The Scientific Method

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The scientific method is a process for experimentation that is used to answer questions and explore observations.

Scientists use an experiment to search for **cause and effect** relationships in nature. In other words, they design an experiment so that changes to one item *cause* something else to vary in a predictable way. These changing quantities are called **variables**. Variables are a key element of the scientific method.

Here is an overview of the scientific method that you will need to understand in order to complete your science fair project. Don't worry about having to learn it all at once; this is just a basic introduction to help you see the steps of the scientific method from beginning to end. For each step, we offer a much more detailed explanation, including examples and samples from past science fair projects. You can access the detailed explanations by clicking on the link for the appropriate step or by using the menu on the left hand side of the screen.

1. **Stating the Question:** What is it that you are trying to find out from your experiment? What is it that you are trying to achieve?

2. **Research Your Topic:** Investigate what others have already learned about your question. Gather information that will help you perform your experiment.

3. **State Your Hypothesis:** After having thoroughly researched a topic, you should have some prediction about what you think will happen in your experiment. This educated guess concerning the outcome is called your hypothesis. You must state your hypothesis in a way that you can readily measure.

4. **Test Your Hypothesis by Doing an Experiment:** Now that you have come up with a hypothesis, you need to develop a procedure for testing whether it is true or false. This involves changing one variable and measuring the impact that this change has on other variables. When you are conducting your experiment, you need to make sure that you are only measuring the impact of a single change.

   Scientists run experiments more than once to verify that results are consistent. Each time that you perform your experiment is called a **run** or a **trial**.

5. **Analyze Your Results:** At this stage, you want to be organizing and analyzing the data that you have collected during the course of your experiment in order to summarize what your experiment has shown you.

6. **Draw Your Conclusion:** This is your opportunity to explain the meaning of your results. Did your experiment support your hypothesis? Does additional research need to be conducted? How did your experiment address your initial question and purpose?

7. **Report Your Results and Conclusion:** Since you are performing an experiment for the science fair, you will write a report and prepare a display board so that others can share in your discoveries.

   Throughout the process of doing your project, you should keep a journal containing all of your important ideas and information. This journal is called a laboratory notebook.

You can find this page online at: http://www.sciencebuddies.org/mentoring/project_scientific_method.shtml