Hollygirt SCHOOL

Science Fair Planning Guide

SCIENCE PROJECT STEPS

Choose a topic. Be sure it interests you. Don't pick one because you think it will be easy. Talk it over with your parents and when you have decided, inform your teacher, and do not ask to change your topic later.

State your purpose as a question. What is it that you want to find out by doing this project?

Research your problem. Look at any books/websites that might help you, make observations by simply looking at things, talk to people, and find out as much as possible about your topic. Write down any ideas you have and where you got them. Also, keep note of all information needed for citing your resources.

Form a hypothesis. What do you think is going to happen? Based on what you know or found out from step 3, what do you think the results of your experiments will be? After doing the experiments, it may turn out that your guess was wrong. It is okay if this happens.

Plan your project. How will you test your hypothesis? What experiments will you do? How will you measure the results? Where will you keep your information? Be sure to keep notes and write down everything you do and what happens.

Collect all your materials. Find a place to keep things where others won't bother them. Let other family members know what you are doing so they do not throw your materials away by mistake.

Conduct your experiments. Remember, the more times you do an experiment the more reliable and accurate the results will be. Do each experiment at least three times and get an average of the results for your graph. Use something to measure your experiments: a ruler or yardstick if you are measuring distance, a clock to measure time, etc. Check the measurements to be sure you are correct.

Record your data. As you do your experiments, you will want to write down what you saw or found out. Organize this information in an orderly manner. Put the date, time, and any other useful information. Write your measurements clearly.

Draw conclusions. What did you learn from your experiments? Have you proved or disproved your hypothesis? You made a guess about what you thought would happen. Now tell what really did happen. You don't lose points if your guess turned out to be wrong.

Prepare your titles, charts, graphs, drawings, and diagrams. Make them large enough to see, neat, and colourful.

Construct your science fair display. Get your cardboard display board so you can show all your work and have your hands free to point to sections when you give your presentation.

Prepare and practice your presentation. Be able to tell about what you used what you did in your experiments, and what you found out. Know it well enough that you don't have to read it from the display.

https://www.sciencebuddies.org/science-fair-projects/science-projects

https://littlebinsforlittlehands.com/easy-science-fair-projects/

https://sciencebob.com/science-fair-ideas/ideas/

https://www.winter.k12.wi.us/community/sciencefair/sciencefairideas.pdf

https://www.sciencefaircentral.com/students/scientific-projects

Choosing a category that interests you…

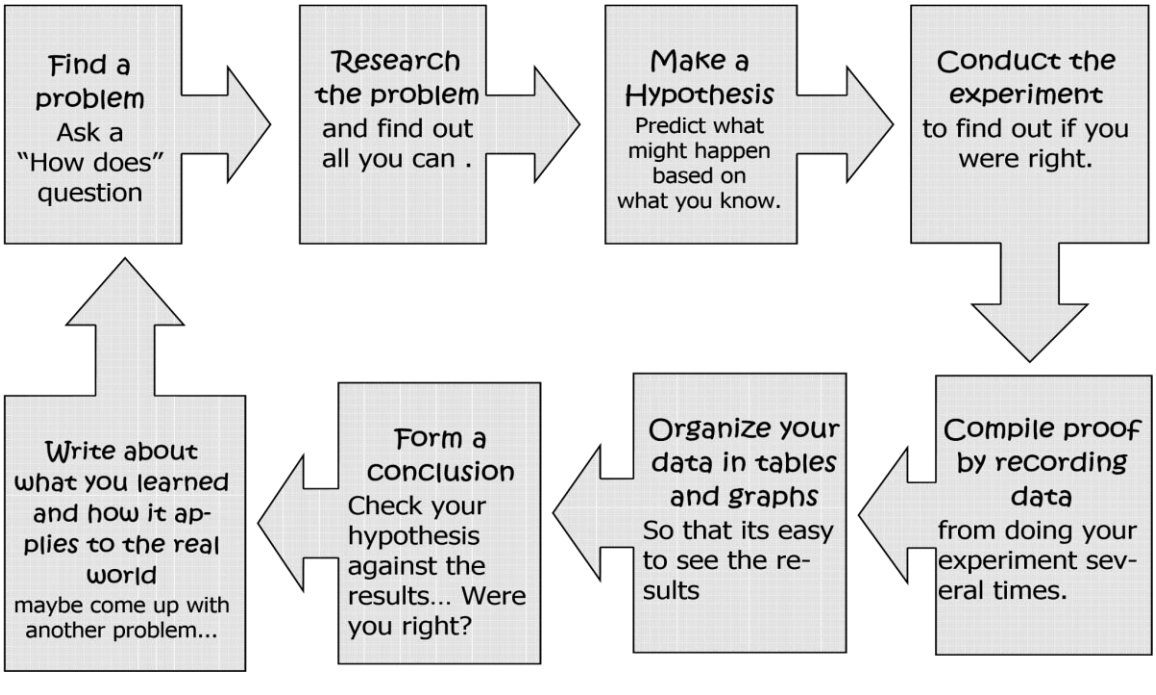
Life Science: This category includes all animal, plant and human body questions that you might have and want to do an experiment about.

