Advice to students for science fair projects

Ask a question and think about what you think the answer might be

Don't ask a question that can be answered by yes or no. You won't learn much. Ask a question that makes you test ideas and make measurements.

Keep the experiment simple. Measure one change at a time. Have a "control" in the experiment--that is, run the experiment without changing anything to get a "normal" result. Then you can compare changes against the normal.

You may test several or many variables, but one at a time. This will mean a lot of trials, but they will help you to understand what is actually causing changes in the outcomes.

Write down all your measurements. If they don't look like what you expected, test again. If they still don't look like what you expected, try to figure out why that happened. You may learn something interesting and important by doing that.

Judges like to see your data. If you have a "notebook" where you kept track of measurements during the experiment, bring it along to the fair. Make tables where you present your measurements, or charts, or graphs that summarize the trials and results. If you have made multiple trials of the same variation (and you should), try to also show the average results. The average is likely to be a more representative result than any individual one.

Put labels on your charts and graphs so we can see what is being measured.

The judge will want to have a short conversation with you. You don't have to make a report. Be prepared to explain your project, to explain how you got the idea, and to show what your results are. Try to do some reading about the subject so you know more than the experiment shows.

Questions judges may ask at a science fair

Where did you get the idea for your project?

What were you trying to find out by doing your project?

What did you read about the topic of your project?

What help did you get in doing the project?

Can you show me your project notebook?

What things went "wrong" or frustrated you? What did you learn from that experience?

How could you have improved your project, or how could it be a better project if you did it again next year?

Measuring tools to use in your science fair project

Good experiments require measurements. Descriptions with words--like hot or cold, short or long, heavy or light, fast or slow--are not very useful. Descriptions with numbers are much better.

You have many simple things in your home that can be used to make measurements. Here's a list of some of them:

- Measuring cup
- Clock
- Room thermometer
- Ruler or measuring tape
- Scale

And don't forget one of the simplest and best of all ways to measure: **Counting!**

But what if your experiment asks people to describe something without numbers, like:

- How they feel after some event
- How much energy they have after doing something or hearing something or seeing something
- How well they can concentrate in different parts of the experiment

These are more difficult experiments, and your results will not be as easy to demonstrate (and you will need large numbers of trials). You may have better results if you ask people to "rate" their answers on a scale of one to ten, and give them examples of what a score of one or a score of ten could be described as. These results will still not be as good as those that can be measured directly, but they may make it easier for you to compare and present results in your display.

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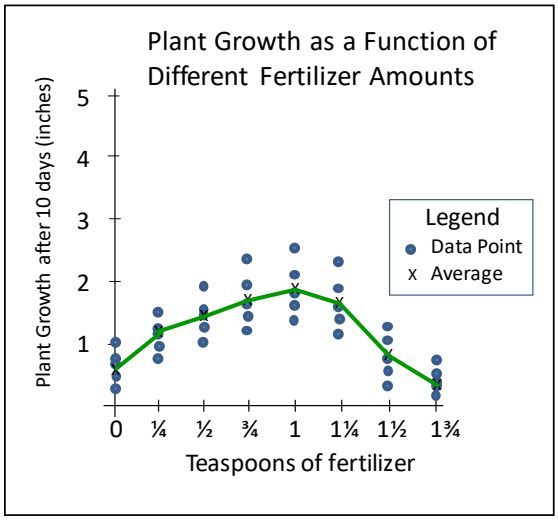
Characteristics of a Good Science Project

- Choose a project that you are interested in and that you are curious about.
- Good sources of inspiration are:

  http://hubpages.com/education/k12interactivescienceprojects
  http://www.sciencebuddies.org
  http://www.cool-science-projects.com
  http://www.stevespanglerscience.com/lab/experiments/
  http://reekoscience.com/category/science-experiments
  http://ag.ncat.edu/extension/programs/dte/science.pdf
  http://www.ipl.org/div/projectguide/

- Be able to state where the science is in the project (important!)
- Be able to define your variables. The independent variable is the input variable you change during your experiment to observe its effects on the dependent variable (output variable). A control variable (sometimes called 'controls') is a variable that you hold constant throughout the experiment. For example, let's say you wanted to measure plant growth using different amounts of plant fertilizer. In the example shown on the right, the independent variable is the amount of fertilizer (that's what you're changing); the dependent variable is plant growth (height) that you measure; and controls are the seeds (from the same packet), the soil (from the same bag), water (same amount given to each plant), and sun (same amount of sunlight).



- Projects should have a presentation board with at least the following sections: Title, Question, Research, Hypothesis, Independent & Dependent variables, Procedure, Data results, Graphical results, and Conclusion.
- A project should have the following characteristics:
  1. An experiment should have only one independent variable and it should be clearly identified.
  2. Dependent and control variables should be clearly identified.
  3. Trials should be repeated multiple times and data collected for each trial.
  4. Results should be able to be measured by counting or by using a measurement tool (scale, watch, ruler, voltmeter, tape measure, thermometer, etc.). Results that are merely observed (for example, "It looks like there is more mold on the apple than on the pear.") are not truly measured.
  5. Results from each trial should be recorded and provided on the board.
  6. Data should be summarized by totaling or averaging the results.
  7. Either detail or summary results should be graphed.
  8. Students should relate the conclusion back to the hypothesis ("My hypothesis was proved to be correct, because . . ."), and be able to state the role "science" plays in the conclusion.

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