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Scientific Method Worksheet

Anyone who has ever read a mystery novel or seen a "whodunnit" on TV, has seen the scientific method in action. Anyone who has ever tried to figure out what happens to the refrigerator light when you close the door, or where that other rock goes after you put it in the dirt, has used the scientific method. The scientific method is not a mystical, incomprehensible rite that only "polyester clad" science nerds use to solve cosmic problems. Instead, it is a logical, organized mechanism for identifying and researching a problem, and devising a strategy for solving it.

The scientific method is split up into five major steps:

- 1. Determining the problem or question.**
 - In this step, you (the researcher) must decide what it is that you will be studying. This sounds like a simple procedure, but it is actually very important. It identifies exactly what you wish to learn and allows you to focus only on that material.
- 2. Development of a hypothesis.**
 - The hypothesis is not a just a random W.A.G. (Wild @SSMR Guess) to your problem. Instead, the hypothesis is an Educated Guess. In other words, it involves researching the problem and finding out what other people have learned, and using that information to help devise an answer. An important aspect of the hypothesis is that it should answer the original question, and it should be testable!
- 3. Design an experiment to test the hypothesis.**
 - Design an experiment whose results will either support or disprove your hypothesis. If your hypothesis is supported, then the results of your experiment will indicate that your hypothesis is correct. However, this does not mean that your hypothesis is 100% beyond a shadow of a doubt, correct. There may be other factors that will influence the results that you haven't tested. Therefore, it is important to say that the hypothesis is supported, you should never say that it is correct! However, the results of your experiment can prove your hypothesis wrong!
 - There should be at least two groups in your experiment. The first group is the experimental group. This group is the group that has the factor that is being tested (Experimental Variable). It is easy to identify the experimental variable, since it is usually stated in the hypothesis. The second group is the control group. The control group is identical to the experimental group in every way, except that they lack the experimental variable. (If there were other differences, then they would invalidate the results of the experiment.)
- 4. Conduct the experiment and collect the data.**
 - Run the experiment that you have so carefully constructed. In this step, you will be measuring the dependent variable. This variable (DO NOT confuse it with the experimental variable) is the thing that is being observed or measured. Any pieces of information that you collect regarding the dependent variable are called DATA.
- 5. Draw Conclusions from your data.**
 - Here, it is stated directly whether the hypothesis was supported or disproven.
 - If your hypothesis is supported, it should be repeated, since one of the basic foundations of the scientific method is that it is repeatable. The more an experiment is repeated, the more valid the results are. However, if there is a hypothesis that is supported by many experiments and a lot of data, we call that hypothesis a theory.
 - The word theory is often misused in everyday language. Theory and hypothesis are not synonyms; a hypothesis is just an educated guess that perhaps has been supported once or twice by an experiment. A theory was once a hypothesis, but is now supported by a lot of data and is accepted as being correct, until new information is discovered to disprove it.

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