Name_____ Date _____

Data Analysis

STEM Sims

Lesson 2: Is There A Difference?

Quite often students conduct experiments and collect data in science laboratories. Some students go an additional step and find averages to determine whether an experimental effect exists. Can you go one step further and find out if the experimental effect was statistically significant?

Here are some definitions to help you begin this process.

Average – a measure of the central tendency of a data set. The average, also called the mean, is found by dividing the sum of the values by the total number of values in the data set.

Experimental effect – answers the question of whether or not the independent variable had an effect on the dependent variable. For instance, if a treatment caused the average of one groups' growth to be different from another group's growth, this would indicate an experimental effect. However, an additional statistical test would be needed to find out if this growth difference was meaningful or was only due to randomness in the data.

Statistically significant-indicates that the independent variable did truly have an experimental effect on the dependent variable and the hypothesis is supported.

Doing the Science

1. Count the number of "objects" (fruit, flowers, or roots) on the plant and enter that value into the data entry section on the right side of the screen. Click Enter, then select the next plant and repeat the counting and entering process.

2. When all of the plants in one flat have been observed and counted, click on the next flat and repeat the process.

3. When all flats have been counted, click the "Data Analysis" button to continue.

4. Note and record in Table 1 the % Treatment and the Average value for each flat. The flat that received 0% Treatment was the control group. All other groups were treatment groups. Also enter whether each flat's average value was or was not different from the control (yes or no).

Table 1. Experimental Data

	Flat A	Flat B	Flat C	Flat D
% Treatment				
Treatment or Control?				
Average Count				
Different from Control?				

Do You Understand?

1. Discuss the results of your experiment. Was your hypothesis supported or should it be rejected?

2. Write a conclusion for your study.

Extension Question

3. The simulation used a statistical test called the Student's t-test to help you find out if a real statistical difference was found in your data set. Research the Student's t-test. State what the t-test is used for and how its results are interpreted.