Collecting and Interpreting Data: A ___no talking___ activity to practice self-problem solving

Objectives: To **collect data** using laboratory equipment
                To **graph** and **interpret** data
                To **compare** and **contras**t graphs

MATERIALS (on center tables): ring stand/funnel/stopper/clamp setup, 250 ml beaker,
           graduated cylinder, marking pen, metric ruler, dropper and water

INTRODUCTION:
Looking at a problem scientifically means you take a close look at the facts involved in the problem. Science tries to answer questions by beginning with the facts, such as observations and the recorded data. Interpreting the facts often involves plotting the data on a graph. The shape made by a line on the graph reflects the data used to make the graph. In this lab activity, you will use standard laboratory equipment to collect data. You will then graph and analyze that data. Finally you will use that analysis to compare and contrast graphs while you search for answers to problems/questions.

PROCEDURE:

1. **NO TALKING, BY ANYONE, TO ANYONE, THE ENTIRE PERIOD!**
2. Get a ring stand/funnel/stopper/clamp setup. (already assembled)
3. Fill a 250ml beaker with water from the sink. Using a dropper, place just enough water in the bottom of the funnel to reach the point where the funnel starts to rapidly expand. (see Figure 1.1) With a marking pen place a mark on the outside of the funnel at this location and label it *SP* for *starting point*.

    4. Carefully measure 10ml of water into the graduated cylinder. Use a dropper to improve accuracy. Pour the 10ml into the funnel. Mark the new level on the outside of the funnel. (This is pour #1)
    5. Repeat step #4 nine more times. Remember to mark the water level on the outside of the funnel each time. You should have 11 marks on the funnel. (*starting point (sp)* and 10 pours)
    6. Without smearing the marks, remove the funnel from the ring stand and pour the water out, back into the 250ml beaker.
    7. With a metric ruler, measure, to the nearest tenth of a centimeter, the distance from the *starting point (SP)* to the first pour mark. Record this distance on Data Table A (top of page 2). Repeat by measuring the distance of each of the successive pours from the *staring point (SP)* mark. Record each distance on Data Table A.
    8. Draw a **line graph** on Figure 1.2 (top of page 2) that represents the number of pours (1-10) compared to the distance (in cm) of the pour mark from the *starting point (SP)* mark. To do this place the pour number from the first column of Data Table A along the x-axis and distance (in centimeters) along the y-axis.
    9. Answer the problems/questions in the *Analysis and Conclusions*.

Figure 1.1

ANALYSIS AND CONCLUSIONS: **Figure 1.2**

1. How did the spacing between the lines on the funnel change as more water was added to the funnel?

2. Why did the change (spacing between the lines on the funnel) occur this way?

3. If the funnel was sealed at the wide end, inverted, and filled 10ml at a time from the narrow end, what would you expect to happen to the spaces between the lines as the funnel was filled?

4. If you lived on a lake with a funnel shaped bottom, would you be more concerned about a heavy rain causing the lake to flood if the banks were *wide side down* or *wide side up* (assuming it could occur either way)? Explain you answer!

Graph A   **Graph B**

Graph C   **Graph D**

5. Which of the above four graphs is shaped most like your graph?

6. Identify one way in which each of the other graphs is shaped differently from your graph.

7. If the distance between the lines on the funnel had been measured and plotted on a graph, which of the above four graphs would most closely resemble the results?

8. If instead of a funnel, a large beaker had been filled with 10ml at a time and the results plotted on a graph, which of the above four graphs would most closely resemble the results?