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Design and Conduct the Experiment

Once you have learned more about your research topic, it is time to narrow down a question for testing. This, along with your prediction is known as your **hypothesis**, and the purpose of your experiment is to put this theory to the test using the **scientific method.** The data you collect will either support or reject your initial predictions. An experimental procedure is a detailed, step-by-step list of what you plan to do to test your hypothesis. Make sure your **experimental procedure** follows these basic guidelines:

Hypothesis	A hypothesis is a clear statement of what you are testing in your experiment, and includes your prediction of the outcome. It also clearly states how that changed will be measured. In an experiment, only one factor should be changed or tested at a time, and this factor is known as a variable. It is also important to include a control (experimental procedure with no variable applied) as it allows you to monitor any changes your variable may have on the system. To increase the validity of your experiment, be sure to include multiple trials and or replicate the experiment. ***Still confused about what to do? See more examples below:** http://school.discoveryeducation.com/sciencefaircentral/scifairstudio/handbook/scientificmethod.html#hypothesis http://www.stats.gla.ac.uk/steps/glossary/hypothesis_testing.html#hypothtest
Materials	List all the materials and equipment needed for your experiment and have an adult supervisor check over it for safety concerns. Be sure to make note of any potentially harmful materials, and to take the necessary safety precautions (ex. Work in a well-ventilated area, wear protective eyewear etc).
Procedure	Write a clear, concise experimental procedure outlining the steps necessary to carry out the experiment. This is also a great way for you to carefully plan out the experiment before proceeding. Science is a collaborative effort, and as such, other research scientists need to be able to replicate your experiment in the future. Careful planning is an essential ingredient for safety and success! Be sure to include a control in your experiment. This allows you to a point of reference from which you can compare the effect, if any, of your variable.
Observations	In your hypothesis, it should clearly state how change would be measured in the experiment. There are two types of observations: 1) qualitative and 2) quantitative. • **Qualitative,** or non-numeric data, is typically recorded in the form of written descriptions, photographs and or video. • **Quantitative,** or numeric data, is based upon a measurable trait (ex. Population count, temperature, volume etc) and is more useful statistically as it allows us to make predictions and or generalizations based on the sample of data collected. Organize quantitative data in the form of charts and or tables.
Analysis	This is arguably one of the most important steps in an experiment-making sense of the data collected.
Conclusion	Did the result of your experiment agree or disagree with your initial hypothesis? Summarize your findings, explain the results, and propose additional experiments and or applications for this research in the future.

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