Print Form

Name: _____, _____
Last Name First Name

Date: _____-_____-_____
Day number – Month (3 letters) – Year (2 digits)

Description of Work: _____

Teacher's Last Name: _____

Measurements, tables and graphs

Lab and other hands-on chemistry learning activities should be reported in your lab notebook. ALL observations (including measurements) should be recorded in your lab logbook/notebook.

In your lab logbook/notebook, write only in black or blue ink pen. If you make a mistake DO NOT write out, erase, or scratch out. If you make a mistake, you should draw a single line through the error, and start writing over. If necessary, draw a line through the error, and write a notation that corrections or additions will be found on such-and-such a page.

All the pages in your lab logbook/notebook should be numbered (in upper right corner and circled). Skip the 1st 2 pages and create a table of contents which you will update as you do more labs or activities. All new activities or labs that continue on a second day should include a new date (in upper left corner of right hand page in this form 00-Mon-00). All activities require a new title (middle of page at the top). If you have not keep keeping your table of contents up-to-date, do so tonight. Write only on the right-hand page. Write in complete sentences.

Determine the density of tap water: Density is mass divided by volume. Example: If a sample of substance has a mass of 12.52 g and a volume of 8.4 mL, then the density is determined in this manner:

$$D = \frac{12.52\text{ g substance}}{8.4\text{ mL substance}} = 1.4\underline{9047619}\,\frac{g}{mL} \rightarrow 1.5\,\frac{g}{mL}$$

$$\text{which should be written as } \boxed{\frac{1.5\text{ g}}{1\text{ mL}}}.$$

It is your responsibility—and that of the other students in your lab group—to figure out how to use the lab equipment to determine the density of the water. Record all of your math in your lab notebook/logbook.

Determine the density of salt water: Each lab group will be assigned a different amount of salt to add to their water.

> *Lab group #1:* Add ~ 2.00 g NaCl to 40.0 mL of tap water. Dissolve completely. Record temperature and determine density.
>
> *Lab group #2:* Add ~ 4.00 g NaCl to 40.0 mL of tap water. Dissolve completely. Record temperature and determine density.
>
> *Lab group #3:* Add ~ 6.00 g NaCl to 40.0 mL of tap water. Dissolve completely. Record temperature and determine density.
>
> *Lab group #4:* Add ~ 8.00 g NaCl to 40.0 mL of tap water. Dissolve completely. Record temperature and determine density.
>
> *Lab group #5:* Add ~ 10.00 g NaCl to 40.0 mL of tap water. Dissolve completely. Record temperature and determine density.
>
> *Lab group #6:* Add ~ 12.00 g NaCl to 40.0 mL of tap water. Dissolve completely. Record temperature and determine density.

Share your results: Your group recorder is required to post your measurements and density calculation on the Google Docs form for this purpose. ALL students are required to write these results in their lab notebooks/logbooks and to download the data onto their flash drive.

Table: Prepare a table on the 3rd leaf of this handout and a graph on the opposite side of the 3rd leaf (on the graph paper). Follow all instructions to complete a formal table and graph. An example of a formal table is shown below. You will NOT be creating a table with the data shown below. You will be creating a table that compares the *concentration of all the solutions produced by the class* with *the density of all the solutions produced by the class*.

An example of a formal table:

Table 1. The acceleration of an object compared to the force applied to it.

Acceleration (in m/s^2)	Force (in N)
0.0	0.0
5.2	1.9
9.9	3.8
14.1	6.2
19.7	8.1
25.2	9.9
30.0	12.1

Table must be numbered in the form "Table 1." "Table 2." "Table 3." And so forth. Notice that the number is always followed by a period.

Tables must have a description of what data is recorded in the table and its importance.

Tables must column labels that describe the kind of data that is found in that column. If the data in the column is measured or calculated numbers, the column label must include the measurement unit(s) in parentheses.

When measured or calculated numbers are recorded in cells, they cannot include the measurement units. Measurement units belong in the column labels.

Calculating what is needed for YOUR table and YOUR graph:

Concentration - We will use a very simple salt water concentration. Starting with the mass of salt that you weighed out, divide that by the amount of tap water that you actually measured in the graduated cylinder:

$$\frac{\text{mass of table salt (in grams) weighed on the balance (before dissolving in water)}}{\text{volume of tap water (in mL) measured in the graduated cylinder (before dissolving the salt in it)}}$$

$$= \text{concentration of salt water (in grams of salt / mL of water)}$$

Density – AFTER you have dissolved your salt sample in your tap water sample to create a salt water solution, you should have weighed the salt water solution (in grams) AND measured its volume (in milliliters). Divide the mass by the volume to get the density:

$$\frac{\text{mass (in grams) of salt water solution}}{\text{volume (in mL) of salt water solution}} = \text{density of salt water solution} \left(\text{in } \frac{\text{g}}{\text{mL}} \text{ , } \text{g}/\text{mL} \text{ or } \text{g/mL} \right).$$

Graph: Prepare a graph on the 3rd sheet of this hand out on the opposite side of the sheet with the table. Follow all instructions to complete a formal table and graph. Below is an example of a formal graph. You will NOT be creating a graph with the data shown below. You will be creating a graph that compares the *concentration of all the solutions produced by the class* with *the density of all the solutions produced by the class*.

