Graphical Analysis Using Microsoft Excel©97

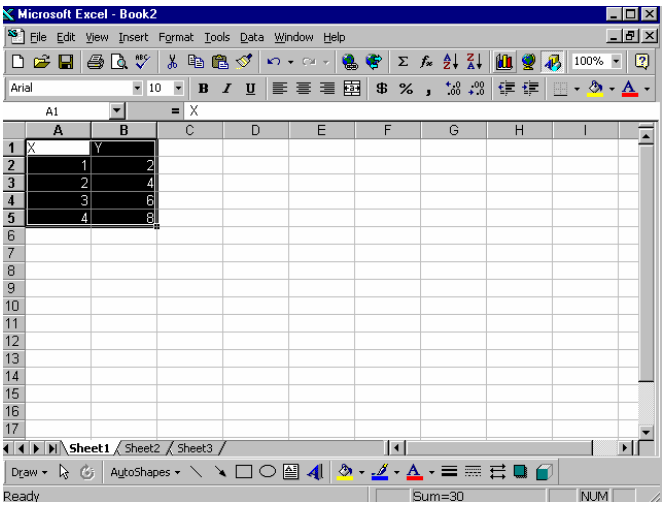
The purpose of this section is to provide a reference for plotting graphs and fitting data using Microsoft Excel 97. We will have the need several times in this course to get the best fit line, or a best to some other function. Having done this, we will want the functional form of the relationship between the data variables so that we can extract useful information from the data.

Expectations of all graphs: Data is always plotted using markers and we do not connect the points. Every graph should have a title. Each axis should be labeled with the units clearly marked inside parentheses. When fitting curves to data, the equation of the curve should be placed on the graph in a size that can be read and with the appropriate number of significant digits. Typically, the gridlines are turned off. To preserve printer toner, the plot background should be white. All papers should have the names of the group members before going to the printer. These things will be handled below.

Got to the MS Excel Icon . You might find it on the Start button. You might need to go to the MS Office to find MS Excel.

1. **Data Entry:** Set up columns for data in the spreadsheet, making sure that the first column contains the independent values to be plotted along horizontal axis. Include a title for each column, including the units.

2. **Selecting Data:** Click the left mouse button and drag the mouse over the data to be plotted. If you need to plot columns of data that are not adjacent, hold down the **Ctrl** key as you click and drag over the desired cells.



3. **Plotting:** Click the **ChartWizard** button in the tool bar:  . This will take you through a few steps to get a preliminary graph set up.

Chart Wizard Step 1: Now you must select the type of graph to use. In this course, you will always choose the "XY (Scatter)" type. Select the type of XY graph. Choosing the default subtype will plot only points. Click the **Next** button. Note that there is also a **Back** button; if you change your mind during any step, you can back up and choose another option.

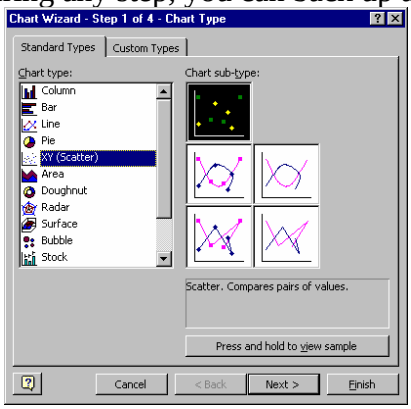
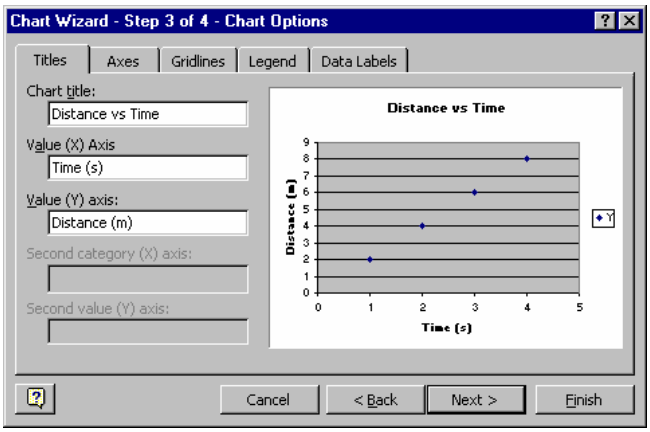


