Physics 103

Pre-Lab #1

Introduction:

Spreadsheet software programs such as Microsoft's Excel are powerful technological tools. Spreadsheet software can be used to organize information, perform calculations, analyze data and generate graphs or charts.   The goal of this pre-lab assignment is to remind you how a spreadsheet package functions, or, if necessary, to give you the opportunity to learn how to use a spreadsheet package like Excel to generate graphs.

Assignment:

Generate a page that looks **exactly** like the image on the next page (except that your name must actually be typed in the upper left). To do this, enter the data shown in the table on the next page into a table in Excel or any other computer spreadsheet program (for example, OpenOffice). Then, generate the graph shown (it is a scatter plot with a trend line.) The formatting of the table and graph must match that shown including such things as the number of digits for numbers in the table, the style of outline in the table and format of fonts. The graph must be generated using the graphing functions of the software and the data entered in the table. **Once you have generated both the data table and graph, print the page, <u>answer the questions in #5 below </u> and bring this assignment to your first lab meeting.   This "pre-lab" assignment will be graded.**

 If you know how to use a spreadsheet program you may not require any instruction to complete this assignment.   If you feel that you require instruction on how to generate a graph using a spreadsheet program, find a computer that has Microsoft's Excel (Versions 2007-2010) and follow the directions on the next pages. A computer in one of the university's computer labs is a good place to work if you need instructions but you lack a computer with Excel (versions 2007-2010). You may also find the following links and videos useful:

- DEMO: Excel Basics, Linear Regression, Graphical Analysis
   http://www.youtube.com/watch?v=w9-jQPNUJ0o
- *http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CDAQFjA A&url=http%3A%2F%2Fwww.sag*
- http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0CDcQFjAB &url=http%3A%2F%2Fwww.aug
- Get to know Excel 2010: Create your first spreadsheet thttp://office.microsoft.com/en-us/excel-help/meet-the-spreadsheet-   RZ101773335.aspx?section=2
- http://office.microsoft.com/en-us/excel-help/create-a-basic-chart-RZ001105505.aspx?section=2
- Forecasting with Trend Lines using Microsoft Excel™
   http://jcflowers1.iweb.bsu.edu/rlo/trendlines.htm

<mark>If there are things that you cannot get done on this assignment, make notes about where in the assignment you have questions/problems and bring that list to the first lab. We will answer your questions there.</mark>

Your Name Here

Time in Seconds	Position in Meters
0.10	0.13
0.20	0.24
0.30	0.36
0.40	0.49
0.50	0.65
0.60	0.75
0.70	0.88
0.80	0.97
0.90	1.11
1.00	1.24
1.10	1.40
1.20	1.51
1.30	1.63
1.40	1.75
1.50	1.88
1.60	2.07
1.70	2.13
1.80	2.23
1.90	2.38
2.00	2.52
2.10	2.62
2.20	2.79
2.30	2.88
2.40	3.00
2.50	3.13

POSITION VS. TIME

$y = 1.26x - 0.01$

POSITION IN METERS

TIME IN SEONDS
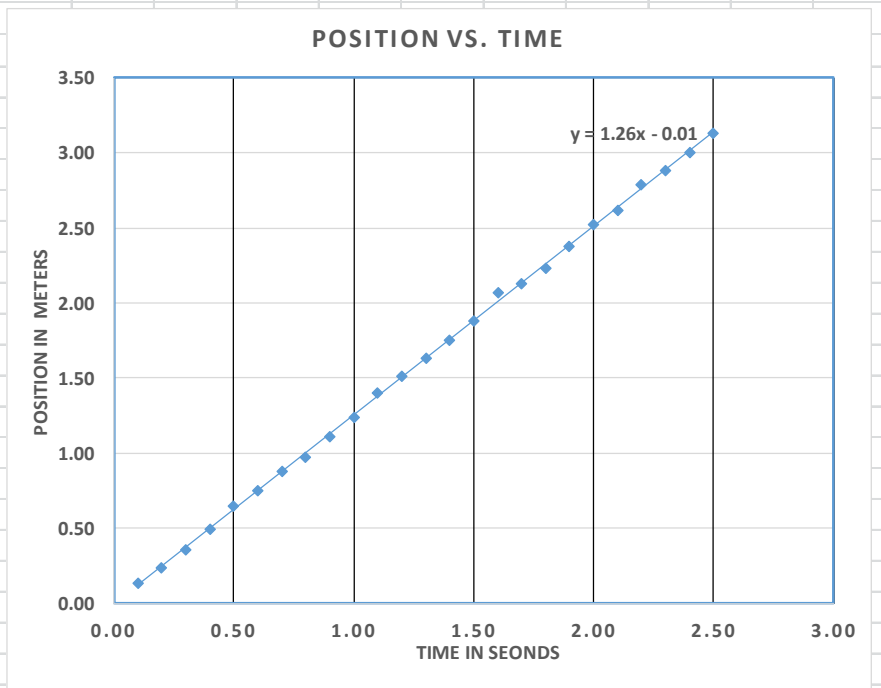
Instructions (for Excel 2007-2010) to be used if needed.

