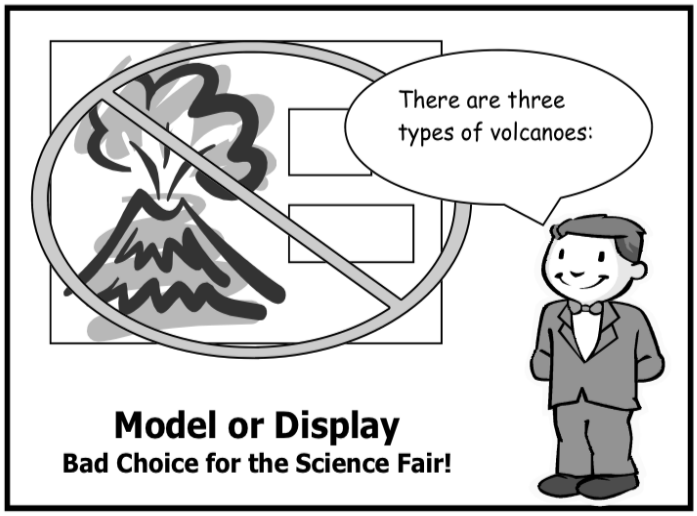
HENDERSON CHRISTIAN HOMESCHOOLERS

Science Fair Packet

Types of Science Projects:

There are two types of science projects: Models and Experiments. Here is the difference between the two:



A Model, Display or Collection:

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

Examples of display or collection projects can be: "The Solar System", "Types of Dinosaurs" , "Types of Rocks", "My gum collection…" Examples of models might be: "The solar system" or "How an Electric Motor Works", "Tornado in a Bottle"

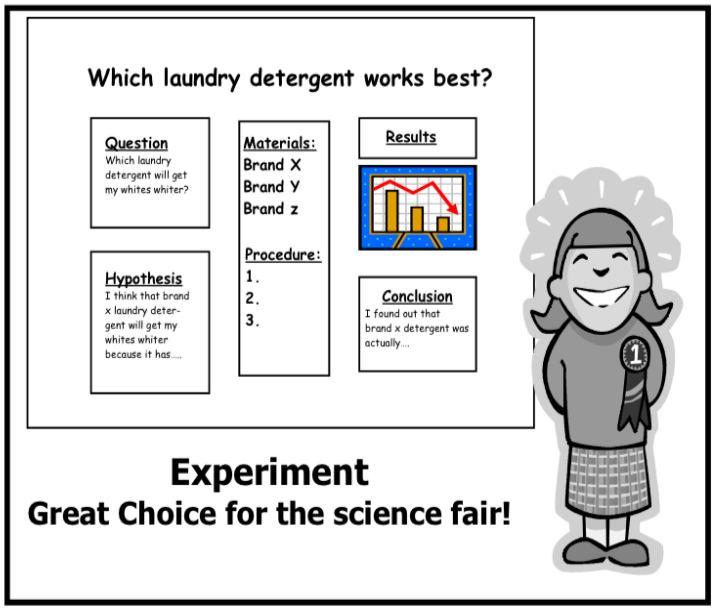
COOL!!!!! DO THIS

An Experiment:

Lots of information is given, **but it also has a project that shows testing being done and the gathering of data.**