Chart Wizard Step 2: Step 2 gives a dialogue box for the Chart Source Data. Most of the time you will not need to do anything at this step. Sometimes one can manipulate the data by manually typing in the cell references. **Skip this step by clicking on Next.**

Chart Wizard Step 3: Here we can select various chart options. Note the top tabs. Clicking on these brings up a new set of things that can be changed.

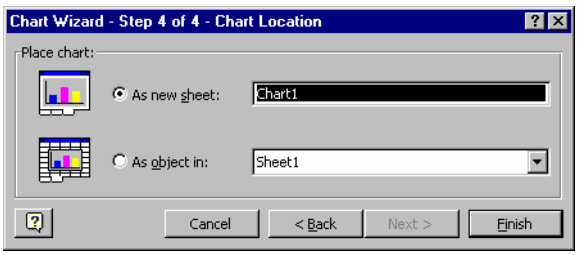


We will only need to go to the tabs: Labels, Gridlines and Legend.

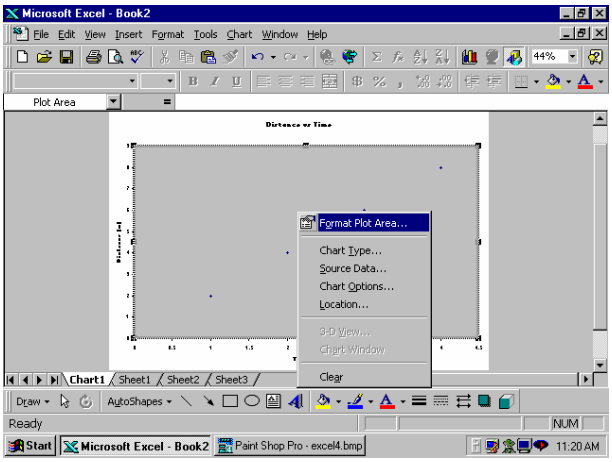
- **Labels:** In here you can enter the title and label the axes. This is where you can add the units to the variables on the axes. You can always change these later by clicking on the label on the graph and changing the text and its size.
- **Gridlines:** For this course, uncheck the gridlines box.
- **Legends:** This is useful for labeling multiple sets of data on one plot. We will have no need for legends, so always uncheck the Show Legend box.

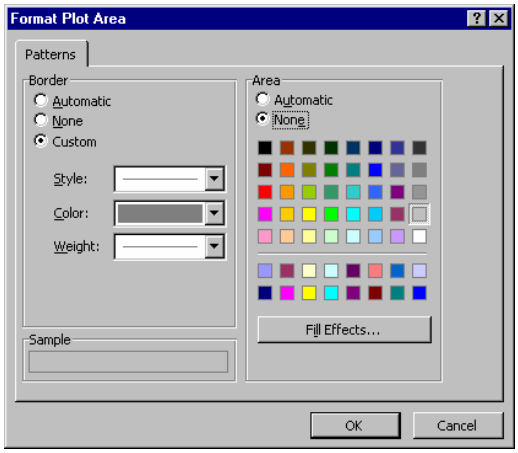
When done with this step, click **Next**.

Chart Wizard Step 4: Here you get a choice as to where to place the plot. You can put in with the data in a small box, or as a stand alone chart. Choose As new sheet, which is shown below. Click **Finish**.

