

# Guidelines on Graphing

Dr. Faith A Morrison

Michigan Tech Chemical Engineering

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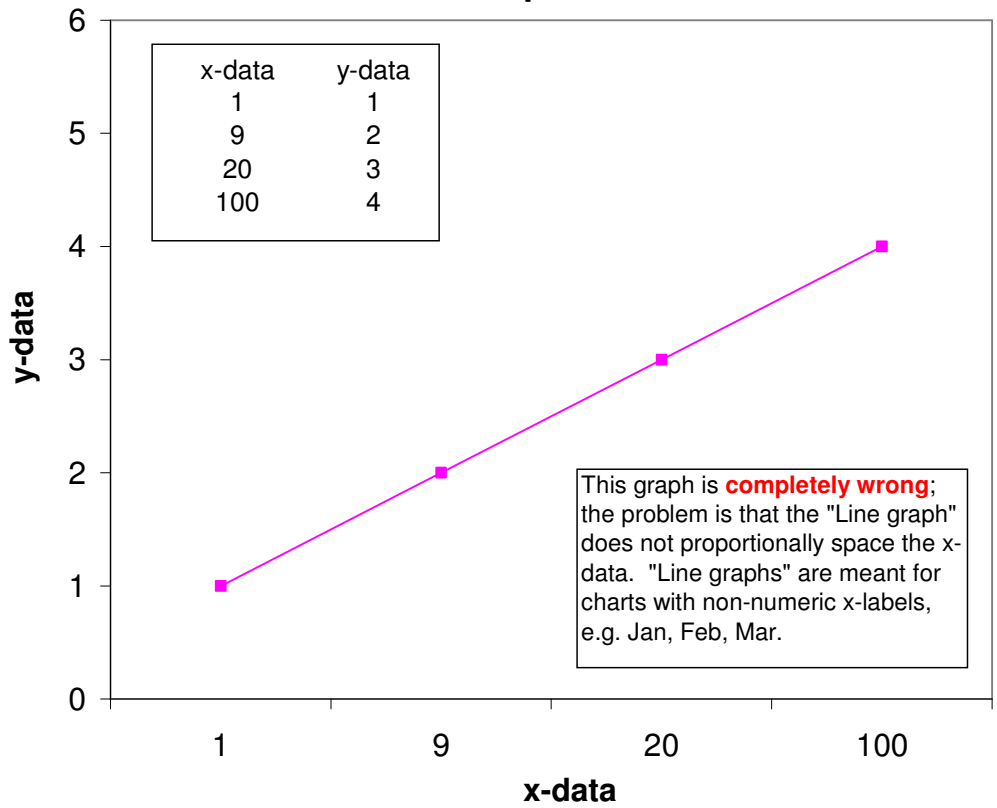
## *General Guidelines*

1. Plot the dependent variable (e.g.  $y$ ) on the vertical axis and the independent variable (e.g.  $x$ ) on the horizontal axis;  $y$  is a function of  $x$  (*i.e.*  $y$  depends on  $x$ ). You choose  $x$  independently.
2. Label your axes with the appropriate units.
3. Use a data legend to label the different lines or symbols on your graph. Alternatively, you may identify the lines and symbols in a figure caption.
4. Use standard whole numbers to label the scales of your graphs. Increments are preferably 1, 2, 5, or 10 or multiples of these.
5. Do not “connect the dots” of your data; use a valid trendline or model instead; see figures below that illustrate the problem. It is desirable to place the equation for the trendline on the graph or in the figure caption.
6. The numbers that label the scales of your graph should reflect the precision of your data; use prefixes like kPa, MPa, etc. to avoid numbers with many zeros. Use scientific notation if necessary, but do not use “2.0E02”; instead use  $2.0 \times 10^2$ .
7. Where appropriate, data points should have some indication of associated error.
8. Include either a title or a figure caption but not both. Use a figure caption for a report; use a title for all other purposes. Position captions at the bottom of figures and at the top of tables.
9. In the text the proper term for a graph is “figure” and a variable is “plotted”.
10. Do not use horizontal or vertical gridlines on graphs; they clutter the graph and make it hard to read. The only exception would be for a graph from which you expect to be able to read precise values.
11. Make sure the graph is large enough for your readers to see the data points and lines. When making the graph keep the final size of the graphic in mind.
12. Make sure to label your axes large enough so that they are easily readable.
13. Do not include a background color on your graphs; this does not photocopy well.
14. Do not rely on color in a printed report; colors do not photocopy easily. You may use color for presentations. You may use color that when photocopied still allows the reader to understand the graphs.
15. Do not use light colors such as yellow.

