GUIDE TO A GREAT SCIENCE FAIR PROJECT

Every good scientist needs a place to start. This is a guide to conducting a science investigation which includes the components of a good science experiment. The sentence starters will help you to think like a scientist. Remember good scientists carefully record all their observations and ideas. They are also careful to support their results with those observations. Have fun and good luck!

TITLE OF PROJECT

RESEARCH QUESTION

First come up with an idea that interests you. Then come up with a question you are trying to answer. What are you trying to find out?

What…, How…, Does… are good beginnings.

BACKGROUND RESEARCH

You should research your idea using a minimum of two different sources. This research should be directly applicable to you research question. Sources might include: journals, books, the Internet, and even an interview with a scientist. Be sure to list your sources in a bibliography.

For younger scientists, the research can simply be reading a children's book, exploring, or talking to an adult. Have them check out books on science at the school library!

BIBLIOGRAPHY

Older students should include a list of all resources used in their experiment. These resources may also include interviews with scientists or other adults.

PREDICTION/ HYPOTHESIS

Write what you think will happen **USING YOUR PRIOR KNOWLEDGE**. This is not just a guess; it is based on what you know about how the world works.

If I do … then… will happen because…
I think … because…

Be sure to include "because." This is your chance to explain why you made your prediction, and it is important to think about it again at the end of you experiment.
Example: I think that hot water placed in a metal cup will stay warmer than water placed in a plastic cup because metal cups get hot and plastic ones do not. (Predictions do not need to be correct; they are simply what you think will happen.)

PROCEDURE

You are designing this experiment. Be sure to include all the steps you followed to conduct the experiment. This procedure should be clear enough that your classmates could repeat your experiment **and** get the same results using your procedure.

DATA

Record the data in a way that will make sense to you such as *tables, charts, drawings, graphs, pictures, or written observations.*

Keep a notebook of all your data and observations. A notebook is a chance for you to record what you discover and your thoughts and notes. It should be neat, but it is your personal record. Bring it with you in case you need to look up something to answer a judge's question. Not all the data you record will be presented on your poster.

RESULTS

This is the data you present. You have recorded your data—now you will summarize it and compile it into a *results section.* Present all important data tables; use graphs to make your results visual; include drawings and photographs. Be sure to include titles and labels for diagrams and pictures. Measurements should be specific and accurate. Units must be labeled.

CLAIMS AND EVIDENCE

Although not a required step in reporting the results of your investigation, this is a good way to organize your results and help you write a good conclusion. It is just a table with two columns: "claims" and "evidence." In the "claims" column, make a claim about what happened in your experiment. In the "evidence" column, give the evidence which supports that claim. The evidence should come from your observations and should support the claim. You can then write your claim and evidence in sentence form.

Claims	Evidence

I claim that when ……, then …….. (happens)
I know this to be true because I observed……

In a good investigation, there will be multiple claims with specific evidence from your observations and data. Below is an example of using a claims and evidence chart to help you in writing a good concluding statement.

Example:

Claims	Evidence
Seeds need water to grow. (This is what you have found out from your experiment.)	None of the seeds grew without water, but the seeds which were watered did grow. (This explains the evidence you got from conducting the experiment.)

In sentence form: I claim that seeds need water to grow. I know this to be true because I observed that only the seeds with water sprouted.

If your research question was "What is necessary for seeds to grow?", then this would be one claim you could use to answer that question. There should be many more claims, such as "Soil is not necessary for all plants to grow because I observed that beans will grow on a paper towel with no soil."

CONCLUSION/REFLECTION

This is where you tell the world what happened in your experiment. It is usually written as a paragraph, but for the youngest scientists, just writing (or drawing) what you learned is great!

- Restate the research question as a topic sentence.
  In this investigation…
  In this project…
- Use your data to answer the research question.
- Every claim must be supported by evidence.
- You will most likely have many claims with lots of evidence.
- Refer back to your hypothesis.
  Originally I thought… Now I learned…
  The evidence (supported/did not support) my prediction that... I discovered that…

QUESTIONS/REFLECTIONS

What new questions do you have to extend your learning?

I (we) liked/did not like…… because…
This reminds me (us) of…… because…
I (we) still wonder…

