Data Table and Graph Requirements Handout
Part 1 - Graphs

Notes on Graphing:

- Graphs give us an instant ability to see trends and relationships between variables.
- The variable that is controlled by you, the experimenter, is the independent variable. It is usually plotted on the *x-axis* of the graph.
- The variable which changes as a result of the independent variable is called the dependent variable. It is usually plotted on the *y-axis* of the graph.
- Obtaining information from locations between data points is called interpolation.
- Predicting information from locations beyond your data points is called extrapolation and should be considered carefully for reliability.
- Finally, the shape plotted is referred to in general as a curve, *no matter its shape*.

When plotting a graph, you should:

1. Unless otherwise told to do so, use 1/4" graph paper. **ALWAYS** use a #2 pencil when making your graph

2. The rule of thumb that plots the independent variable on the x-axis and the dependent variable on the y-axis is NOT necessarily applicable in physics. Your graph should provide a meaningful interpretation of the data. Identify which variable goes on which axis such that the slope, area, and/or y-intercept provide meaningful information.

3. Not all curves go through the origin. You must consider your experiment and decide if (0,0) is valid for your data.

4. Determine a scale such that the maximum area of the graph paper is used to form the curve. Try to use practical divisions for your scale! (1, 2, or 5) Complete the scaling chart on your piece of graph paper.

5. Label each axis with the name of the variable and its unit.

6. Plot each data point and draw a square box around each point. This box represents the uncertainty in the data point.

7. If the data points appear to lie roughly in a straight line, draw the **best–fit line** with a ruler. Have the line go through as many point as possible, but if points are not on the line, adjust so that approximately as many lie above the line as below. Do not simply draw a line between (0,0) and the last data point! Never ever draw dot-to-dot!

8. If the best-fit curve is a line, calculate the slope. Pick two points along the line (neither can be data points) that are at least half the length of the line apart. Record the coordinates of these points in a blank area at the extreme right of your graph paper and show your slope calculation.

9. If the data points form a curve, consider various known shapes (parabola, hyperbola, inverse-square, etc.). Draw the appropriate smooth curve that goes through as many data points as possible. Adjust your curve such that there are as many missed points above the curve as below it.

10. If a data point is obviously in error, circle it, and exclude from determining the best-fit curve.

11. Include a Title for your graph. The title is written y-axis variable versus x-axis variable (ex. position vs. time).

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Part 2 – Data Tables

Guidelines for Making a Data Table
In most cases, the independent variable (that which you purposefully change) is in the left column, the dependent variable (that which you measure) with the different trials is in the next columns, and the derived or calculated column (often average) is on the far right. Reaffirm that rows are a series of horizontal cells and that columns are a series of vertical cells.

When creating a table you should:

1. Make sure the person that collected the data and the date the data was collected is identifiable.
2. Make sure there is there a title that is clear and that it reflects the purpose of the data table.
3. Place the independent variable in the first column and make sure the column is named and the units are marked.
4. Make a column (sometimes with sub-columns) for the dependent variable. Make sure it is named and the correct units are included.
5. If required, add trial sub-columns under the dependent variable. Make sure there is one for each trial.
6. If required, add a column on the far right for derived or calculated quantities. Make sure this column is named and the units are included.
7. Make sure the derived calculations are correct.
8. Is the data recorded correctly.

Example

The effect of independent variable on dependent variable

Independent Variable (unit)	**Dependent Variable Unit**			**Derived Quantity (Unit)**
	Trial 1	Trial 2	Trial 3	

Based on documents found at www.sedl.org/afterschool/toolkits