1. At a computer open the Excel™ program, or any other form of computer spreadsheet program (i.e. OpenOffice™) that you may be familiar with using. All of the following directions are based on using the Microsoft® Excel™ spreadsheet program.

2. Input the set of data that is shown in the table on the right in the following manner:

> A) Put the label of each of the sets of data in the top cell of the column that will hold that data (i.e. time in seconds, or position in meters).

> B) Input the data into the table in a column under the label for that data.

> C) Format the data so that it is convenient for you to read.

3. To obtain a graph of your set of data, highlight the two columns of your data and then:

> A) Select the "Insert" tab in the toolbar.

> B) Select the "Scatter" button in the Charts section of the Insert Toolbar

> C) You should now have a graph that pops up in the field of cells to the right of your data columns.

4. To refine the graph and determine the "Best Fit" line and find its slope:

> A) Right Click on the data of the x-axis and select both "Add Major Grid Lines" and "Add Minor Grid Lines".

> B) Right Click on the data of the y-axis and repeat the previous step.

> C) Mouse over one point of data in the graph and Right Click on it, then select Add Trend Line. A Dialog box will pop up. In that box:

>> 1. Select the Linear button in the Trend/Regression Type area of the dialog box (because your data should appear to be a line).

>> 2. Click the check box to Display Equation on Chart.

>> 3. Click "Close" and you should now have a "Best Fit" line through your data and an equation in the upper right hand portion of the chart.

>> 4. Click on the Chart Tools tab and then the Layout tab.

>>> i. Select the Axis Titles button and label your axis in the correct fashion.

>>> ii. Select the Chart Title button and label the chart in the following manner: "Dependent Variable Name vs. Independent Variable Name" inserting the appropriate variable name into the title.

> D) You can resize your graph by clicking the edge or corner and dragging that boundary to where you would like it stretched.

5. Your graph is now set for you to use it to analyze your data:

    A) Print the page showing the data table and graph as exemplified above. Your name must be have been entered in the upper left cell replacing "your name here".

    B) On the back of the printed page, answer the following questions:

      1. Based on the trend line (Best-fit-line), what is the value of slope of the line that represents this data? Note that the equation should not display the slope with more significant digits than the data you used to plot the graph.

      2.   What are the units for the slope of the line on this graph? How did you come up with this unit?

      3. In the field of math, we often use the word "slope" when we want to use numbers to say how steep something is. Slope is defined as Rise divided by Run. Rise is the vertical measurement, and Run is the horizontal measurement. Find the slope of the graphed line by following these steps:

        a. Mark two points on the line, label them "A" and "B." The points should be on the line, and far apart. Try to choose points that will make it easy to read the distance and time measurements.

        b. Point "A" corresponds to a distance of _____, and a time of _____.

          Point "B" corresponds to a distance of _____, and a time of _____.

        c. Use your answers from part "b" above to calculate the rise and run:

          Rise = _____m - _____m = _____m.

          Run = _____s - _____s = _____s.

        d. Now calculate the slope of line: Slope = Rise divided by Run = _____m/s.

      4. Complete the following sentence: The slope of a position vs time graph for a moving object represents the _____ of the object.

    C) Bring the printed graph and table to your first lab on September 8 or 9. It will be collected and graded. You can print in a university computer lab if necessary. Go to a computer lab and ask for help if you have questions about how to print your table and graph.

If you have other questions regarding how to generate this table and graph using a spreadsheet program, write down your questions/problems. You will have time in lab to ask for help.