Appendix 4

Simple graphs using EXCEL

1)   Start EXCEL

2)   Enter data:

              x data in first column   (this is the controlled data such as mL or wavelength)

              y data in second column   (this is the observed reading such as pH or absorbance)

   if you had more than one set of observed data and want to plot all graphs on one page, then:

              second y data in third column,

              third y data in fourth column,

              etcetera.

3)   Using your mouse (trackpad) select (highlight) all data to be graphed.

4)   Click on Insert Chart.   **Only use "Scatter" graph**.
Choose Scatter graph with Markers.   For a linear graph choose "Straight Lines and Markers".   For a curved graph choose "Smooth Lines and Markers".
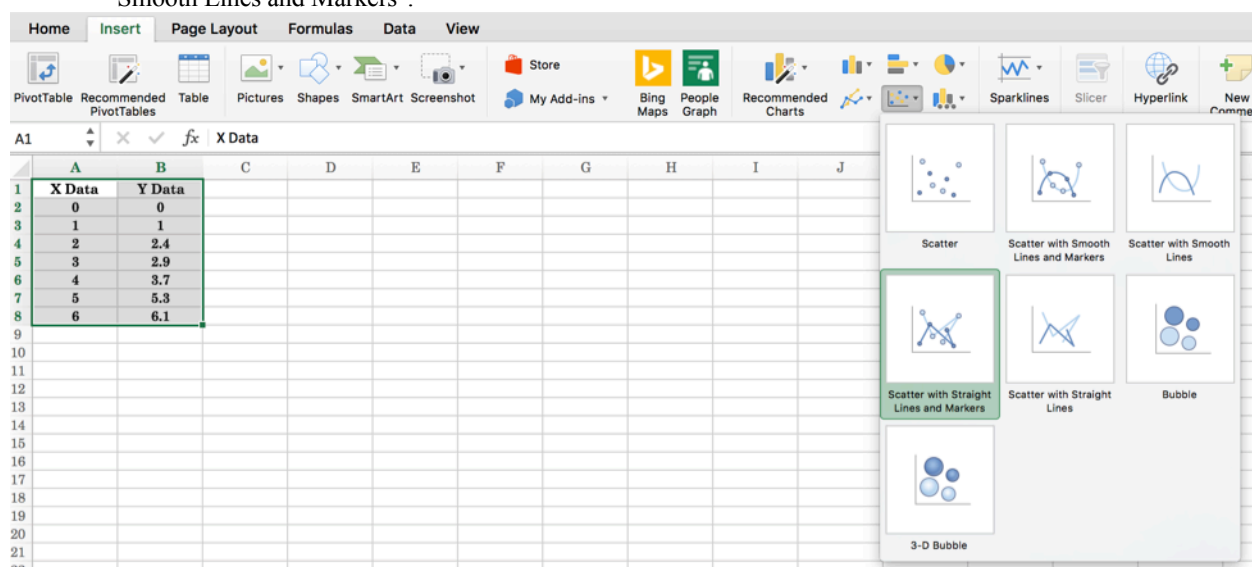
5) It displays a small copy of the graph. Either Right Click on the graph or from the top menu bar choose Chart   Move Chart.
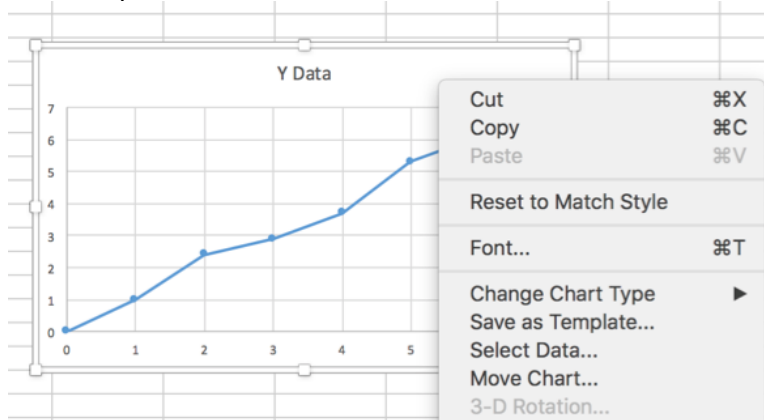
Then choose "New Sheet" and if you want you can name the tab that will appear at the bottom of the excel page. Your data has a tab called "Sheet 1" and your graph defaults to "Chart 1" unless you choose a different name for it.
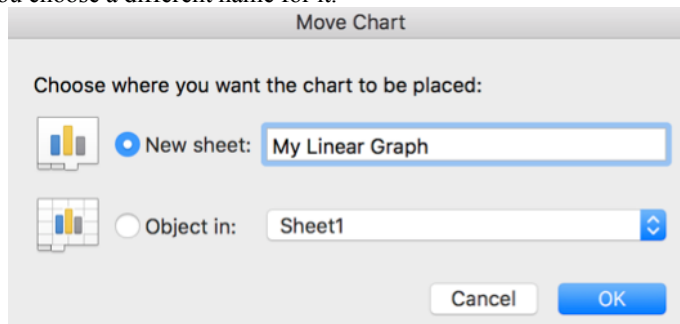

