

GRAPHING

A graph is an effective way to show a trend in data or relating two variables in an experiment.

Consider the following data for exercises #1 and 2 given below.

Temperature, °C	g of salt Y/100g H ₂ O
50	72.4
60	76.5
70	87.0
80	100.0
90	117.2
100	149.0

Exercise 1

Plot a graph on a graph paper

1. Determine which quantity depends on the other. In the data given above, the solubility was measured at specific temperature. Hence, the solubility depends on the temperature at which it is measured. The dependent variable, in this case, the solubility, goes on the y-axis (vertical) and the independent variable, the temperature, goes on the x-axis (horizontal).
2. The chart must be large to be read easily. Select a scale that allows the data to fill out most of the area of the graph. The scale does not need to start at zero and should be divided into equal increments until the highest value.
3. Label the axis and provide units.
4. Add a title. The title should include the dependent and the independent variables.
5. The data points can be each plotted by placing a dot at the intersection of a vertical line (solubility) with a horizontal line (temperature).
6. Use a pencil to draw a smooth faint curve connecting the dots. Do not extend the curve past the first and last data points. Once the curve looks acceptable, you can darken it with your pencil.
7. **Pick up a graph paper from your instructor and plot a graph for the data given above. Show your graph to your instructor and get his/her approval. Staple your graph to this packet and hand it in at the beginning of next lab period.**

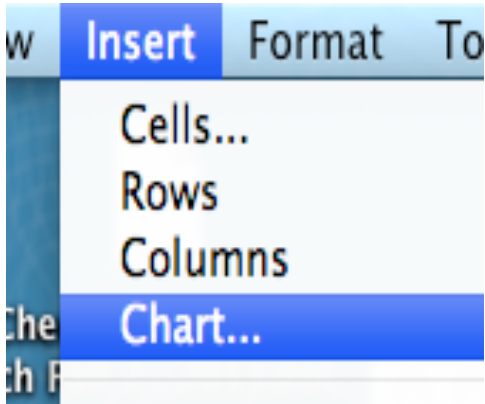
Instructor's approval: _____

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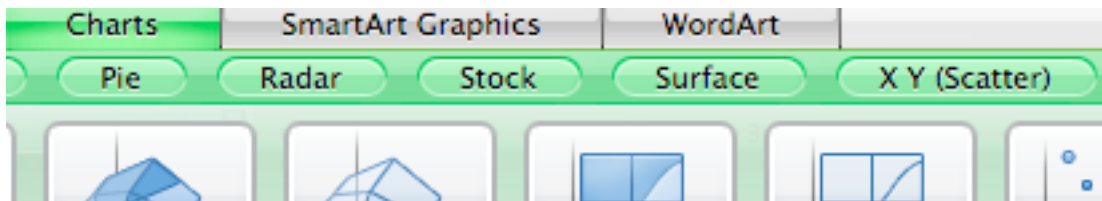
Exercise 2 Computer Graphing Using Excel 2008 for Mac

You can plot data using any graphing program. Below you will find instructions on using Excel 2008 for Mac to plot a graph for the data given on page 1

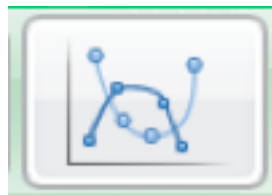
1. Open up Excel
2. In column A, enter the data for x-axis - Temperature data
3. In column B, enter in the data for the y-axis - Solubility data.
4. Highlight the data by dragging the cursor over the data range
5. Click **Insert** and choose **Chart**.