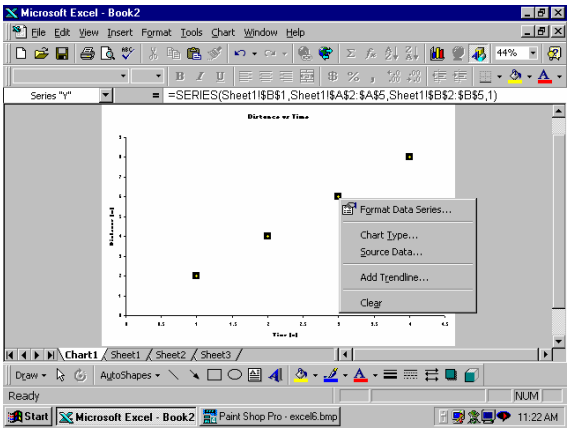


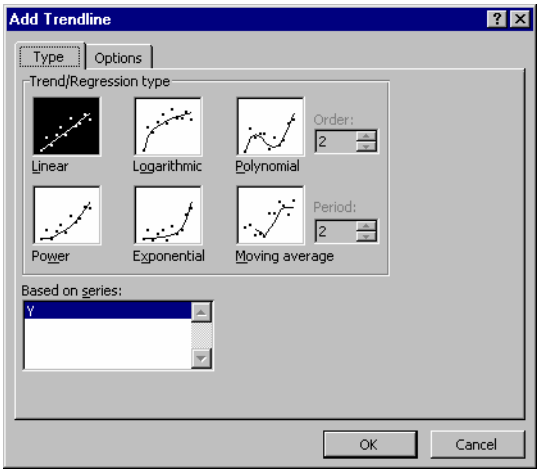
4. **Deleting Background Color:** You will now see your plot. The background is dark and we need to remove the color. Right click on the chart and select Format Plot Area. This brings up another box. At the top of the right column select under Area None. Click OK and your graph will now have a white background.

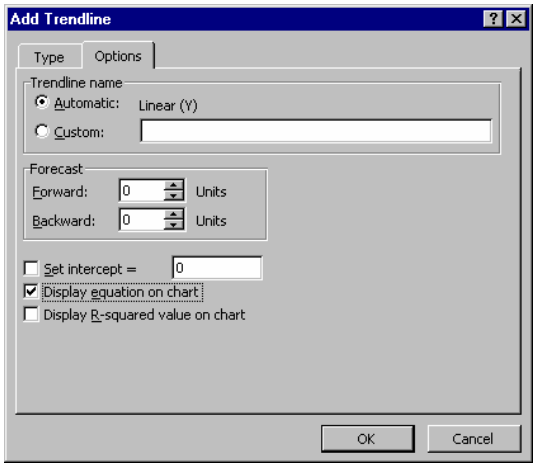




5. **Adding Trendline:** Right Click once on any one of your data points, then from the "Insert" menu, choose "Add Trendline...". Excel will determine which of the six trend lines can be used for your data. Typically, you will be using "Linear" for straight-line data (in the form of $y = mx + b$), and "Power" ($y = ax^b$), "Exponential" ($y = ae^{bx}$), or "Polynomial" (of 2nd order: $y = ax^2 + bx + c$) for curvilinear data. Select the appropriate type, and then click the Options tab. In the Options dialog, click the box next to "Display Equation on Chart", then click the **OK** button. [See the next page for the corresponding figures.]







6. **Formatting Trendline:** The resulting equation is often hard to read and in the wrong location. You can select it and change its font (text size) and you can drag it to a location anywhere on the chart. You can also **change the numerical format**. Select the equation. You will see the handles around the equation. Go to the menu item **Format**. Choose **Selected Data Labels.** Click on **Number**. Select the number of desired decimal places. You could also have scientific notation by using the **Scientific** selection.
7. **Printing:** To print your graph, make it the current selection. Click the "Print Preview" button to make sure you are printing the graph, and not your data. You can see how it will print out; if there's something you wish to change, click the Close button. Your name – and your lab partners' – should appear on the graph; to add the names, click the Setup... button, then the Header/Footer tab. Next click the Custom Header... button, and type your names in the "Center Section" box. Click OK until you return to the print preview. When you are ready, click the Print button.