

Graphing Techniques Lab

Purpose: To practice proper measuring techniques and to practice careful analysis of data through proper graphing methods (manual and computer aided)

Procedure:

**Note: Take no more than two of the samples at any one time—we need to share throughout the class. There are 9 different samples—perform as many trials as you feel necessary for each sample.*

1. Create a data table to show the number or name (as shown on the label) of the sample, its circumference, and its measured diameter.
2. Measure the diameter of a chosen sample item using the Vernier caliper.
3. **Measure** the circumference of the same sample item using an appropriate method of your choosing. Do **NOT** determine this value through a mathematical calculation!!
4. Repeat each measurement for a **minimum** of 2 trials.
5. Repeat steps 1-3 for a **minimum** of 5 of the samples.

Data:

In a second data table, calculate the averages for the measured diameter and the measured circumference.

Analysis Questions:

1. Describe the method you chose to measure the circumference of each object. Why did you choose this method? How accurate do you think your measurements with this method are?
2. Using the average circumferences and the average diameters, construct a graph (**by hand on a full sheet of graph paper**) of Circumference vs. Diameter. (*Circumference will be on the vertical axis*)
3. Calculate the slope of your best-fit line. Show your work (including which data points you used and the equation you used).
4. What is the expected value of your graph's slope? (*Hint: you're allowed to use the equation for circumference now*). Calculate the percent error between your experimental value (the slope of your graph) and the theoretical value.

$$\% \text{ Error} = \left| \frac{\text{Theoretical Value} - \text{Experimental Value}}{\text{Theoretical Value}} \right| \times 100\%$$

5. Create a second graph using LoggerPro. (**NOT** Excel) Re-calculate your percent error from question 4 with the slope obtained from this second graph.
6. Compare/contrast graphs created by hand and graphs created using the computer program. What are the benefits to using each style of graphing?