GRAPHING ACTIVITY

Name: _____

Date: _____ Lab Partner: _____

INTRODUCTION

This is a lab that is concerned with developing and evaluating your understanding of graphs. Be sure that you grasp the concepts and skills in this lab because you will be using them in other labs. In doing this lab you will become familiar with working with a buret (also spelled burette) and the graphing features of Logger Pro.

Make sure that you clearly label all graphs produced throughout this semester. Always print a copy of each graph to attach to your own lab report. The printout should include a title, axie labels, the curve fit information (when appropriate), the names of you and your lab partner, and the date.

PROCEDURE

Obtain a straight-walled tube, a round bottom flask, a meter stick, and a buret from Lab Services.

PART 1.

Using the straight-walled tube and other available equipment, design an experiment that will allow you to produce a graph of Height (%) vs. Volume (mL) of water. The Height (%) is the percent of the total vertical tube length that is filled when it contains the stated volume of water. Briefly describe your procedure below. You want the best data you can obtain in the allotted time.

Description of your experiment:

Perform the experiment, collecting data using Logger Pro.

Manually inputting data on Logger Pro.

1. Start Logger Pro on the computer by double clicking on the Logger Pro icon.

2. Right click on the graph. Choose: Column Options ; Data Set|X. Label and enter units for the x axes. Clear "Short Name". Done. Repeat for Data Set|Y.

3. Right click on the graph. Choose: Graph Options; Graph Options tab. Enter a title for the graph. Be sure the title is specific enough so you will know which run of the experiment the printout goes with. In Graph Options, on the right hand side, the Point Symbols box is the only box that should be checked for this lab.

4. Enter your "X" and "Y" data into the appropriate columns.

5. After completing your data entry click: Analyze ; Autoscale ; Autoscale.

Questions about Part 1.

1. What is the "shape" of the graph produced?

2. Explain the shape of the graph.

3. Find the mathematical relationship that best describes the experimental data. Choose: Analyze; Linear Fit. A line should appear as well as a box containing the equation for the line. If necessary, the box can be dragged so that it does not cover up the graph. Write the equation below. The method for determining the equation for the line of a linear graph using Logger Pro will not be repeated in later labs. Be sure you know how to do this.

4. Print out a copy of the graph for each lab partner. To do this click: File ; Print ; and change the "orientation" to landscape under properties. Be sure that the names of all lab partners are entered in the "Name" section and that the date box is checked. OK. Attach a copy of the graph to your lab report.

5. **<u>Using your graph</u>** (not the equation) of the experimental data, answer the following questions:

    a. Predict the volume of water in the tube when it is 71% full.

    b. Predict the Height (%) of water in the tube when the volume of water in the tube is 48 mL.

6. **Using your equation** for the experimental data (**show work)**:

    a. Calculate the volume of water in the tube when it is 71% full.

    b. Calculate the Height (%) of water in the tube when the volume of water in the tube is 48 mL.

7. How did your answers from parts a and b of questions 5 and 6 compare? If they are different, explain.

8. Why is it useful to have both an equation and a graph to describe your system?

PART 2.

Obtain a small, round bottom flask.

Follow the same procedure as in Part 1 creating a new data table and new graph. Print out a copy of the graph for each lab partner. Be sure that a title and the names of all lab partners are entered and that the date box is checked.

Questions about Part 2.

1. How do the two graphs compare? Was this harder than the graph in the first part, explain why or why not?

2. Can you easily develop a mathematical relationship to describe the experimental data? If not, do you think one is possible?

3. Using your graph,

   a. Predict the volume of water in the flask when it is 36% full.

   b. Predict the % height of the water in the flask when the volume is 28 mL.

4. Describe a real-world system that might employ a graph such as yours to make predictions.

PART 3.

Obtain a graph from your lab instructor.

Identification letter/number of your assigned graph: _____

1. This graph was made from a bottle. In the space below, draw a picture of the bottle based on the graph.

2. Which do you find is more useful for drawing the picture of the bottle, the equation for the curve or the graph? Why?

3. Pick out the bottle that is represented by your graph (your instructor will show you the bottles).

4. Perform experiments and create a new table and graph to verify that you picked the correct bottle. You should be experienced enough to be able to perform this quickly.

5. If you picked the wrong bottle, repeat steps 3 and 4.

6. Identification letter/number of the bottle that goes with your graph: _____

7. Print out a copy of the graph for each lab partner. As always, be sure that a title and the names of all lab partners are entered and that the date box is checked.

Additional Questions

1. In this experiment Height (%) vs. Volume (mL) was plotted. What other quantities could you plot to obtain the same information?

2. Draw the shape of the bottle that was used to generate the graph shown below.