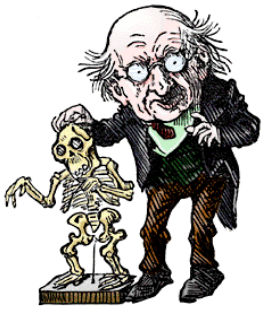
Science Background
Scientific Investigation 3.1



Whenever we do a science experiment we follow certain steps to make sure that the experiment will be fair and that it will test what we want it to test. For example: If you are doing an experiment to test whether a certain fertilizer will make bean plants grow taller than other fertilizers, you want to make sure that your results are just from the fertilizer use and not from some other factor.

Basic Experiment Steps

1. Think of some idea that you want to test. It might be which soap cleans the best, which paper towel absorbs the most water, or which video game makes kids sit on the couch the longest.

2. Predict what the results of you experiment will be. (I think that the Zest will clean the best because it is blue.) This type of prediction is called a **hypothesis**.

3. Make up a **procedure** – a system of steps that will test your hypothesis. In the soap experiment, we might use a few different brands of soap to clean the same type of stain or dirt from our hands. **Your procedure should give you results that you can observe and measure.**

4. Make careful observations and record them in a graphical format, such as a chart or a graph. Observations should be **quantitative** (in some standard or understandable unit) if possible. Instead of saying plant A was tall, you would list its exact height.

5. At the end of an experiment we try to figure out if our procedure proved anything. This process is called **drawing conclusions**. When we draw conclusions we evaluate our experiment by asking questions such as:

   Did the results support the hypothesis?
   (Was I right when I thought the Zest would clean better?)

   Where there any other factors which might have influenced the outcome of my experiment?

   Would I get the same results if I did the experiment again?

   Are there other ways that I could test my hypothesis?

Multiple Trials

When we do experiments it's a good idea to do multiple trials, that is, do the same experiment lots of times. When we do multiple trials of the same experiment, we can make sure that our results are consistent and not altered by random events. Multiple trials can be done at one time. If we were testing a new fertilizer, we could test it on lots of individual plants at the same time.

What about Variables?

Variables are things that we can change in an experiment, either directly (**manipulated variable**) or as an indirect result of something that we do (**responding variable**). Let's see if we can explain this more clearly with a plant experiment. If we wanted to test the effect of Crazy Gro fertilizer on bean plants, we would take a bunch of plants and put Crazy Gro on half of them. The Crazy Gro application is our **manipulated variable**. All other variables, (amount of watering, location, pot size, seed size) would remain the same and we'd call them **constants**. They have to stay the same for the experiment to be a fair and accurate test of our hypothesis. You can imagine what would happen if we put the Crazy Gro plants in a locker and the others in the window. The Crazy Gro plants would all die and we'd conclude that it was a bad product that killed plants.

The **responding variable** in this experiment is going to be plant growth in centimeters. This variable is what we want to observe and record. It either supports or doesn't support our hypothesis.

Other Process Skills for your enjoyment

Classification is the process of organizing objects by characteristic. We can classify by color, shape, size, or any other observable attribute.

Sequencing is the process of putting events in chronological order, which is the order in which they happened in time.