⚘ ⚘ ⚘ Data Analysis   STEM Sims

Lesson 1: Variables
One of the most common tasks students face in science laboratories is making decisions about data they collect during experiments. Very often, students have to decide whether one variable has an effect on a second variable. A good first step in any investigation is to identify the experimental variables of interest. Can you determine the variables in this investigation?

Here are some definitions to help you begin this process.

Independent variable –   also called the manipulated variable; the variable that the researcher intentionally changes or manipulates. This variable is often called the "cause."

Dependent variable –   also called the response variable; the variable of interest to the researcher. This variable can be thought of as the "effect."

Operational definition –   a statement of how the researcher will measure the variables in a particular study.

Moderator variable –   also called the control variable; a variable that is held constant for a given experiment in order to isolate the effects on the dependent variable of the independent variable.

Hypothesis –   your prediction based on prior information that is experimentally tested. A good way to write your hypothesis is in the form: the independent variable affects the dependent variable.

Doing the Science
1.   Start the Data Analysis Simulation by clicking on the "Sim" tab.

2.   Click on the "Counting" button at the bottom of the screen.

3.   Choose one of the factors (Fertilizer, Pesticide, Acid Rain, or Music) to study in this experiment by clicking on that particular button. Record this factor in the top row of Table 1.

4. Click the "Apply Treatment" button (you'll do this three times overall). Describe in Table 1 what happens *each time* you clicked the "Apply Treatment" button.

5. Click the "Results" button. Then click on one of the Flats, A, B, C, or D.

6. Click on one of the plants in the flat you selected. Note and record in Table 1 what factor you are counting on the plant. This information is supplied on the top right side of the screen where data is entered.

Table 1. Study Variables

What factor you tested:	
What you saw: Apply Treatment #1:	
What you saw: Apply Treatment #2:	
What you saw: Apply Treatment #3:	
What factor you counted:	

Do You Understand?
1. Identify the following for your specific experiment:
    a. independent (manipulated) variable –

    b. dependent (response) variable –

    c. operational definition –

    d. moderator (control) variable –

    e. The sample size is defined as the total number of subjects or items in a study. What is the sample size for your experiment?

2. Write a possible hypothesis for your experiment.