____

_____

_____

Step:1 Coming up with a testable question

Now that you have picked out a topic that you like, it's time to write a question or identify a problem within that topic. To give you an idea of what we mean, you can start off by filling in the question blanks with the following list of words:

The "Effect" Question

What is the effect of_____on_____?

road salt	on the growth of plants
soda	your teeth
temperature	the size of a balloon
oil	a ramp

The "How Does" Affect Question

How does the_____affect_____?

color &/or type of light	the growth of plants
humidity	the growth of fungi
color of a material	its absorption of heat

The "Which/What" and verb question

Which/What_____(verb)_____?

paper towel	is	most absorbent
foods	do	meal worms prefer
detergent	makes	the most bubbles
paper towel	is	the strongest

Now it's your turn

Create your question using either the "Effect Question", the "How does Affect Question" or the "Which/What and Verb Question":

_____

_____

_____

Step 2: Doing the research and forming a hypothesis

You have a category and a topic. You even wrote a question, now it is time to become an expert on your topic! That is what real scientists do in their jobs!

So how do you become an expert?

YOU READ!!!!

READ about your topic from books and/or trustworthy sites on the internet.
(Don't forget to have an adult help you!) At the same time, keep a list of all the books and/or articles you read (you can do this on the next page) and take note of any new science words you learn!
This way, when you present, it will make you sound like a real scientist.

YOU DISCUSS!!

Talk about it with adults, teachers and friends!!!
Talk about it with experts like Veterinarians, Doctors, Weathermen or others who work with the things you are studying. Sometimes websites will give you e-mail addresses to experts who can answer questions
But again, do not write to anyone on the internet without letting an adult help you!
(*hint: take pictures of yourself interviewing people)

Then when you think that you can't learn anymore you are ready to...

Write a hypothesis

This is a "SMART GUESS" or PREDICTION based on what you already know!

Here is an example:

Problem: *What paper towel brand will be more absorbent?*

Hypothesis: *I think brand X will be more absorbent because it's more expensive and popular based on interviews.*

So, what do you think will happen, when you do your experiment?

Now it's your turn

Write down a problem statement and create a hypothesis
(way down on the next page) based on what you have researched.

Problem:_____

_____

_____

Completing a research log:

My problem is about this subject: _____
(sample topics could be: magnetism, electricity, buoyancy, absorbency, taste, plant growth, simple machines or other scientific topics that relate to your problem. If you are having problems finding out what the topic is, ask your adult &/or go to pg. 15 to help you!)

Here are the books I found on my topic: (Include the title & author)

_____

_____

_____

Here are the websites that I found on my topic:

_____

_____

_____

Here are the people I talked to about my topic:

_____

_____

_____

Some important points that I learned about my topic are:

_____

_____

_____

_____

_____

_____

Hypothesis: I think that _____ (will happen) because (my research shows...)_____

_____

_____

_____

Step 3: Test your hypothesis

Now we've come to the good part... the EXPERIMENT!

When you design an experiment, you get to use your imagination to come up with a test for your problem where you will prove or disprove your hypothesis.

Science fair rules state that you CANNOT perform your experiment live, so you should take pictures as you go through these seven steps.

1. Gather your MATERIALS: The safest way to do this, is to ask an adult to help you get the things you need. Don't forget to take pictures along the way.

2. Write a PROCEDURE: A procedure is the list of steps needed to perform the experiment. It is the process you will use to test your hypothesis.

3. Identify your VARIABLES: The variables are any factors that can change in an experiment. You should only test ONE variable at a time in order to get accurate results. In other words, if you want to test the affect that water has on plant growth, then all the plants you test should have the same controlled variables, for example, you should use the same type of plant and dirt, they should be kept in the same location with the same amount of sunlight, too. In this way, the only thing you change is the amount of water the plants receive, this is called the ***independent variable.*** The independent variable is the one factor that you are testing, in this case it would be the amount of water you add (measured in milliliters-we use the metric system in science). The results of the test are called the ***dependent variable.*** In this example, the dependent variable is how much plant growth you saw (measured in centimeters). Knowing what your variables are is very important because if you don't know them, you won't be able to collect your data or read your results! *See more about this on page 10.*

3. TEST, TEST, TEST: Remember that the judges expect your results to be consistent, so that means you need to do the experiment more than once in order to test it properly. We recommend THREE times or more. More is better! Don't forget to take pictures!

