Creating a chart with Microsoft Excel 2013 (Biology)

After you complete all the instructions in this handout you should be able to:
1. Create a graph using the new Excel 2013 version.
2. Understand the terms used in creating a chart.
3. Make changes and customize a graph.
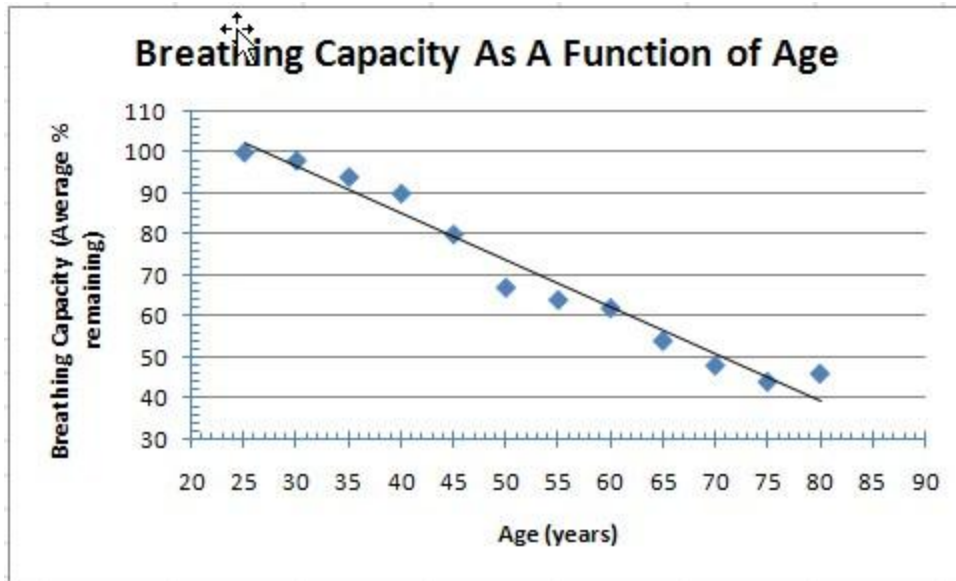4. Construct a graph that looks like Figure 1.1 below.

Figure 1.1 Sample Computer graph using Excel 2013

1. To begin, double-click Microsoft Excel icon on the desktop. Excel will automatically open a clean Excel sheet similar to figure 1.2 below.
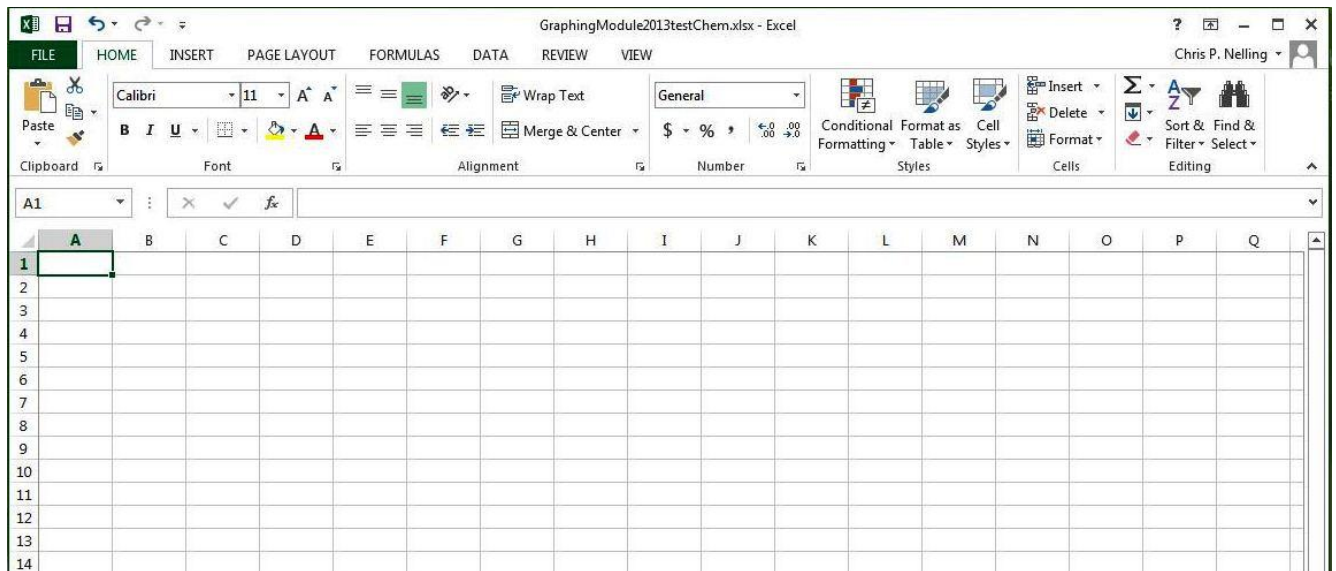

Figure 1.2   An Excel worksheet

The data table below contains the data that you will be using in this exercise. **Volume** will be the independent variable (X axis) and **Pressure** will be the dependent variable (Y axis).