The axes on a graph must be labeled showing what was measured or calculated.

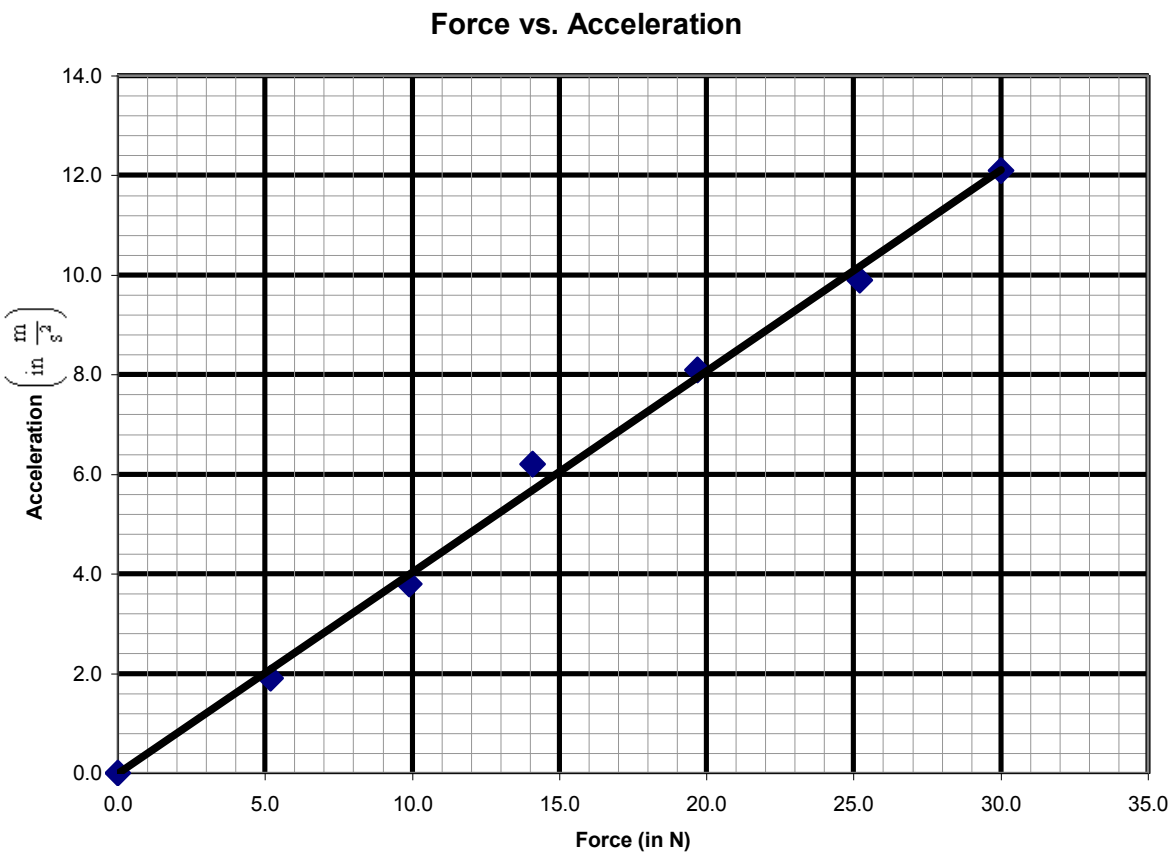

Figure 1. Force and acceleration are examples of a direct variation. This direct variation is evident because the "best fit" line is a straight line with a positive slope.

The units of measurement must be included (in parentheses).

The intervals on each axis must be marked in equal increments.

The graph must have a title which explains what is being analyzed in the graph.

All graphs in chemistry MUST be "dot graphs" or "scatter graphs" of the type shown in the figure above. A "best fit line or curve" or "trend line or curve" must be included on all graphs. You must decide if a line or curve best fits the data. Connect the dots lines or graphs are NOT acceptable. The line that is shown in the graph a "best fit line" or "trend line."

All graphs MUST include a figure number and description. These MUST be placed BELOW the graph.

Put your table on this page. Your table must compare concentration with density. Complete as homework and turn in tomorrow.

Put your graph on this page. Your graph must compare concentration with density. Complete as homework and turn in tomorrow.