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?"

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.

Earth and Space Science: 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!

Engineering or Technology: This category is so amazing because it is science applied to everyday life. Technology begins with a task or a system that hasn't been done or is already being done and it allows new equipment or gadgets to work better or more efficiently! Engineering is figuring out a better way to make an idea work. Think of how it could work better or faster if you changed something. In technology, think of something you do every day and divide that into the separate steps that make it happen. This is the foundation for technology. Now what are the steps to make it happen?



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 the problem of your topic. To give you an idea of what we mean you can start off by filling in the question blanks:

The effect Question:

What is the effect of_____on_____?

*Examples:	sunlight	the growth of plant
	eye colour	pupil dilation
	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_____?

*Examples:	colour of light	the growth of plants
	Humidity	the growth of fungi
	Colour of a material	its absorption of heat

The which/what and verb question:

Which/what_____(verb)_____?

*Examples	paper towel	is most absorbent
	foods	do meal worms prefer
	detergent	makes the most bubbles
	paper towel	is strongest
	peanut butter	tastes the best

Engineering or Technology Question:

What interests me_____(noun)_____?

* Example: How can I make it work (faster or better, at a lower cost or in a new way)

Create your Science fair question using one of the three options above!

Step 2: Doing the Research and forming a Hypothesis…

You have picked your category and you have chosen a topic. You also wrote a question and now it's time to do some **RESEARCH!!!** You will do so much that you will become an expert at your topic just like real scientists do in real labs.

How do you become an expert??

You READ!!!!!

It is important that you read about your topic. You can read encyclopaedias, magazine articles and books from the library. Also, read articles from the Internet. Don't forget to take notes of any new things you learn including words so you can use them. It will make you sound like a real scientist! Keep track of all the books and articles you read, you will need them later.

You DISCUSS!!

It is important to talk about your topic with your parents, teachers, and experts in the field like veterans, doctors, weathermen or others who work in the things you are studying. Sometimes websites will give you email addresses to experts who can answer questions… **But don't forget to ask an adult to supervise** before you write to anyone on the Internet. Also, take pictures of any interviews you do with people.

Finally…

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

Form a HYPOTHESIS…

Now it is time to predict what you think will happen if you test your problem… This type of "Educated Guess" or PREDICTION is what real scientists calls a HYPOTHESIS. This will have you thinking like scientist.
How do you begin? Well, just answer the following question…

What do you think will happen? (Before you start your experiment)

Example of problem: Which paper towel is more absorbent?

Example of 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 their predictions.)

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 great 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 favourite dish. If they want to try it, they can follow your steps to test if it's 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.

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 it.

Fourth: TEST, TEST, TEST: Remember that the judges expect your results to be consistent in order to be a good experiment. So that means you need to ***do the experiment more than once in order to test it properly***. We recommend five times or more. ***Don't forget to take pictures of the science project being done and the results.***

Observation is a very important part of this step! Remember to use your five senses to gather information as you conduct your investigation. Then record the information in careful detail.

Fifth: Collect your DATA: This means ***write down or record the results of the experiment every time*** you test it. Be sure to organise it in a way that it is easy to read the results. Most scientists use ***tables, graphs***, and other organizers to show their results. Organising makes the results easy to read, and much easier to recognise patterns that might be occurring in your results. (And, don't forget, 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.

Sixth: Write a conclusion: ***Tell us what happened.*** Was your hypothesis right, wrong, or neither? Would you change anything about the experiment or are you curious about something else now that you've completed your experiment? ***TELL WHAT YOU LEARNED FROM DOING THIS.***

Seventh: UNDERSTAND IT'S APPLICATION. Write about how this experiment can be used in real life. How will this help in the future? Why was it important to know about this?

Your Board Layout:

A general guide for what elements the judges will be looking for is the following:

- ***Title*** (This could be your question—or something to make your audience interested in your topic).
- ***Question*** (State your question clearly and explain how you got interested in this question).
- ***Hypothesis*** (This is your guess of the answer to your question. Tell why you think this will be the result.)
- ***Procedures*** (The plan for testing your question and why you chose this plan).
- ***Materials and Equipment*** (a list of what you will need for your experiment).
- ***Results and Data (***Your description of what happened when you did your experiment. You should include any graphs or charts which help show your results).
- ***Conclusion*** (This is where you explain what happened, and tell whether your guess was correct or not. This is also where you can explain why you got the results you did. If you did your experiment again, would you change anything?)
- ***Resources*** (Who helped you? What books or websites gave you ideas?)
- ***Personal Information:*** Your name, year group, and teacher.

A typical layout is as follows: the title is centred at the top in large, readable font to catch people's attention. The question, hypothesis, materials, and procedures are usually on the left panel, while the data, conclusion, resources, and personal information are on the right panel. The centre is reserved for pictures of your experiment and your main results.