6. Scroll the **Charts** menu bar to choose **XY (scatter)**.



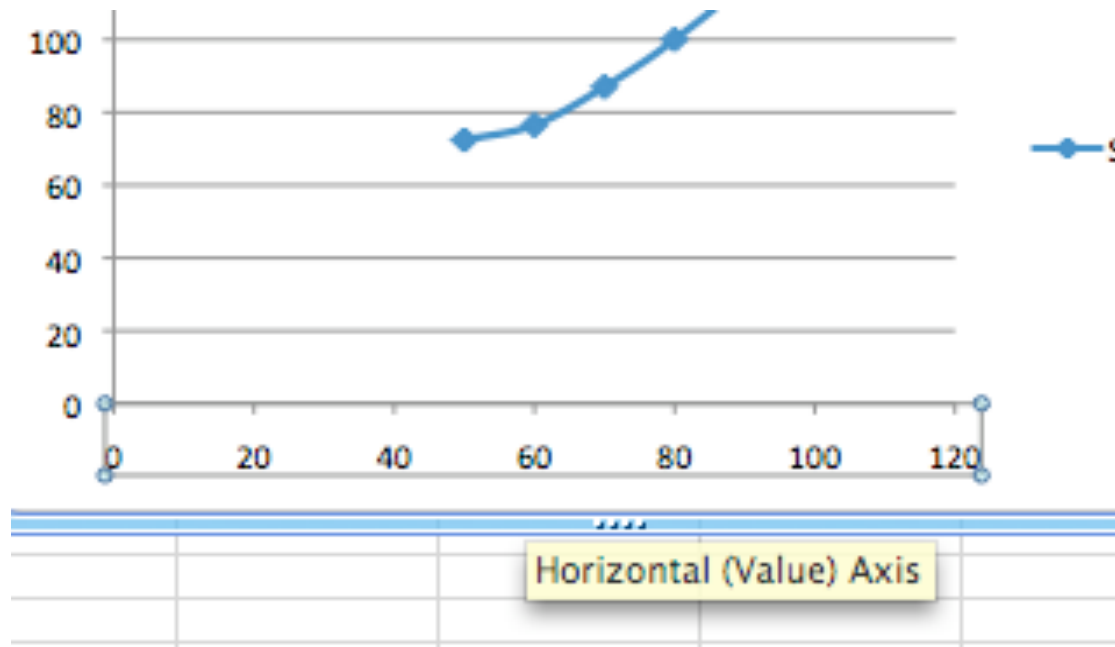
7. Click the "scatter with smooth line and markers" icon which looks as follows:



8. Now you should see your data plotted as a graph.

Formatting the Scale for the X-axis

1. Place the cursor on any temperature data point present under the x-axis to display "Horizontal Value Axis". Now double-click any temperature data point to open the Format Axis box. Choose **Scale**.



Another method:

(Instead of double-clicking a Temperature data point on the x-axis to open the **Format Axis** box, you can click on **Format** in the Excel menu bar and choose **Axis**. In the box, choose **Scale**.)

2. For the Horizontal (Value) axis Scale, uncheck all auto boxes.

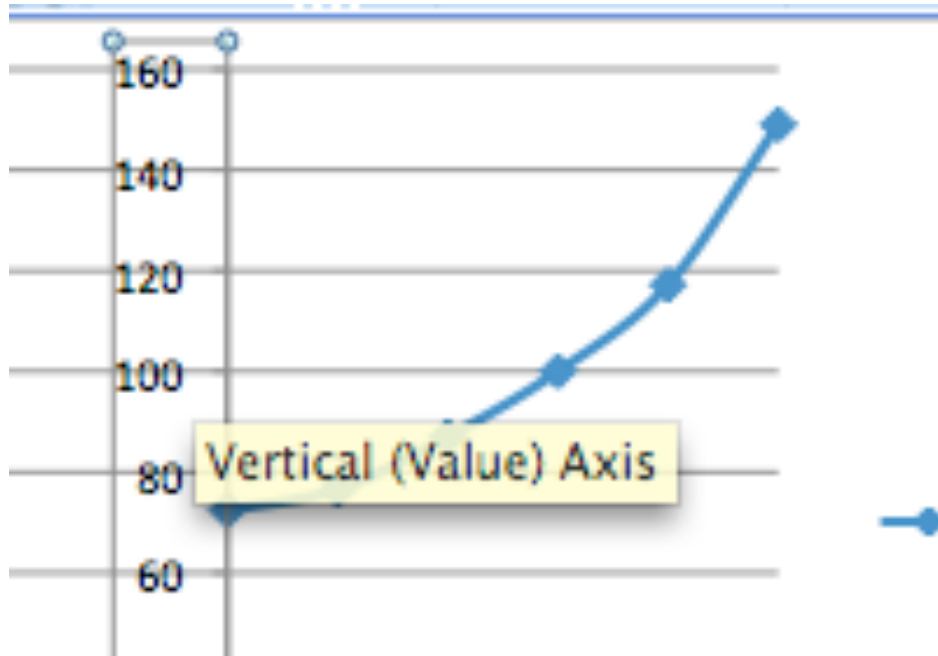
Type 50,100,10,2 ,and 50 for Minimum, Maximum, Major unit, Minor unit, and Vertical (category) axis crosses at , respectively. Note: You have typed 50 and 100 because these are the lowest and highest data points for Temperature.

