SCIENCE FAIR PROJECT STEPS

Ask a question

Once you find a general topic that interests you, write down the question that you want to answer. A scientific question usually starts with: How, What, When, Who, Which, Why, or Where.

Example:
If you are interested in robots, your question might be "How much current does a robot's arm use to lift a weight?"

Research

Use the sheet attached in your packet to help you use questions to guide your background research. Why, How, Who, What, When, Where.
This table is a great way to organize questions, key words and ideas to help learn new information and background on your topic for your science experiment.

Hypothesis

- A hypothesis is an educated guess about how things work.
- Most of the time a hypothesis is written like this: "If _____[I do this] _____, then _____[this]_____ will happen." (Fill in the blanks with the appropriate information from your own experiment.)

- Your hypothesis should be something that you can actually test, what's called a **testable** hypothesis. In other words, you need to be able to measure both "what you do" and "what will happen."

Example :

Raising the temperature of a cup of water [temperature is the independent variable] will increase the amount of sugar that dissolves [the amount of sugar is the dependent variable]."

Variables:

Independent: Something I as the scientist changed. To keep it a fair test, remember to only change one thing!

Dependent: Something that is being measured. Compared to the change of the independent variable

Controls: Stays the same throughout the whole experiment.

Example:

Question	Independent Variable (What I change)	Dependent Variables (What I observe)	Controlled Variables (What I keep the same)
How much water flows through a faucet at different openings?	Water faucet opening (closed, half open, fully open)	Amount of water flowing measured in liters per minute	• The Faucet • Water pressure, or how much the water is "pushing" "Different water pressure might also cause different amounts of water to flow and different faucets may behave differently, so to insure a fair test I want to keep the water pressure and the faucet the same for each faucet opening that I test."

Procedures:
List the materials needed to complete the experiment

List of steps followed to conduct the experiment.
A good procedure is so detailed and complete that it lets someone else duplicate your experiment exactly!

Experiment:

It is very important to take very detailed notes as you conduct your experiments. In addition to your data, record your **observations** as you perform the experiment. Write down any problems that occur, anything you do that is different than planned, ideas that come to mind, or interesting occurrences. Be on the lookout for the unexpected. Your observations will be useful when you analyze your data and draw conclusions.

Take pictures, create data table, collect data (use numerical data as much as possible)
Include units, label chart, keep units the same throughout the experiment!!!

Graphing

- **Review** your data. Ask yourself these questions:
    - Is it complete, or did you forget something?

    - Do you need to collect more data?
    - Did you make any mistakes?

- **Calculate an average** for the different trials of your experiment, if appropriate.

- **Make sure to clearly label** all tables and graphs. And, include the **units of measurement** (volts, inches, grams, etc.).

- Place your **independent variable on the x-axis** of your graph and the **dependent variable on the y-axis**.

Conclusion

- Summarize your science fair project results in a few sentences and use this summary to support your conclusion. Include key facts from your background research to help explain your results as needed.

- State whether your results support or contradict your hypothesis.

- If appropriate, state the relationship between the independent and dependent variable.

- Summarize and evaluate your experimental procedure, making comments about its success and effectiveness.

- Suggest changes in the experimental procedure (or design) and/or possibilities for further study.

Abstract

An **abstract** is an abbreviated version of your science fair project final report. For most science fairs it is limited to a maximum of 250 words. The science fair project abstract appears at the **beginning of the report as well as on your display board.**

An abstract should have the following five pieces:

- **Introduction**. This is where you describe the purpose for doing your science fair project or invention. Why should anyone care about the work you did? You have to tell them why. Did you explain something that should cause people to change the way they go about their daily business? If you made an invention or developed a new procedure how is it better, faster, or cheaper than what is already out there? **Motivate** the reader to finish the abstract and read the entire paper or display board.

- **Problem Statement**. Identify the problem you solved or the hypothesis you investigated.

- **Procedures**. What was your approach for investigating the problem? Don't go into detail about materials unless they were critical to your success. Do describe the most important variables if you have room.

- **Results**. What answer did you obtain? Be specific and use numbers to describe your results. Do not use vague terms like "most" or "some."

- **Conclusions**. State what your science fair project or invention contributes to the area you worked in. Did you meet your objectives? For an engineering project state whether you met your design criteria.