Tabling, Graphing and Analyzing Data

I. Introduction

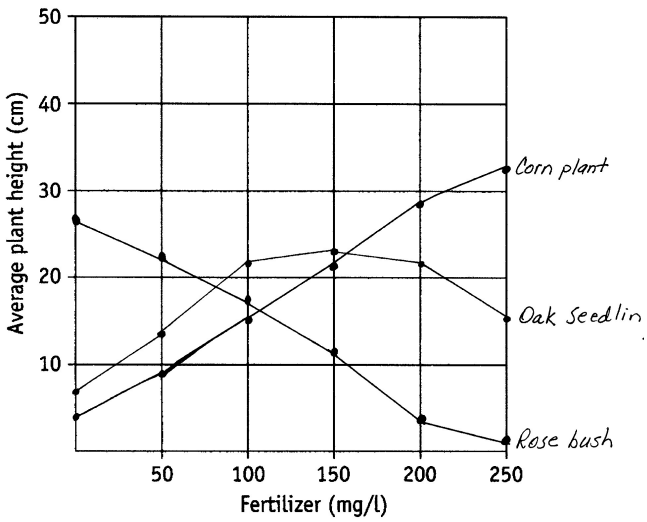
A. Whenever data is collected, it is often presented in a meaningful way so that others can view and make sense of it. Often the data will be presented in a _____ or a _____. Data tables are a way of _____ the information. Graphs are _____ that represent _____.

B. As a student, it is important that you master these essential skills:
   1. Interpreting and reading graphs
   2. Constructing data tables
   3. Constructing different types of graphs (line graphs, bar graphs, circle graphs)
   4. Critical thinking and problem solving

II. Interpreting Graphs

A. Study the line graph to the right and answer the following questions.

1. What information is being shown in this graph?



2. Describe the results shown for corn plants.

3. Describe the results shown for oak seedlings.

4. Describe the results shown for rose bushes.

5. At what fertilizer concentration do oak seedlings stop improving?

6. What was the height of the tallest plant used in this experiment?

7. For which plant is this fertilizer least effective at higher concentrations?

8. Which plant shows the best growth when the fertilizer concentration is 100 mg/L?

9. Predict how tall corn plants might be when the fertilizer concentration is 75 mg/L.

10. Consider the three types of plants used in this experiment. What reasons might explain why the results turned out as they did?

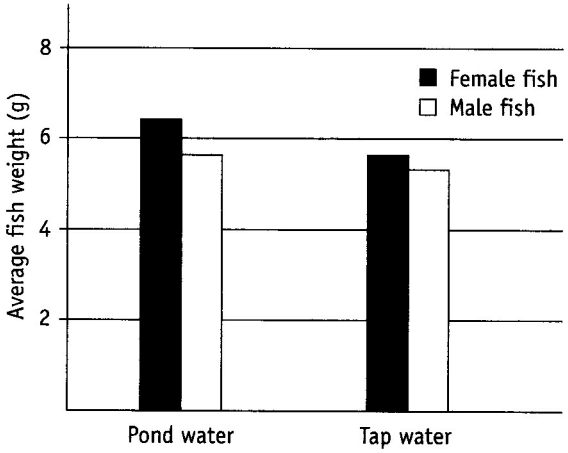
B. Study the bar graph to the right and answer the following questions:

1. Do fish grow to a larger weight in pond water or in tap water?

2. Which grow larger, the males or the females?

3. What is the average weight of female fish when grown in pond water?

4. What is the average weight of male fish when grown in tap water?



5. Why do you suppose the fish grow the best in pond water?

III. Making a Table

As scientists collect data, it must be recorded in an _____ fashion. Any time data is collected in an experiment, it is most often presented in a _____.

The data table must have a _____.

The title should be placed at the top and tells the observer what _____ is contained in the table. At the top of each column should be a "head" that tells you what information is in the column.

Example 1: Make a data table for the following information

The following data were collected for the growth of a plant. On day 0, there was 0 growth. On day 1, there was 2.0 cm of growth. On day 2, there was 5.3 cm of growth. On day 3, there was 6.1 cm of growth. On day 4, there was 8.4 cm of growth. On day 5, there was 11 cm of growth.

1) In the top row, place the title of your data table.
2) In the next row, place the two column heads.
3) In the remaining rows, fill in the data.

Example 2: Make a data table for the following information

The number of cricket chirps was recorded on two different nights at various temperatures (Celsius). On night 1, the following data was obtained: Temp 16, cricket chirps 33; Temp 18, cricket chirps 38; Temp 20, cricket chirps 42; Temp 22, cricket chirps 46; Temp 24, cricket chirps 50.

On night 2, the following data was obtained: Temp 16, cricket chirps 32; Temp 18, cricket chirps 36; Temp 20, cricket chirps 41; Temp 22, cricket chirps 43; Temp 24, cricket chirps 51.