<input type="checkbox"/> Minimum:	<input type="text" value="50"/>
<input type="checkbox"/> Maximum:	<input type="text" value="100.0"/>
<input type="checkbox"/> Major unit:	<input type="text" value="10.0"/>
<input type="checkbox"/> Minor unit:	<input type="text" value="2.0"/>
<input type="checkbox"/> Vertical (Category) axis crosses at:	<input type="text" value="50.0"/>

3. Click "OK".

Formatting the Scale for the Y-axis

1. Place the cursor on any Solubility data point present on the left of the y-axis. It should say, "Vertical Value Axis". Now double-click a Solubility data point to open the **Format Axis** box. Choose **Scale**.

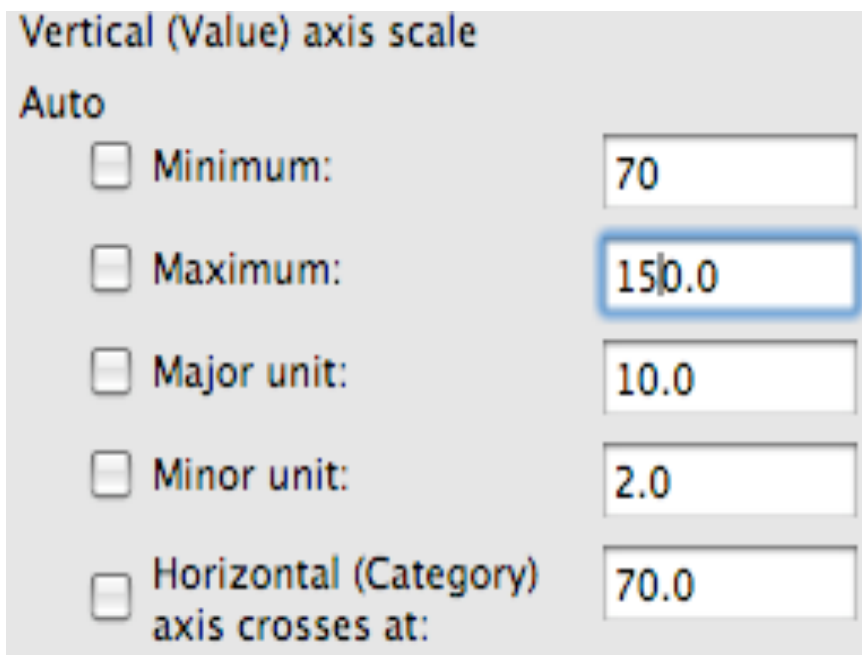


Another Method:

(Instead of double-clicking a Solubility data point on the y-axis to open the **Format Axis** box, you can click on **Format** in the Excel menu bar and choose **Axis**. In the box, choose **Scale**.)

2. For the Vertical (Value) axis scale, uncheck all auto boxes.

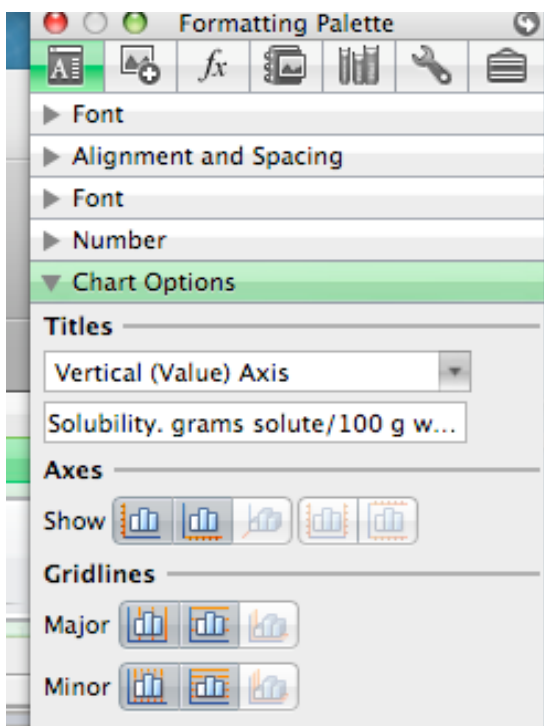
Type 70,150,10,2 ,and 70 for Minimum, Maximum, Major unit, Minor unit, and Horizontal(category) axis crosses at, respectively. Note: You have typed 70 and 150 because these are the closest to the lowest and highest data points for Solubility.