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

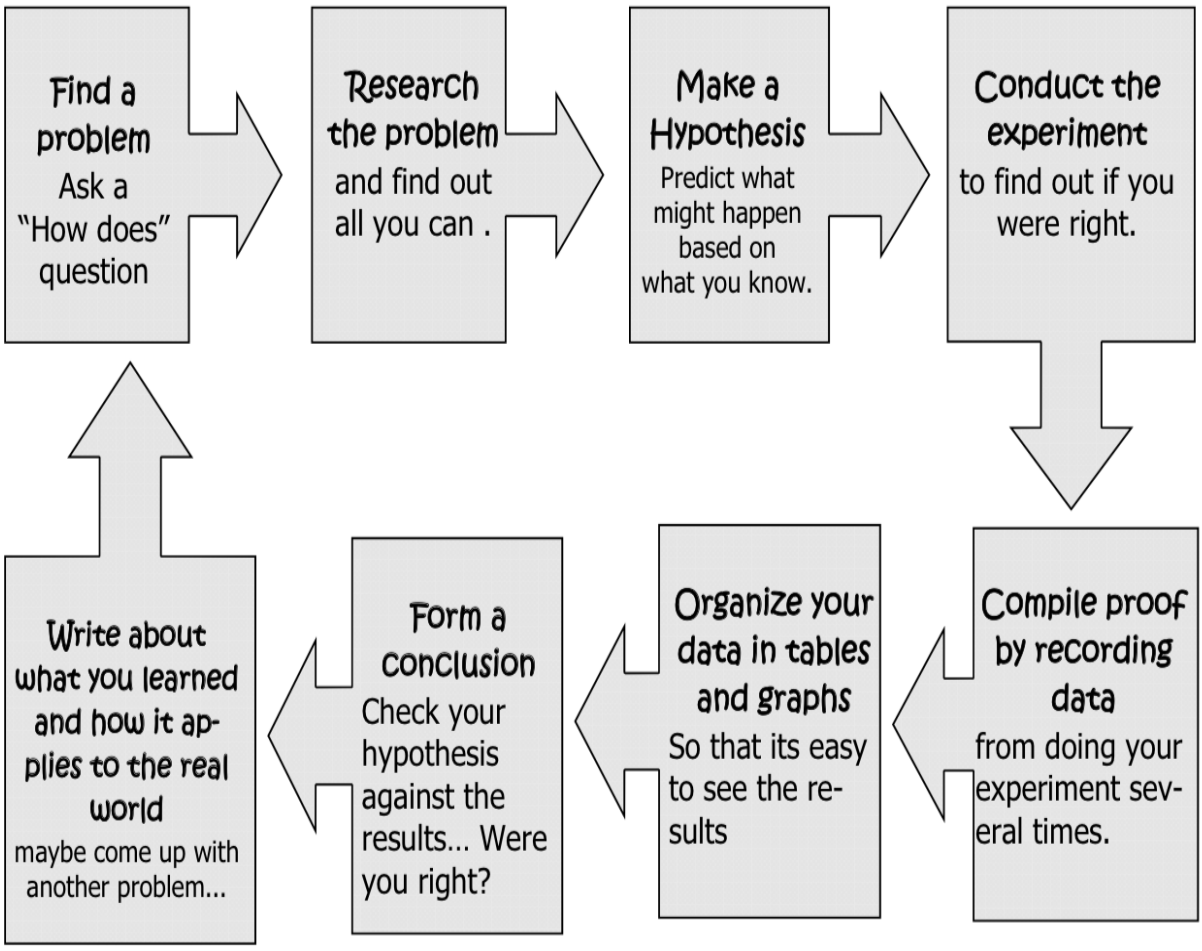
You can tell you have an experiment if you are testing something several times and changing a variable to see what will happens. We'll talk about variables later….



So What Type of Project Should You Do?

Even though you can learn a lot from building a model or display, we recommend that you do an **Experiment!!!** Why? Well, they are fun, they are more interesting and most of all, they take you through the **SCIENTIFIC METHOD,** which is the way real scientists investigate in real science labs. Besides that, the **scientific method** is what the judges are looking for!!

The Scientific Method



Choosing a category that interests you…

All Great Projects start with great questions but before you get started on a great question you need to pick a subject or topic that you like. There are three different categories of the Science Fair to choose from. They are:

Life science: This category deals with all animal, plant and human body questions that you might have and want to do an experiment about. Remember that it is against Science Fair Rules to intentionally hurt an animal during an experiment. If you are dealing with animals, please let an adult assist you. It is okay to do experiment on plants, as long as they don't belong to someone else, like don't do an experiment on your mom's rose bushes unless you ask her first...

Life science also includes studying behaviors, so its a perfect category to try taste tests, opinion surveys, animal behavior training (or even training behavior in humans...like baby brothers or sisters...)

Physical Science: If you like trying to figure out how things work, then this is the category for you! It includes topics about matter and structure, as well as electricity, magnetism, sound, light or anything else that you might question, "How does it work and what if I do this to it, will it still work?" *But remember, you always need to ask an adult first (and always make sure there is one of those adult guys with you when you try it.)*

Physical Science also includes the composition of matter and how it reacts to each other. These are the science experiments that may have bubbling and oozing going on, like figuring out what is an acid and what is a base. It is a perfect category to try to mix things together to see what will happen. *Again, if you are experimenting with possibly dangerous things, you need to recruit an adult to help you out.*

Earth and Space Sciences: This category is really awesome because it covers all sorts of topics that deal 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, volcanoes, 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 mess up and do a collection or model project instead of an "Experiment," so be careful!!!