6) To add features to your graph you can usually double click or right click on whatever you want to change, such as an axis, or from the top menu bar find what you want in the Chart menu.
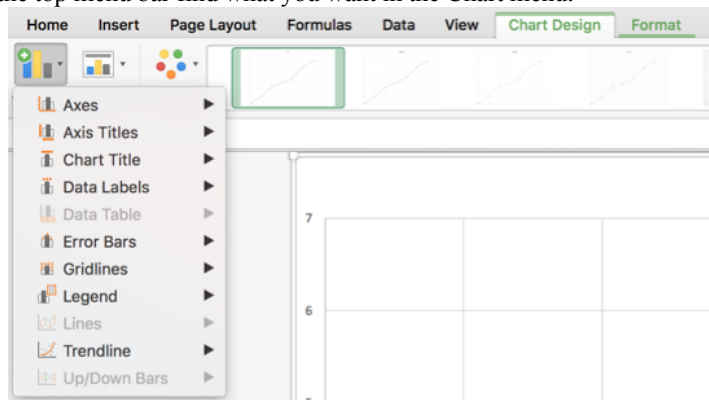
Features you should include are:

(a)   A **Title** for your graph telling the reader what he/she is looking at.

(b)   **Axis Titles on both x and y axes including units**.
(Do NOT put labels on data points. If you do, it labels every point and the graph becomes unreadable.)

(c)   Include **both** horizontal and vertical **gridlines**.

(d)   A blank, or clean, not distracting, background.

(e)   If only one data set is shown do NOT add a legend;   the title says what it is.   If more than one data set is shown on the same graph then a **legend** is required so the reader knows what each line represents.   The default "Series 1, Series 2, etc." is useless.

(f)   **On linear graphs a "Trendline"** accompanied by an equation of the line is usually required.   If desired, an R^2 line shows how closely the line represents the data, with $R^2 = 1.000$ being perfect. Never use a Trendline on a non-linear graph.