1) In the top row, place the title of your data table.
2) In the next row, place the two column heads. Since data were collected on two different nights, you will need 4 columns.
3) In the remaining rows, fill in the data.

IV. Making a Line Graph

Line graphs show data plotted as points that are connected by a line. Line graphs are often used to show change over time and can be used to compare two or more sets of data.

Before a line graph can be constructed, you must identify the two variables that will serve as x and y coordinates on the graph. These are called the _____ and the _____.

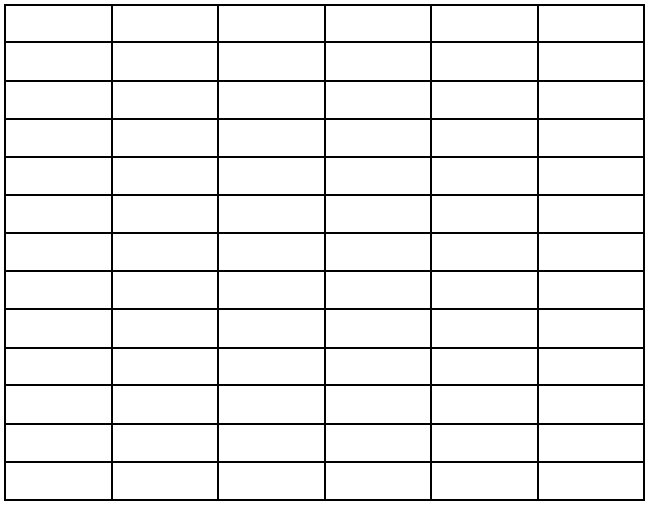
The independent variable is the one being _____ during the experiment. It is always placed on the _____.

The dependent variable is the observed result of the independent variable being changed. The dependent variable is always placed on the _____.

An easy way to remember this is to ask yourself the questions, "What did I know before I did the experiment?" (independent variable) and "What did I learn by doing the experiment?" (dependent variable)

Using the grid below, make a line graph using the information in example 1 from above.

Be sure to: (1) First determine which variable to place on the horizontal (x) axis and which variable to place on the vertical (y) axis. (2) Label each axis appropriately. (3) Scale each axis appropriately. (4) Title your graph.



Using the grid below, make a line graph using the information in example 2 from above.

Be sure to: (1) First determine which variable to place on the horizontal (x) axis and which variable to place on the vertical (y) axis. (2) Label each axis appropriately. (3) Scale each axis appropriately. (4) Title your graph. (5) Since this graph will have two different lines, be sure to label each line.

V. Making a Bar Graph

Bar graphs are useful for showing comparisons of data collected by _____. A bar graph has two axes, a horizontal axis and a vertical axis. Generally the horizontal axis is _____ and the vertical axis is _____. The data are not related so the bars do not touch.

In the space below, make a bar graph of the following information.
In an orchard the following kilograms of peaches were picked during a 6-year period

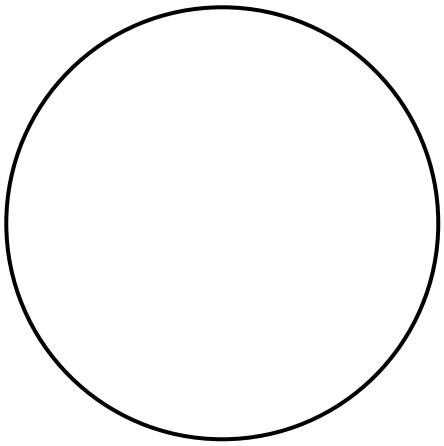
Year	Kilograms
1995	54
1996	42
1997	35
1998	57
1999	48
2000	62

VI. Making a Circle Graph

Circle graphs are used less often in _____, but they are often seen in newspapers and magazines.

A circle graph is a convenient way to show:

Suppose that in a particular high school, the number of students taking a science class is as follows: 50% are taking biology, 30% are taking chemistry, 10% are taking physics and 10% are taking some other type of science class. Use the circle below to represent this data in pictorial form.



VII. Analysis Questions

1. Under what circumstance would each of the following types of graphs be best used?

   a) Line Graph:

   b) Bar Graph:

   c) Circle Graphs:

2. How is a graph similar to a data table?

3. Does a steep curve on a line graph indicate a rapid or slow rate of change?

4. You are conducting a photosynthesis experiment to determine how much oxygen is produced over a 24-hour period of time. You are measuring the oxygen production every hour for 24 hours.
   a) What type of graph is best used to represent this data?
   b) When you construct a graph of your data, which variable will be placed along the x-axis?
   c) When you construct a graph of your data, which variable will be placed along the y-axis?

5. What is an advantage of using multiple lines on the same graph?