Now It's Your Turn:

Write down your favorite Science Fair Category and what it is you want to learn more about:

My favorite Category was _____
(Life Science, Physical Science, Earth and Space Science)

I want to do an experiment involving

_____

_____

_____

_____

Step 1: Coming up with a Good Question…

Now that you have picked out a topic that you like and that you are interested in, 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 _____?

sunlight	on the growth of plants
eye color	pupil dialation
brands of soda	a piece of meat
temperature	the size of a balloon
oil	a ramp

The How Does Affect Question:

How does the _____ affect _____?

color 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	strongest
peanut butter	tastes	the best

Now its your turn:

Create your Science Fair 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

So you've picked your category and you've chosen a topic. You even wrote a question using our cool fill in the blank template. Now it is time to research your problem as much as possible. Becoming an expert at your topic is what real scientists do in real labs.

So How do you become an expert?

YOU READ!!!!

READ about your topic. READ encyclopedias. READ magazine articles and books from the library. READ articles from the internet. Take note of any new science words you learn and use them. It makes you sound more like a real scientist. Keep Track of all the books and articles you read. You'll need that list for later.

YOU DISCUSS!!

Talk about it with your parents. Talk about it with your teachers. 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 supervise it.* (*hint: take pictures of yourself interviewing people)

Whew…..

Then when you think that you can't possibly learn anymore and the information just keeps repeating itself.. You are ready to...

Write a Hypothesis

Now it is the time to PREDICT what you think will happen if you test your problem. This type of "SMART GUESS" or PREDICTION is what real scientists call A HYPOTHESIS. Using this fancy word will amaze your friends and will have you thinking like a full fledged scientist.

So how do you begin? Well, just answer this very simple question:

What do you think will happen, (even before you start your experiment)?

Example Problem: *Which Paper Towel is more absorbent?*

Example Hypothesis: *I think Brand X will be more absorbent because it's a more popular brand, it is thicker and the people I interviewed said that the more expensive brands would work better*

(This hypothesis not only predicts what will happen in the experiment, but also shows that the "Scientist" used research to back up his prediction.)

Step 3: Testing your Hypothesis by doing an experiment

Now we've come to the good part. The part that all scientists can't wait to get their grubby little hands on… you guessed it… The EXPERIMENT!

Designing an experiment is really cool because you get to use your imagination to come up with a test for your problem, and most of all, you get to prove (or disprove) your Hypothesis. **Now Science Fair Rules state that you cannot perform your experiment live, so you'll have to take plenty of pictures as you go through these seven very simple steps.**

First: ***Gather up your materials***. What will you need to perform your experiment? The safest way to do this is get that adult you recruited to help you get the stuff you need. Oh, did we mention to take pictures or draw pictures of your materials. This will come in handy when you are making your board display.

Second: ***Write a PROCEDURE***. A procedure is a list of steps that you did to perform an experiment. Why do you need to write it down? Well it's like giving someone a recipe to your favorite dish. If they want to try it, they can follow your steps to test if its true. Scientists do this so that people will believe that they did the experiment and also to let other people test what they found out. Did we mention to take pictures of yourself doing the steps?

Third: ***Identify your variables.*** The variables are any factors that can change in an experiment. Remember that when you are testing your 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 be in the same conditions, these are called **controlled variables:** same type of dirt, same type of plant, same type of location, same amount of sunlight, etc. The only variable you would change from plant to plant would be the amount of water it received. This is called the **independent or manipulated variable.** The independent variable is the factor you are testing. The results of the test that you do are called the **dependent or responding variables.** The responding variable is what happens as a result of your test. 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.

Fourth: ***TEST, TEST, TEST.*** Remember that the judges expect your results to be consistent in order to be a good experiment, in other words, when you cook from a recipe you expect the outcomes to be the same if you followed the directions (or procedure) step by step. So that means you need to do the experiment more than once in order to test it properly. We recommend five times or more. More is better! Don't forget to take pictures of the science project being done and the results.

Fifth: ***Collect your DATA.*** This means write down or record the results of the experiment every time you test it. Be sure You also need to organize it in a way that it is easy to read the results. Most scientists use tables, graphs and other organizers to show their results. Organizing makes the results easy to read, and much easier to recognize patterns that might be occurring in your results. (Besides, it impresses the judges when you use them.) But don't make a graph or table because we asked you to, use it to benefit your project and to help you make sense of the results. There is nothing worse than having graphs and tables that have nothing to do with answering the question of a science project.

Now it's your turn

Materials: (take pictures!)