(g)   If the computer's automatic settings do not make best use of the graph, **adjust the axes** so the data take up almost the full graph. (See the second example for this.)
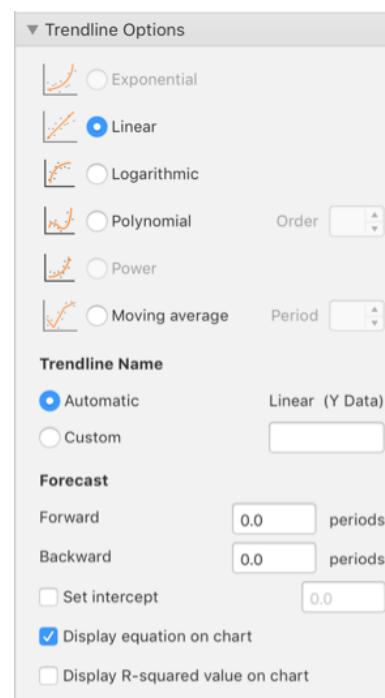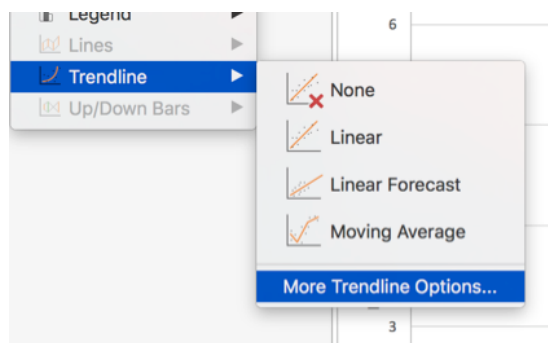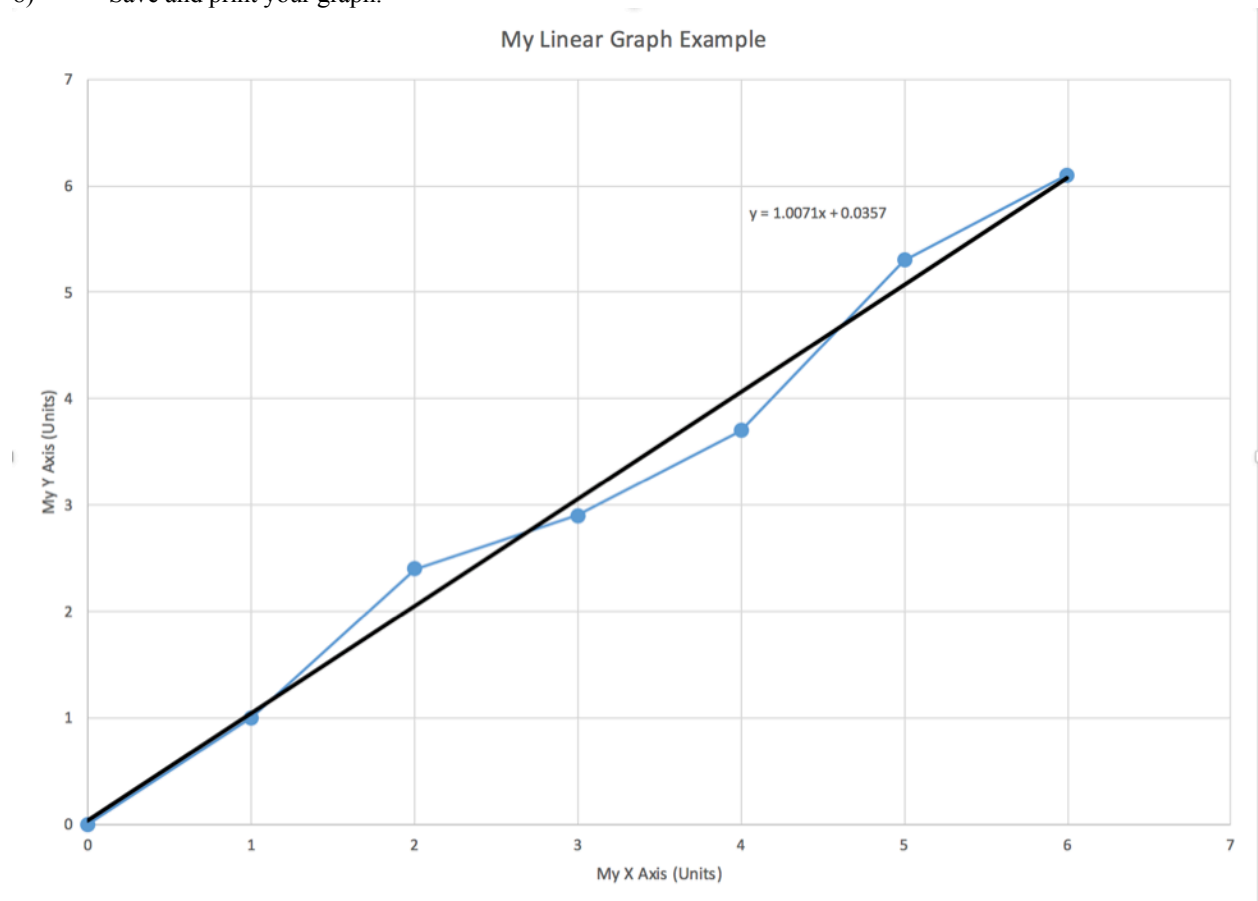
7)   Before printing make sure it will print in "Landscape" mode so it uses a whole page for the graph.
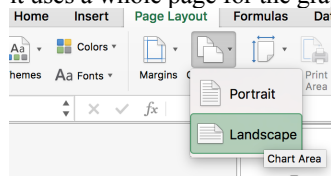
or
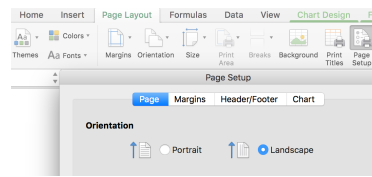
8)   Save and print your graph.