3. Click "OK".

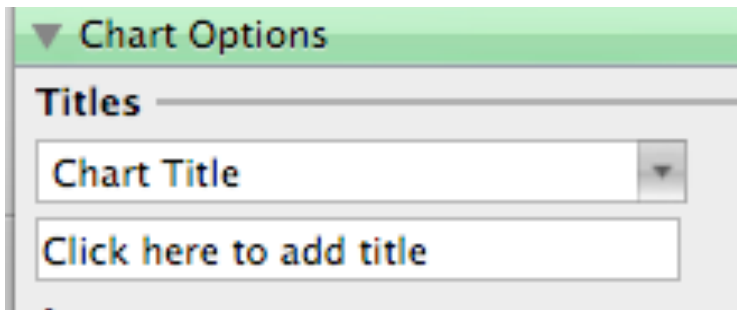
Label the Axes, Add Title to the Graph and Display the Gridlines

1. Click on **View** on the Excel menu bar and choose **Formatting Palette**
A **Formatting Palette** box will open.

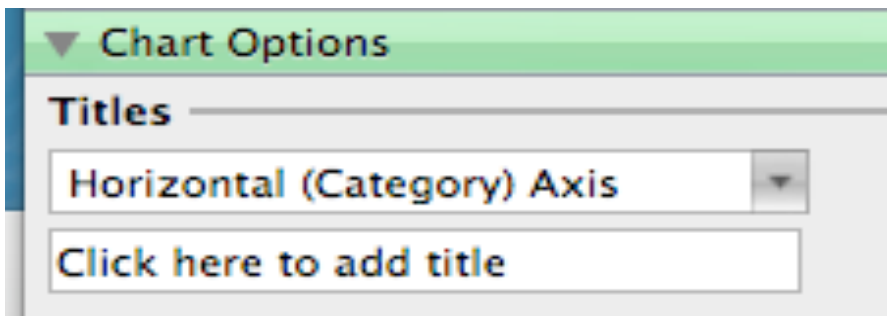


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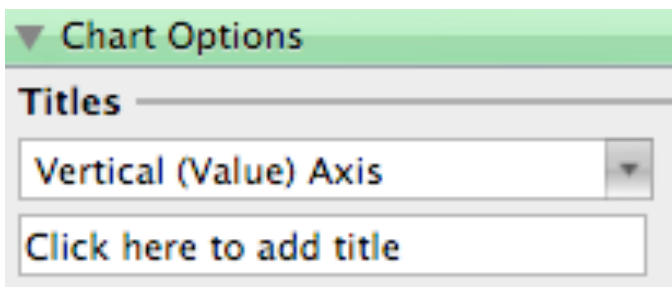
2. Pull down the **Titles** menu bar to display **Chart Title**
Type: Solubility versus Temperature



3. Pull down the **Titles** menu bar again to display **Horizontal (Category) Axis**
Type : Temperature, C



4. Pull down the **Titles** menu bar again to display **Vertical (Value) Axis**
Type : Solubility, grams of solute/100 grams water

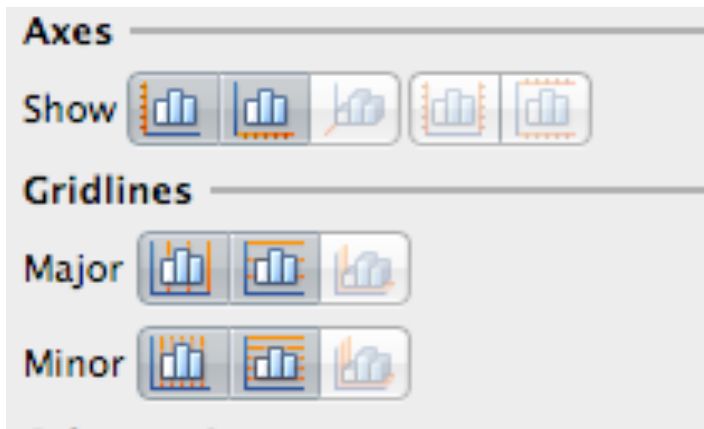


5. Under **Axes**, click to highlight the two icons on the left for the Primary Vertical Axis and the Primary Horizontal Axis.