List the Materials that you will need for your science experiment here:

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

Variables:

List the variables that you will control, the variable that you will change and the variables that will be the results of your experiment:

My controlled variables are (the stuff that will always stay the same): _____

_____

_____

My independent variable is (this is the thing that changes from one experiment to the next, it is what you are testing): _____

My responding variables might be (in other words, the results of the experiment)

Procedure: (the steps.... Don't forget to take pictures)

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

1st.... _____

2nd _____

3rd _____

4th _____

5th.... _____

_____

_____

_____

Design a table or chart here to collect your information

(Did we mention that you needed to take pictures of you doing the actual experiment?)

Conclusion:

Now tell us what you learned from this and if you were able to prove your hypothesis. Did it work? Why did it work or why didn't it work? What did the results tell you? Sometimes not being able to prove a hypothesis is important because you still proved something. What did you prove?

_____

_____

_____

_____

_____

_____

_____

Application:

(How does this apply to real life?)

Its important to know about this experiment because……

_____

_____

_____

_____

Step 4: The Presentation or Why you needed all those pictures….

But First, a school Fable….

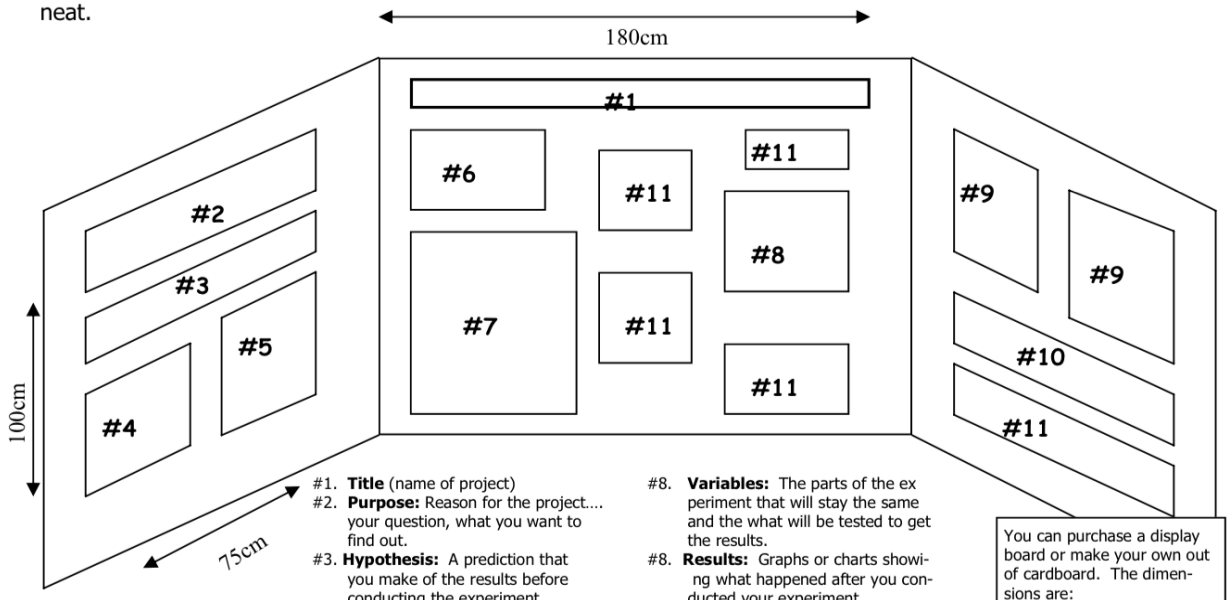
Sammy and Sally both baked cakes for the bake sale with the same cake mix and by following the same directions. When Sammy got his cake out of the oven, he carefully took it out of the pan, smoothed the chocolate frosting neatly and decorated his cake so that it looked delicious. Sally on the other hand, smashed her cake slightly when getting it out of the pan and globbed the frosting on parts of the cake. As you may have already guessed, everyone wanted some of Sammy's cake and no one wanted Sally's. Sally couldn't figure out why, because she tasted both and they both tasted the same…

A good display is a Piece o'cake

You may have become the leading expert of your topic and had the most interesting experiment results, but if you don't make your science project look delicious for the judges eyes to see, well, your chances of winning sweepstakes will crumble like Sally's cake. Your display board is kind of like an advertisement for all your hard work. So take our advice: **BE NEAT!!** The judges like to see a nice, easy to read display, that has neat writing, easy to read graphs and tables and you guessed it…. lots and lots of pictures!! (Did you remember to take pictures?)