4. Collect your DATA*: This means to write down or record the results of the experiment every time you do it. Be sure to organize it in a way that it is easy to read. Organizing makes the results easy to understand and it will also make it easier to recognize patterns. The tables and graphs help you make sense of the results.

***SEE THE NEXT PAGE FOR MORE ABOUT COLLECTING DATA**

Time out: How do you collect data?

Keep a science journal: A science journal is a type of science diary, in it, you can record observations, research, draw and diagram pictures and write down any additional questions you might have for later.

Have the right tools to do the job: Make sure you have what you need to take accurate measurements like: rulers, measuring tape, thermometers, graduated cylinders or measuring cups that measure volume. The recommended standard of measurement in science is **metric**, so you should use centimeters or meters (length), milliliters or liters (liquid measure), Celsius (temperature) & grams (weight).

Tables, charts and diagrams are generally the way a scientist like to keep track of trials!

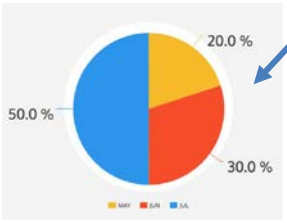
table

Remember you are testing at least **3** times or more. A table is organized in columns and rows and **ALWAYS** has labels or headings telling what the columns or rows mean. You will probably need a row for every time you did the experiment and a column telling what the independent variable was (what you tested) and the dependent variable (what happened because of the independent variable)

Plant	Amount of water per day	Size it grew in two weeks
	(independent variable)	(dependent variable)
Plant A	none	.5 cm
Plant B	5 ml	2 cm
Plant C	10 ml	5 cm
Plant D	20 ml	7 cm

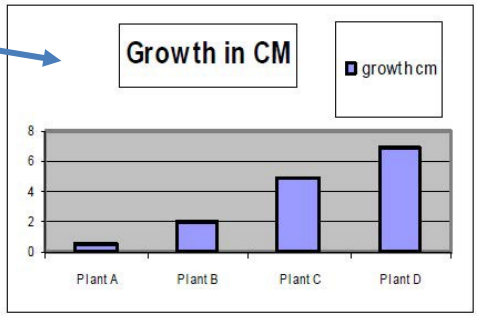
Be accurate and neat when you are writing your tables and charts. Also, make sure that you record your data in the correct column or row and that you write clearly. Most importantly, record your data as soon as you can **SO YOU DON'T FORGET WHAT HAPPENED!!!!** Sometimes an experiment might be hard to explain with just a table, so draw and label a diagram (or picture), if you need to explain what happened.

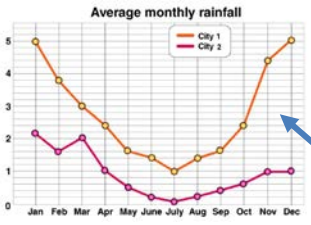
Next, use the right graph (or chart) for your experiment. Here are some examples of a: **pie, bar and line.**



• ***Pie graphs*** *are good to use if you are showing percentages. Remember, that you can't have more than 100% and all the pieces need to add up to 100%. This type of graph is great if you are doing surveys.*

• ***Bar graphs*** *are good to use if you are comparing different amounts, because the they are easy-to-read. This way the judges will be able to understand, too. Usually the bars go up and down. The x axis (or horizontal axis) is where you label what is being measured, (like plant A, B, C and D) and the y axis (or vertical axis) is labeled to show the unit being measured (in this case, it would be centimeters that the plant grew)*





• ***Line graphs*** *are good to use if you are showing how changes occurred in your experiments over time. In this example, you would be using the x axis to show the time (minutes, hours, days, weeks, months) and then you would use the Y axis to show what you were measuring at that point in time.*

...and now back to the experimental steps

5. ***Write a CONCLUSION:*** In this step, you will explain what happened. You will also state if you proved or disproved your hypothesis. Here you might also write, whether you would change anything about the experiment or if you curious about something else now because of what you found out. Most of all, **EXPLAIN WHAT YOU LEARNED FROM THIS PROJECT.**

6. ***FUTURE CONSIDERATIONS:*** Write about how the results of the experiment can be used in a real-life situation. In other words, why was it important to know about it?