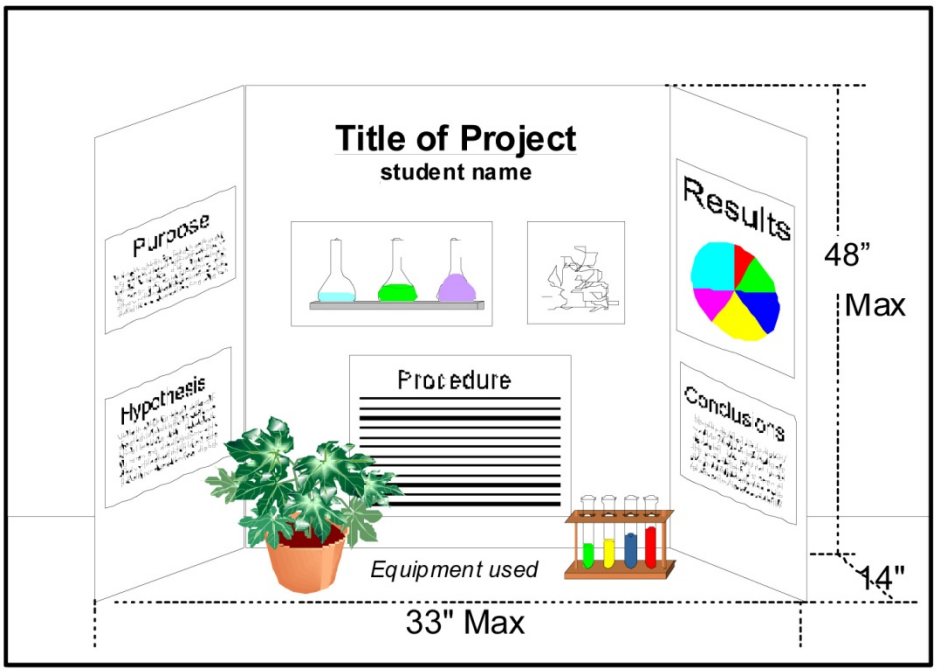
FOR THE YOUNGEST SCIENTISTS:

Have fun exploring science. Early elementary students **LOVE** to make predictions and explain their reasoning. Adapt the steps to your child. Use drawings and photographs. Let the kids write their own text. It is not as neat as typing, but the kids are more involved and practice writing in addition to science. More than anything, we want you to have fun and get everyone excited about science.

SCIENCE FAIR GUIDELINES

READ THIS CAREFULLY WITH AN ADULT!

1) A **self-supporting display** should accompany each project and should fit into a space no larger than 33 inches in width, 14 inches in depth, and 48 inches in height. Include your title, name, grade, and school. Make sure the lettering is neat and easy to read. If your display or apparatus exceeds these dimensions, please contact the science fair coordinators for prior approval. **PLEASE PUT YOUR NAME FRONT AND CENTER ON YOUR DISPLAY BOARD.**



2) Animal studies are encouraged, though **NO live animals** (vertebrate or invertebrate) can be used in your display. It is important to be concerned about collecting any threatened or endangered species. Vertebrate animals, which are much more complex, require more experience and training to use them properly. An adult supervisor must assume primary responsibility for the purpose and conditions of any project using live animals.

   Remember **NO live animals** may be exhibited. Photographs are an excellent way to illustrate any work on your project that involves live animals. The basic aim for experiments involving animals is to achieve an understanding and deep respect for all living things. The comfort, care, and proper handling of animals used in any study shall be the primary concern of the investigator.

3) Projects requiring switches and cords for 110-volt operation must have an Underwriters Laboratories-approved cord, which is at least 12 feet long and equipped with a standard grounded plug of the approved type, and their use must be cleared by the science fair coordinators. Participants must furnish their own extension cords. No running water is available.

4) Anything hazardous to the public cannot be included in your display. Remember that people of all ages will be visiting the fair, and we have limited supervision. Some (but not all) hazardous **ITEMS TO AVOID** are the following:
   - Live, disease-causing organisms that are pathogenic to human/other vertebrates
   - **NO MOLD**, microbial cultures, fungi, live or dead, especially unknown specimens
   - Any flame, open or concealed
   - Highly flammable or explosive solids, fluids, or gases
   - Dangerous chemicals, including caustic acids or bases
   - Pressurized tanks containing combustible gases
   - Human or animal blood or other bodily fluids

5) Proper attention to safety is expected of all participants.
   - Any exhibit exceeding 100°C (212°F) must be insulated from its surroundings.
   - Batteries with open top cells are not permitted.
   - High-voltage equipment must be shielded with a ground metal box or cage to prevent accidents.
   - Vacuum tubes or ray-generating devices must be properly shielded.
   - High-voltage wiring, switches, and metal parts must be located out of the reach of observers.
   - Additional safety precautions for those interested in chemical experiments are outlined in the American Chemical Society's booklet: "Safety in Academic Chemistry Laboratories." This booklet may be obtained from the Society at 1155 16th Street NW, Washington, DC 20036.

6) Students should wear safety goggles and follow standard safety practices when working with fire, hot liquids, or chemicals. **NEVER WORK ALONE**. Parental approval and supervision should be obtained before working on these projects.

7) **DO NOT** display expensive or fragile items. The fair will be open for three days with limited supervision. If you do not want your exhibit touched, please indicate on your display. Collections can be displayed in Plexiglas or plastic-covered boxes. Carefully pack materials when transporting to and from the exhibition.

8) Parental assistance is encouraged at all stages of the project. Keep in mind that the child will be encouraged to describe their project to an adult evaluator or judge. It is important for the child to be able to explain, in their own words, what they did and what they learned doing the project.

Although reasonable care will be given to all property displayed at the exhibition, the school and science fair cannot be held responsible for the loss or damage of any property belonging to the exhibitor.