MAKING A MOUTH WATERING DISPLAY

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



#1. **Title** (name of project)
#2. **Purpose:** Reason for the project…. your question, what you want to find out.
#3. **Hypothesis:** A prediction that you make of the results before conducting the experiment.
#4. **A report** of your research on the subject.
#5. **Books and Resources:** A list of the books you read and websites you used. Also list your inter views.
#6. **Materials:** a list of the supplies needed for the experiment.
#7 **Procedure:** The steps or directions that you used to conduct the experiment.
#8. **Variables:** The parts of the ex periment that will stay the same and the what will be tested to get the results.
#8. **Results:** Graphs or charts showing what happened after you conducted your experiment.
#9. **Conclusion:** Telling what happened.. Did it work, were you right about the hypothesis? What did you learn?
#10. **Application:** Explain how your experiment relates to the real world.
#11. **Pictures,** pictures and more pictures…

You can purchase a display board or make your own out of cardboard. The dimensions are:

Height: 100 CM

Length: 180 CM

Depth: 75 CM

It has to be able to stand on its own

Display Beauty Secrets:

- Use a computer to type out your information, but if you can't, write out your information in your best writing. Printing the titles is usually best. If you are using a computer, make sure the fonts are readable and only use one or two type faces.
- Use spray adhesive or glue stick to paste up your papers. It is less messy
- Mount white paper, pictures, graphs and tables on colored papers (making sure the colored paper is larger so it creates a border for the white paper.) Do not

Science **Experiment** Grading Rubric

POINTS **Display**

____/20___ Is the display neatly organized and the design pleasing? (-5 to -10)
Is there a Title? (If not, -5) Is it in the proper location? (-1 each)
Is the student's name below the Title? (-5 each)
Are there at least 3 appealing pictures that pertain to the experiment? (-2 each)

____/10___ **Scientific Question**

Is there a Scientific Question? (-10)
Is the Scientific Question labeled? (-2)
Is the Scientific Question in the proper location? (-1)
Does the question end with a "?" (-1)
Does the question make sense? (-1 to -5)

____/15___ **Hypothesis**

Is there a Hypothesis? (-15)
Does the Hypothesis end with a period? (-1)
Does the Hypothesis relate to the experiment performed? (-1 to -7)
Does the Hypothesis answer the scientific question? (-5)
Does the Hypothesis make sense? (-1 to -5)

____/10___ **Materials**

Is there a list of materials? (-10)
Is the list of materials in the proper location? (-1)
Is it difficult to read the list? (-2)
Are all the items included that were necessary for the experiment? (-2 each)

____/15___ **Procedures**

Is there a list of procedures (-15)
Is the list of procedures in the proper location (-1)
Are the procedures numbered? (-2)
Does the list have fewer than 5 procedures? (-2 each <5)
Does each procedure make sense? (-1 per confusing procedure)
Can the list be followed to replicate the experiment? (-1 to -4)

____/10___ **Results**

Are the results on the board? (-10)
Are the results in the proper location? (-1)
Are the results easy to read? (-3)

____/15___ **Conclusion**

Is there a conclusion? (-15)
Is the conclusion in the proper location? (-1)
Does the conclusion respond to the question? (-2 to -5)
Does the conclusion fit given the hypothesis? (-2 to -5)

____/5___ **Bibliography**

Is there a bibliography? (-5)
Is the bibliography in the proper location? (-1)
Is the bibliography clearly labeled? (-1)

_____ **Total Points (possible 100)**

Judges Notes: _____

_____

_____

_____

_____

_____

NOTE: Please check your work for spelling and grammar errors!

Science **Model/Display/Collection** Grading Rubric

POINTS **Display Board**

____/50___ Is the display board neatly arranged and the design pleasing? (-10 to -30)
Is there a Title? (If not, -20) Is it in the proper location? (-10 each)
Is the student's name below the Title? (-5 each)
Are there at least 10 appealing pictures that pertain to the topic? (-5 each)
Is it clear what topic is being displayed? (-20)
Are multiple colors and textures used? (-5 to -10)

Physical Items

____/15___ Are there multiple physical items for people to view and/or touch? (-5 to -15)
Do the items correlate with the information on the display board? (-10)
Are the items visually appealing and interesting? (-5)

Oral Presentation

____/15___ Can the student clearly explain what they've learned from memory? (-5 to -15)
Is the student able to answer 3 specific questions regarding their research topic? (-5 each)

____/20___ **Bibliography**

Is there a bibliography? (-20)
Does the bibliography include at least 3 sources (elementary) or 5 sources (upper grades)? (-5 each)
Is the bibliography in the proper location? (-5)
Is the bibliography clearly labeled? (-5)

_____ **Total Points (possible 100)**

Judges Notes: _____

_____

_____

_____

_____

NOTE: Please check your work for spelling and grammar errors!