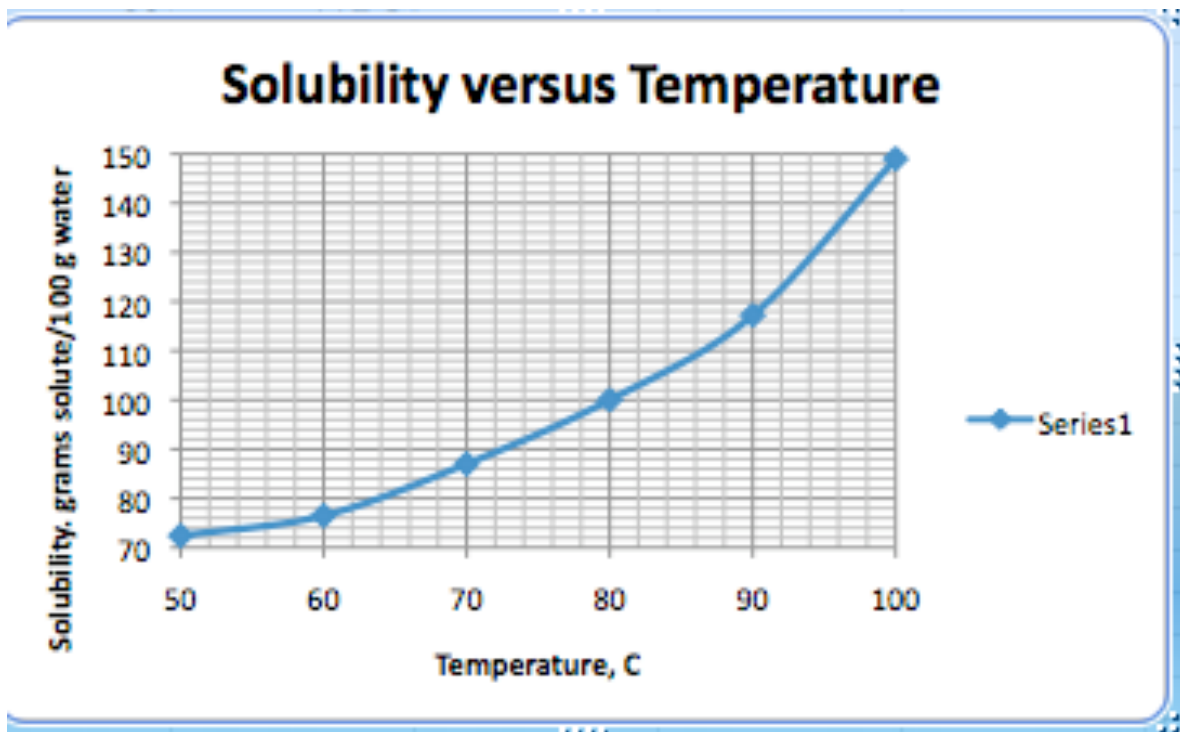
Under **Gridlines**, next to **Major**, click to highlight the two icons on the left. These are for the Vertical Gridlines for Major units and Horizontal Gridlines for Major units.

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Next to **Minor**, click to highlight the two icons on the left. These are for the Vertical Gridlines for Minor units and Horizontal Gridlines for Minor units.



6. Your final graph will look as follows:



Show your graph to your instructor for approval.

Instructor's approval _____

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Exercise 3

Plot a graph for the data given below using Excel or any other computer- graphing program.

Temperature, °C	Solubility of a salt (g salt/100 g water)
20	30.2
40	73.9
60	120
80	179
100	256

- *You will hand in to your instructor three graphs for exercises # 1, 2, and 3.*
- *Staple all three graphs, and write your name before submitting your work.*