Now it's your turn

Need help? Go back to pg. 8

Materials: (List the things that you will need for your experiment here)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Variables: (List all your variables here)

Refer back to page 8

List the variables that you will control, change and those that will be used to determine the results of your experiment *(Need help? Email: Emily McGady at mcgadye@pasd.com)*

My controlled variables are (these are the things that will stay the same):

_____

_____

My independent variable is (this is what I am adding to create a change):

_____

My dependent variable is (these are the results I will use to measure change):

_____

Procedures: (the steps I will take to do the experiment…. take pictures)

List the steps that you have to do in order to perform the experiment here:

Refer back to page 8

_____

_____

_____

_____

_____

_____

_____

_____

You can always write on another paper if you need to!

Make a table or chart of your information

Examples are on pg. 9

You can use graph paper or a website like gizmos© or chartgo© for your final copy.

Refer back to page 9

Conclusion: (Explain here if you proved or disproved the hypothesis)

By the way, disproving doesn't mean you were wrong- ***so <u>never</u> go back and change it****! It was just a guess!* Other questions you want to consider in this section are... did you experiment work? Why did it work or didn't it work? What did the results tell you? What did you learn from this process?

Future Considerations (Explain here, how the results can be used)

Refer back to page 9

In other words, its important to know about this experiment because.....

One more thing, the ABSTRACT!!! (What is it? A quick summary!)

It will help you to remember the important steps you did and it can be read at the presentation, too!

THIS SHOULD BE DONE ON A SEPARATE PAPER BECAUSE IT IS A LONG PARAGRAPH)

Step 4: The Presentation

But first, a story...

Juan and Alexa both baked cakes for the bake sale. When Juan got his cake out of the oven, he carefully took it out of the pan, put on frosting and decorated it. Alexa on the other hand, damaged her cake slightly and did not decorate it. At school everyone wanted some of Juan's cake and no one wanted Alex's cake. Alexa couldn't figure out why, because she tasted both and they both tasted the same. In the case, the one that looked better got more attention.

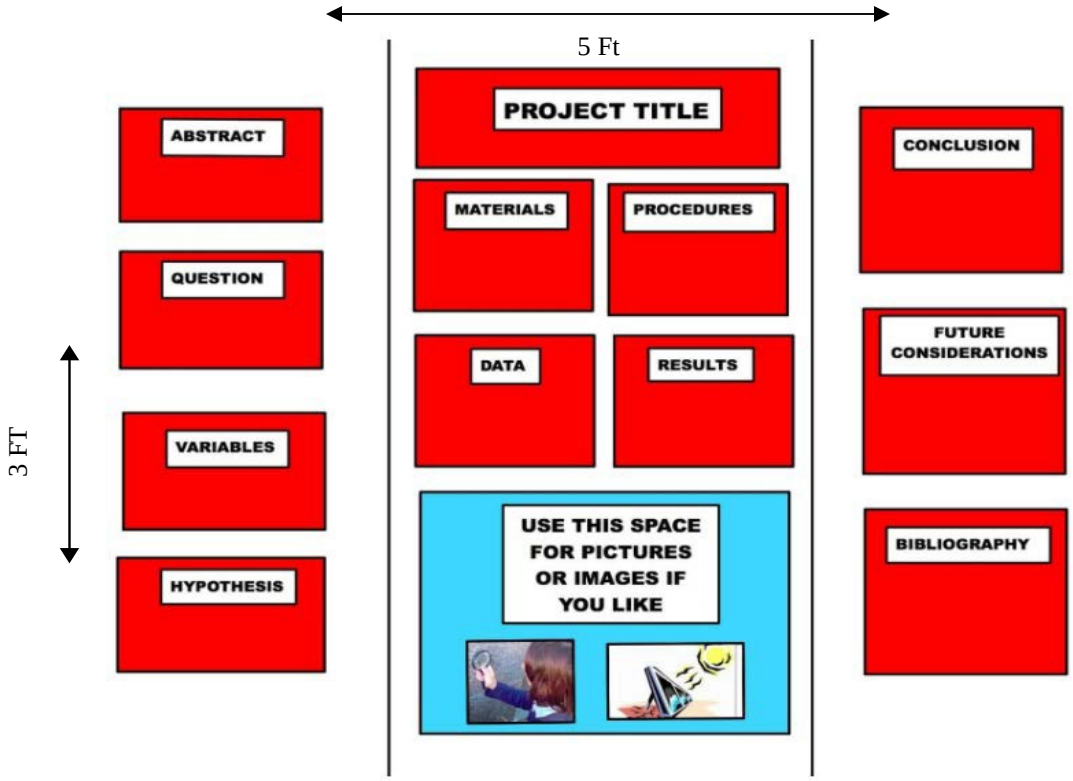
This story reminds us, that even if you are an expert on your topic and/or you have the most interesting experiment, if you don't make your results board attractive and neat, you may not get the attention you deserve-so get help and show only your best work!