My Linear Graph Example

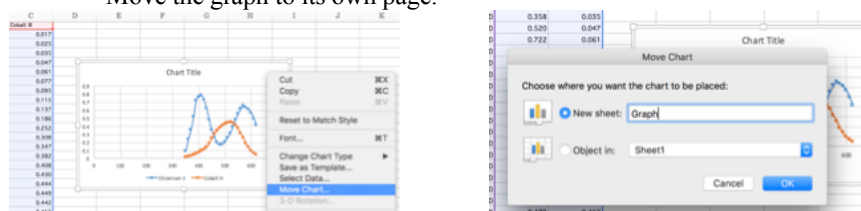$y = 1.0071x + 0.0357$

My Y Axis (Units)

My X Axis (Units)

To plot a curved graph and/or a graph with multiple graphs on one page, follow the same instructions as above — see above instructions.
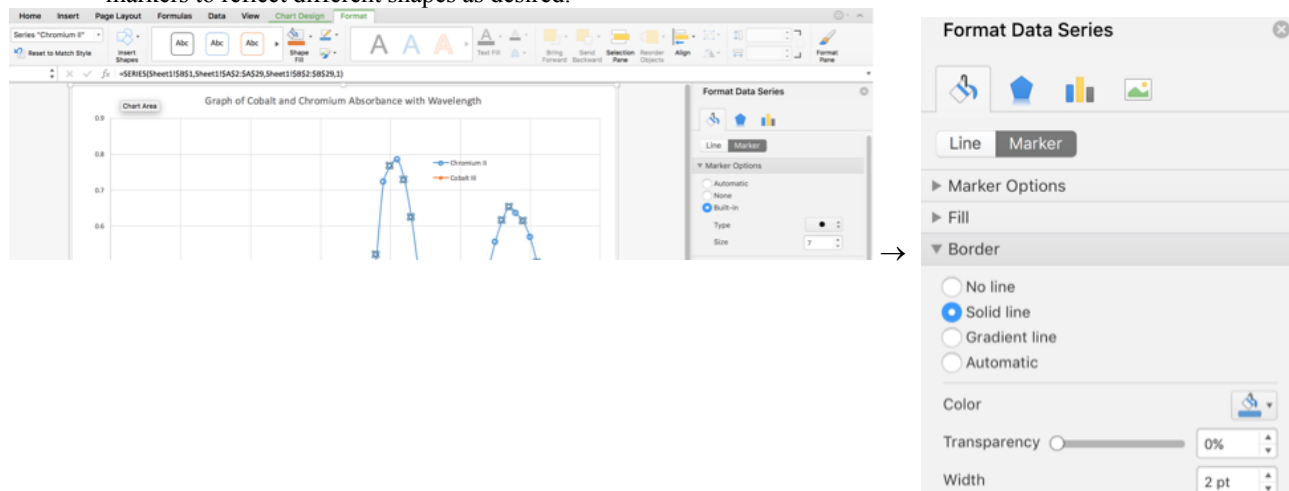
1), 2), 3) Enter data, select entered data and select Scatter Graph
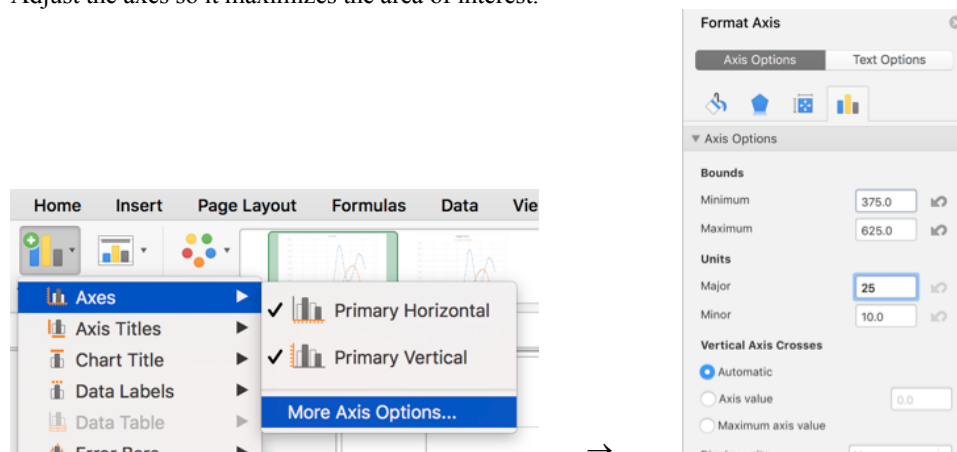with smooth lines and Markers.
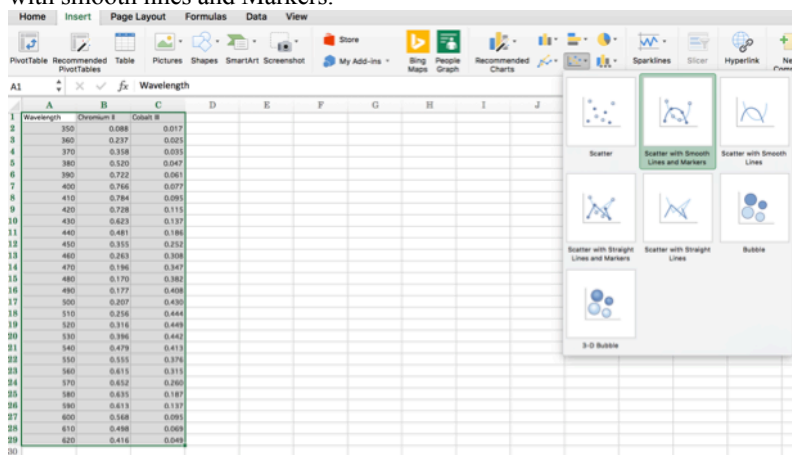
4), 5)   Move the graph to its own page.

6)   Give it titles, axis labels, gridlines, a legend, and change data
markers to reflect different shapes as desired.

Adjust the axes so it maximizes the area of interest.

Format Axis

Axis Options | Text Options

▼ Axis Options

Bounds
Minimum | 375.0
Maximum | 625.0

Units
Major | 25
Minor | 10.0

Vertical Axis Crosses
- Automatic
- Axis value | 0.0
- Maximum axis value

| Home | Insert | Page Layout | Formulas | Data | Vie |

- **Axes** ▶ ✓ Primary Horizontal
- Axis Titles ▶ ✓ Primary Vertical
- Chart Title ▶
- Data Labels ▶ More Axis Options...
- Data Table ▶
- Error Bars ▶

→

7), 8)   Make sure it is in "Landscape" mode, save, and print.

Graph of Cobalt and Chromium Absorbance with Wavelength

Legend: Chromium II, Cobalt III

Y-axis: Absorbance (0 to 0.9)
X-axis: Wavelength in nanometers (375 to 625)