Name: _____ Class: _____

Flow Rate

Purpose:

_____

_____

_____

Equipment:

- Graduated Cylinder
- Funnel
- Measuring Spoon
- Stop Watch
- Soap
- _____
- _____
- _____

**You will be assigned to your three fluids at random.*

Hypothesis:

I think the flow rate of the experimental liquids will rank in this order:

Fastest Flow Rate _____

_____

Slowest Flow Rate _____

Procedure:

1. Practise with water:
    a. Fill the measuring spoon with 15 ml of water.
    b. Hold the funnel, such that your finger is blocking the exit point.
    c. Dump the water into the funnel (not letting any water come out the bottom.)
    d. Hold the funnel over the graduated cylinder.
    e. Remove your finger, allowing the liquid to flow into the graduated cylinder, and start the stop watch immediately.
    f. Stop the stop watch when there is 10 ml of water in the graduated cylinder.
    g. Empty the graduated cylinder preparing to start a new trial.

2. Once you are confident with your ability to work as a group, perform the experiment with all three of your liquids, three times each.
    a. Repeat steps "a" through "g" three times.
    b. When performing step "g," you may need to rinse the graduated cylinder with water. If so, you will need to dry it before proceeding.
    c. After the third trial, wash the funnel, graduated cylinder, and measuring spoon with soapy water.
    d. Rinse these items to remove the soap.
    e. Dry these items thoroughly.
3. Record your results on the class data sheet.

Note: Consider the following safety precaution:

- Water spilled on the floor can be very slippery, please be careful to clean up any messes you make.

Discussion:

Complete the following, individually, to submit this work.

1. The class data file will be posted as an assignment on Google Classroom.
2. In column N of your copy of the data file, code the spreadsheet to calculate the average time for each of the fluids.
3. In column O of your copy of the data file, code the spreadsheet to calculate the flow rate of each of the fluids, in ml/s.
4. Highlight cells A3:A8 and O3:O8 and use this data to create a bar graph of the results.
    - To highlight multiple sections, start by highlighting one of them, then hold the "control" button on your keyboard and highlight the next section.
5. Move this graph such that the top left corner is aligned with cell Q1.
6. Edit the graph to include the proper features of a graph.
    - *Note: The Google Sheets spreadsheet program does not allow you to control all aspects of the graph; you will not be able to edit some things. I am aware of these limitations*.
7. Answer the questions that have been typed out on the spreadsheet, in the spaces provided.
8. Submit the file on your Classroom.

If you are not familiar with the use of a spreadsheet program you will need to start this assignment early, as you may run into difficulties. I am available to help show you how to get around these issues. However, you will need to **do so before it is due**.

Due date: _____