Understanding Hypotheses

You already know that the scientific method provides an organized way to investigate a question. Once you have a question that you want to investigate and have done some research on it, the first step in the scientific method is to express that question in terms of a hypothesis. A hypothesis is an idea about how what you are investigating works. A hypothesis is often stated as a condition (if) and a result (then).

Example: If I add fertilizer to my plants, I will get more flowers.

A hypothesis is a prediction about what you think will happen *if* you try the condition. A good hypothesis must be *testable.* A hypothesis must be written carefully so that you can measure both the condition and the result. Is the example hypothesis testable?

A hypothesis is testable if you can create a *controlled* experiment that will give you more information. This hypothesis is testable because you can experiment with two groups of plants of the same species. One group would get a measured amount of fertilizer, like one tablespoon, on a regular schedule and the other group of plants wouldn't get any fertilizer. Then at the end of the experiment you can measure, or count, the number of flowers on the plants in each group.

An untestable hypothesis: If I eat more protein, my muscles will be stronger.

There are two reasons why this is not a well-defined hypothesis. If you tried to design an experiment from this hypothesis, there is no control group to compare to. Second, "get stronger" can't be measured. Think of some ways that you could measure "get stronger." Did you think of lifting heavier weights, running further, or doing more pull-ups? These are three different ways of measuring strength in a human.

Exercise: Write a testable hypothesis for the following statement.

Statement: Proper tire pressure improves gas mileage.

Hypothesis: If the tire pressure for a car is set at the manufacturer's recommended amount, the gas mileage of the car will increase.

How would you test this hypothesis?