This is different from the earlier QR code

Don't create a board until your topic is approved!
Please have your adult register with this QR code or write to Emily at mcgadye@pasd.com **BEFORE 4/30/21**

SETTING UP YOUR BOARD

This is an example of how you should set up your tri-fold board.



Project Title (name of project)

Abstract- project summary

Question- what problem did you want to solve (this is the reason you did you experiment)

Variables- List your: controls, independent & dependent variable

Hypothesis-write your educated guess before you did the experiment

Materials-the list of things you used in your experiment

Procedure: the steps or directions that you did in the experiment

Data: tables, graphs &/or charts showing what happened in the experiment

Results- explain your data here

Conclusion- review your process and whether your proved or disproved your hypothesis

Future Considerations- write about how your results can be used to help people

Bibliography-list the books and websites you used to do your project

OTHER IMPORTANT THINGS TO REMEMBER

- ALL parts of the project MUST be included (see above) and TYPING IS PREFERABLE over handwriting
- ONLY 3ft x 5ft tri-fold boards can be used and they MUST stand alone.
- Spray adhesives and construction paper under typed sheets can improve your presentation
- Displaying items like pictures & logbooks, but not things that are: living or once living or are harmful
- Practicing your presentations many times with adults and/or a mirror is a great way to prepare
- Experiments are NEVER done at the fair!

What are the judges are looking for?

What should you do the day of the fair?

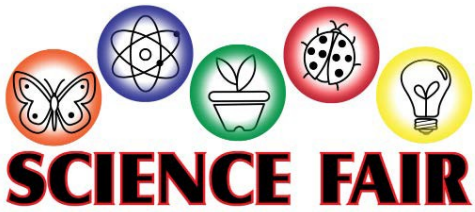
A lot of kids are scared of talking to judges, but you don't need to be, here is what they are looking for! (They will use a system based on 25 points to give you feedback, but all students are winners!!!)

Relax, smile and have fun! Remember, you are the expert and you had fun doing the project, so try to remember to: dress nicely, speak clearly and confidently and look them in the eye. Note cards can also help you stay on track!

Judging criteria:	Point Value	
1. **Clearly state your title, purpose and hypothesis**	3	*Introduce yourself, your project title and tell the judge why you chose to do this project. State your question (or the problem) and tell them about your hypothesis (what you thought would happen)*
2. **Report on your topic**	3	*Talk about what you learned while researching your topic. Make sure you sound like an expert on your topic. Try to use science vocabulary whenever you can.*
3. **Talk about your sources**	3	*Talk about the sources (books, websites and interviews) that helped you understand your topic. You should have at least **3 sources**.*
4. **List procedures & materials**	3	*Talk about the steps you took to do your experiment. Be sure to include the materials involved and point out your pictures!*
5. **State variables & controls**	3	*Point out the controlled, independent and dependent variables.*
6. **Explain your data here**	3	*Be sure to show that you tested your experiment at least **3 times**. Show them your tables and charts. Remember to point out the labeled parts of your graph and/or tables to show that you know what it represents.*
7. **Explain what your results mean and compare it to your hypothesis**	3	*Let the judge know if you proved or disproved your hypothesis. What did you conclude about your problem? Did you find another problem to investigate based on what you learned? Explain what you learned from doing the experiment.*
8. **State real life connections**	3	*Explain how your experiment relates to real life experiences. Judges love this one, because it gives a real-world purpose to your topic. It makes you sound like a scientist, too-for example, "My experiment about paper towel absorbency could help people save money!"*
9. **Conclusion**	1	*Remember if you forget what you were saying, look at your display to help remind you. It is better to discuss everything than to forget to tell the judge something. When you are done, thank them for their time, they are volunteers who care about you!*

Important Science Fair Guidelines

1. Number one rule... BE SAFE. Always have an adult help you.
2. Never eat or drink during an experiment and always keep your work area clean.
3. Wear protective gear when doing any experiment that could be dangerous.
4. Do not touch, taste or inhale chemicals or chemical solutions.
5. Respect all life forms. Do not perform an experiment that will harm any animal or person.
6. Again, 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. Throw away waste properly.
9. No projects involving drugs, explosives or biological agents (including mold) are 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 parts of your experiment, like using sharp tools or experimenting with electricity, please have an adult help you or have them do the dangerous parts.



