Name: _____

Lab Instructor:_____

PREPARATION FOR CHEMISTRY LAB: GRAPHING ACTIVITY

For a review of straight-line graphs, see Appendix D-1 in your textbook.

Plot the following x,y points on the sheet of graph paper attached to the lab. Use up as much of the graph paper as you can while still showing all the points.

X	1.00	3.00	4.00	7.00	10.00
Y	14.09	29.41	37.07	60.05	83.03

Determine the slope (symbol, m) of the line.

Determine the y-intercept (symbol, b).

What is the equation for the line ($y = m x + b$)?

What is the value of y when x is 28.44?

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. If necessary, review the linear graphs section in the Appendix of your textbook. In doing this lab you will also become familiar with the graphing features of the LabQuest.

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, axis labels, the curve fit information (when appropriate), the names of you and your lab partner, and the date. These should all be generated by LabQuest. Enter the graph title and your names in the footnote box and be sure that the date box is checked when you print out your graph.

PROCEDURE

Obtain a LabQuest, a straight-walled tube, a round bottom flask, and a meter stick 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. Think about the volumetric glassware that you have previously used. 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 your LabQuest.

Manually inputting data using the LabQuest. Always use the stylus to touch the screen, never touch it with your fingers.

1. Touch the TABLE icon (top of screen, third "icon" from left).

2. Touch X in the column heading and replace the X with an axis label (Volume in this case). Enter the appropriate units (mL in this case). OK.

3. Repeat for the Y column heading (Height) and units (percent).

4. Enter your "X" and "Y" data into the appropriate columns. When you start a new row you will have to touch the column entry position twice.

5. You will want to periodically save your data. Touch: FILE; SAVE; in the Name: box enter a unique name for the file, SAVE. **In this lab, as well as others, you should save your data before printing. You won't be reminded to do this.**

6. When you are ready to return your LabQuest to Lab Services, be sure to delete all of your saved files. Touch: File; Delete; select the file; Delete; OK.

Questions about Part 1.

1. Touch the GRAPH icon (top of screen, second "icon" from left). What is the "shape" of the graph produced? If your graph is not appearing as it should you can make modifications in GRAPH ; GRAPH OPTIONS.

2. Explain the shape of the graph.

3. Find the mathematical relationship that best describes the experimental data. ANALYZE; CURVE FIT; HEIGHT; choose the LINEAR fit; OK. Write the equation below. The method for determining the equation for the line of a linear graph using LabQuest will not be repeated in later labs. Be sure you know how to do this.

4. Be sure you have saved your data. Using a USB cable that is already attached to a printer, connect the LabQuest to the printer. Print out a copy of the graph including the equation for the line for each lab partner.

   Touch: File; Print; Graph; Print Footer (check box), Replace "Enter name or comment here." with the title of the graph and the names of all lab partners. Be sure the Time/Date box has a check mark in it.

5. **<u>Using your graph</u>** 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. After saving your data, print out a copy of the graph for each lab partner. Be sure that a tile and the names of all lab partners are entered in the footnote 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 in the footnote 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.