

Graph and the World Graphs With You

Graphing is a way to present data that provides a “picture” of the relationship between two variables that can help us describe interactions between real world quantities. The following guidelines must be used for most graphs that you prepare in this class (I’ll tell you when there are exceptions to these):

Graph Paper: Hand-drawn graphs must be prepared on graph paper. Ms. Q has graph paper available, and you can always print graph paper from the internet (<http://www.printfreegraphpaper.com/>).

Variables: You have probably been schooled on the difference between independent and dependent variables. It is typical to place the independent variable on the x-axis, and the dependent variable on the y-axis. There are some cases where this convention may not be applied, particularly where the slope of a graph has some physical significance.

Scaling: To make the graph easy to plot (and easy to read), the data should occupy as much of the graph as possible. To scale your data, you need to determine the range of your data for each variable, and find an appropriate scale (likely a multiple of 2, 4, 5, or 10).

Labeling: After scaling your axes, you need to label the axes with the quantity measured AND the unit (for example, “time in seconds” or “t (s)”).

Title: Make sure you have a title for your graph. The title should indicate what two variables you are relating, such as “Velocity vs. Time”, or “Force vs. Position”.

Plot the Points: Plot the points based on the scale you established.

Observe the Trends: Never play connect the dots. We are looking for relationships between variables, and these “trends” become lost when we play dot-to-dot. If the data appears to be linear, draw a STRAIGHT LINE of best fit through the data, and then draw a slope triangle. If the data appears to be non-linear, we will possibly transform the data (we’ll talk about this when it comes up).

Calculating the Slope: When calculating the slope of the best-fit lines, you must identify the points **on the best-fit line** that you have chosen, and then show your calculation. Remember that the points must come from the best-fit line (not your data): Make sure to include units in your answer:

Given the Force vs. Acceleration graph provided, calculate the slope of the best-fit line:

Points Selected:

(37m/s²,92 N)

(21m/s²,52 N)

$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{92 \text{ N} - 52 \text{ N}}{37 \frac{\text{m}}{\text{s}^2} - 21 \frac{\text{m}}{\text{s}^2}} = \frac{40 \text{ N}}{16 \frac{\text{m}}{\text{s}^2}} = 2.5 \frac{\text{N}}{\frac{\text{m}}{\text{s}^2}}$$