Rules & Regulations

1. Only one student per project, you can't work in a team, sorry.
2. Adults can help, in fact we want them to get involved. They can help gather materials, supervise your experiment and even help YOU build the display, but they can't do it for you or be there during judging.
3. **You will be judged on the use of the scientific method, so please follow ALL of the steps.**
4. You cannot perform the experiment live. You will only be judged on your presentation and board. You can put things in front of or on your board, but remember that your board has to be able to stand by itself. If you do mount things on the board, try not to mount something valuable or breakable and make sure you have things mounted securely so they don't fall off. YOU MAY NOT DISPLAY ANY FOOD, DRINK OR ORGANIC MATERIALS!
5. Limit your presentation to around 5 minutes. Your judges will need to ask you questions, too!
6. No recording or transmitting devices are permitted, including video cameras and cell phones.
7. Respect all adults involved in the fair... especially the judges!
8. All participants, even your friends need to have adult permission.
9. All decisions of the judges and science fair committee are final.

If you have completed everything in this packet you probably have a great project, but if you still need help...
You have come to the right place! Check out these...

Websites

Internet Public Library
http://www.ipl.org/div/kidspace/projectguide/ Are you looking for some help with a science fair project? If so, then you have come to the right place. The IPL will guide you to a variety of webite resources, leading you through the necessary steps to successfully complete a science experiment.

Discovery.com: Science Fair Central
http://school.discovery.com/sciencefaircentral/
"Creative investigations into the real world." This site provides a complete guide to science fair projects. Check out the 'Handbook' which features information from Janice VanCleave, a popular author who provides everything you need to know for success. You can even send her a question about your project.

Science Fair Idea Exchange
http://www.halcyon.com/sciclub/cgi-pvt/scifair/guestbook.html
This site has lists of science fair project ideas and a chance to share your ideas with others on the web!

Cyber-Fair
http://www.isd77.k12.mn.us/resources/cf/welcome.html
This site has one-sentence explanations of each part of a science fair. One of the steps described is presenting your project to judges. This may or may not be a part of your science fair. The site also has an explanation of what makes a good project and an explanation of how to come up with your own science fair project.

Try Science
http://tryscience.com
Science resource for home that gives you labs to try and 400 helpful links all related to science

The Yuckiest Site in the Internet
http://yucky.kids.discovery.com/
Brought to you by Discovery Kids, this site gives you lots of ideas on how to do the messiest yuckiest experiments

Experimental Science Projects: An Introductory Level Guide
http://www.isd77.k12.mn.us/resources/cf/SciProjIntro.html
An excellent resource for students doing an experiment-based science fair project. There are links on this page to a more advanced guide and an example of an actual experiment-based project.

Gateway to Educational Materials: Science Fair Projects
http://members.ozemail.com.au/~macinnis/scifun/projects.htm
The Gateway to Educational Materials extensive and de-tailed step-by-step guide to doing a science fair project.

Science Fair Primer
http://users.rcn.com/tedrowan/primer.html
A site to help students get started and run a science fair project.

Science Fair Project Guidebook
http://www.energy.sc.gov/K-12/science_fair.htm
The State of South Carolina publishes a K-12 science fair guidebook. It can be viewed using Adobe Acrobat Reader.

Science Project Guidelines
http://www.thesciencefair.com/guidelines.html
The scientists at the Kennedy Space Center have participated in judging local school science fairs for many years and have some great suggestions for student research projects. This information by Elizabeth Stryjewski of the Kennedy Space Center is now provided on a commercial site.

The Ultimate Science Fair Resource
http://www.scifair.org/
A variety of resources and advice.

Mr. McLaren's Science Fair Survival Page
http://www.ri.net/schools/East_Greenwich/Cole/sciencefair.html
Tips from Archie R. Cole Junior High school on what makes a good project.

Neuroscience for Kids: Successful Science Fair Pro-jects
http://faculty.washington.edu/chudler/fair.html
Site made by Lynne Bleeker a former science teacher, science fair organizer, and judge. Gives a thorough and de-tailed description of the steps to a successful science fair