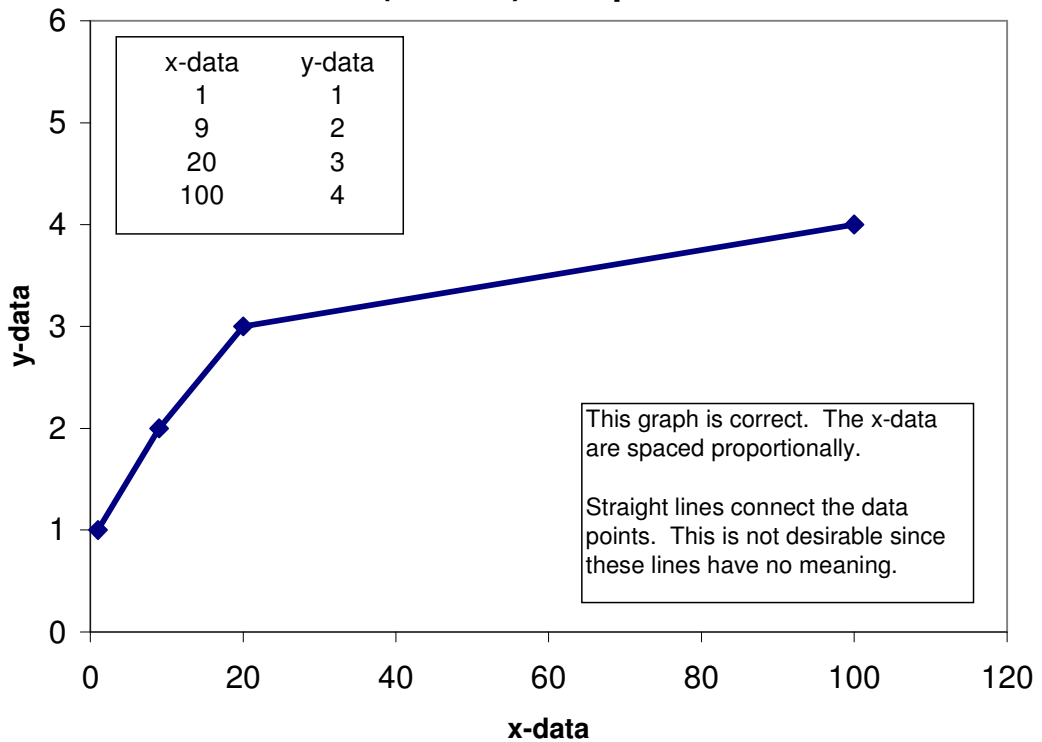
### **Tips for making graphs in Excel**

1. Always use an XY Scatter Plot for scientific data. This is a correct scientific graph.
2. There is no scientific use for a Line Graph; see the attached graphs that illustrate this problem.
3. For filled symbols, you can make them stand out more in your reports and presentations if you set the “foreground” color to black and only use the “background” color to fill-in the symbols.
4. To create a complex label such as  $\frac{4Q}{\pi R^3}, s^{-1}$  for a graph, follow these steps:
  - a. Create the label in Word.
  - b. Create a text box and copy the label into the text box. Remove any line boundary from the text box.
  - c. Select the text box and copy it.
  - d. Paste the textbox back into Word using the Paste Special command and choosing Picture (Enhanced Metafile).
  - e. Copy the graphic from Word and paste it into your figure in Excel.

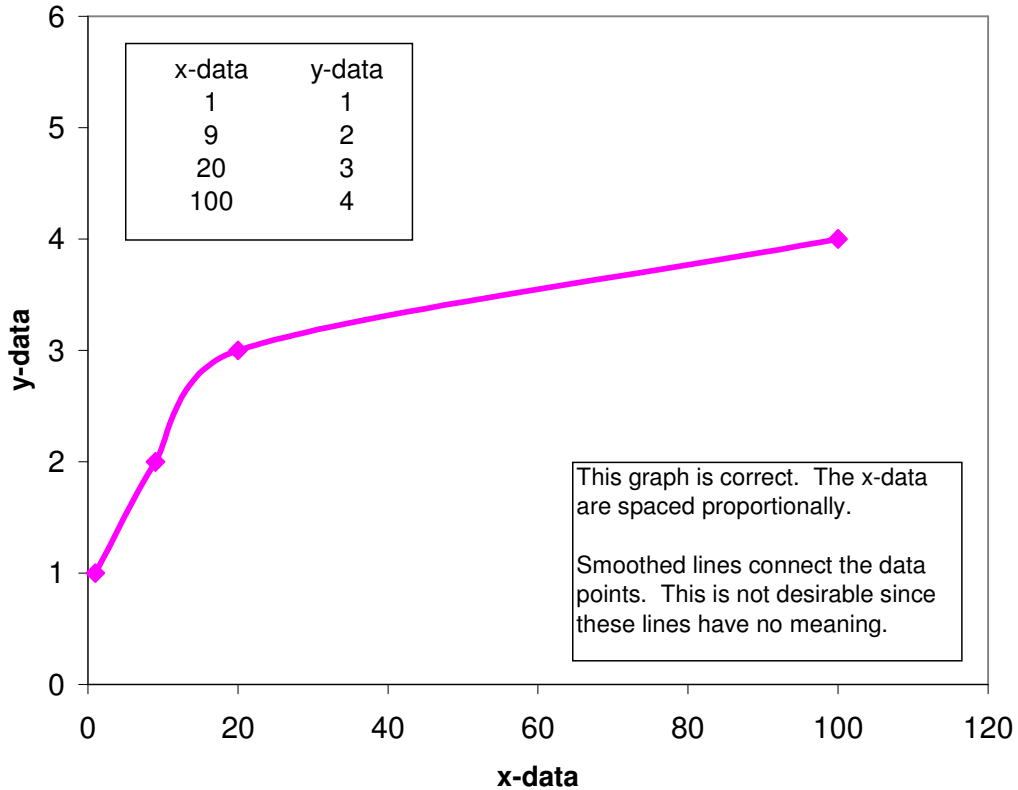
### Excel "Line Graph" for Data Given



### Excel "XY (Scatter)" Graph for Data Given



### Excel "XY (Scatter)" Graph for Data Given



### Excel "XY (Scatter)" Graph for Data Given