Age (years)	Breathing Capacity (average % remaining)
25	100
30	98
35	94
40	90
45	80
50	67
55	64
60	62
65	54
70	48
75	44*
80	46

Table 1.1

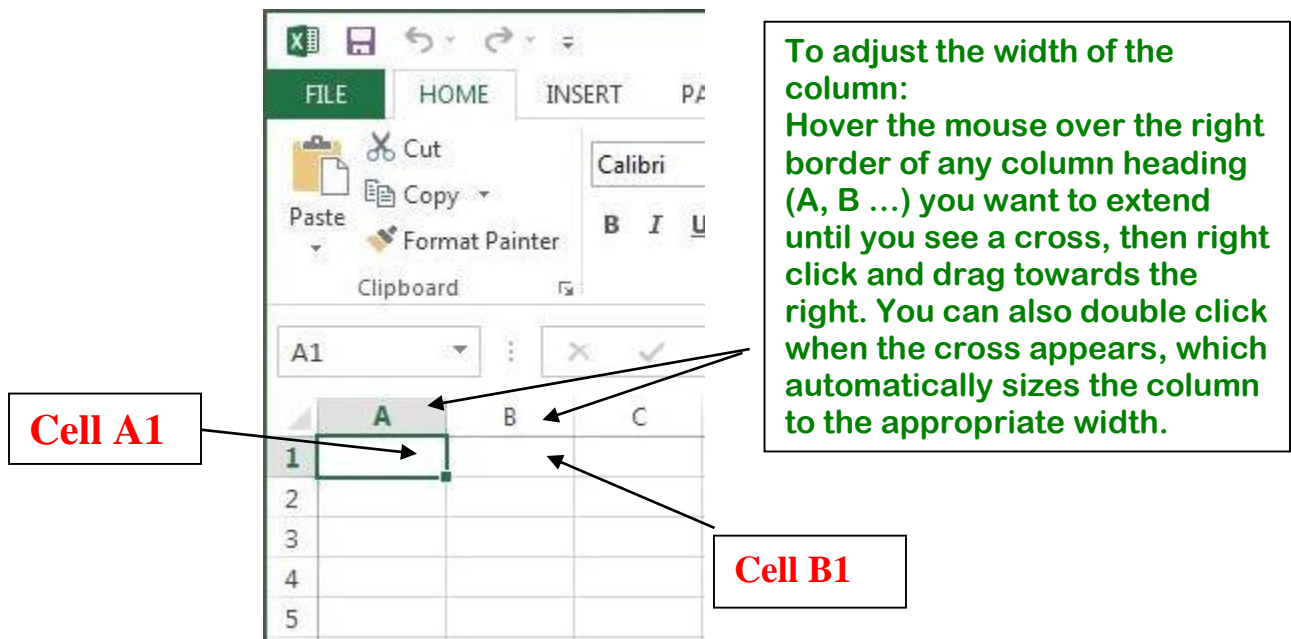*Note that the smallest number is not always the last number on the table.

To adjust the width of the column:
Hover the mouse over the right border of any column heading (A, B …) you want to extend until you see a cross, then right click and drag towards the right. You can also double click when the cross appears, which automatically sizes the column to the appropriate width.

Cell A1

Cell B1

Figure 1.3

2. In cell A1 of new Excel sheet, type **Age (years)** and in cell B1, type **Breathing Capacity (average% remaining).**
    Adjust the width of the column if needed. To do this: see boxed instructions above.
    Enter the data from table 1.1 in the appropriate cells.
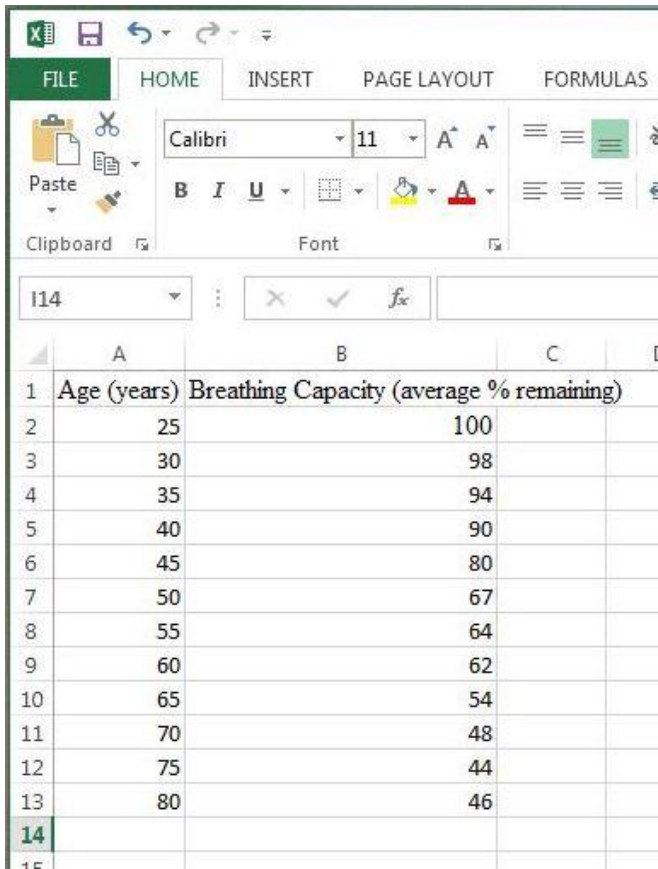
Figure 1.4

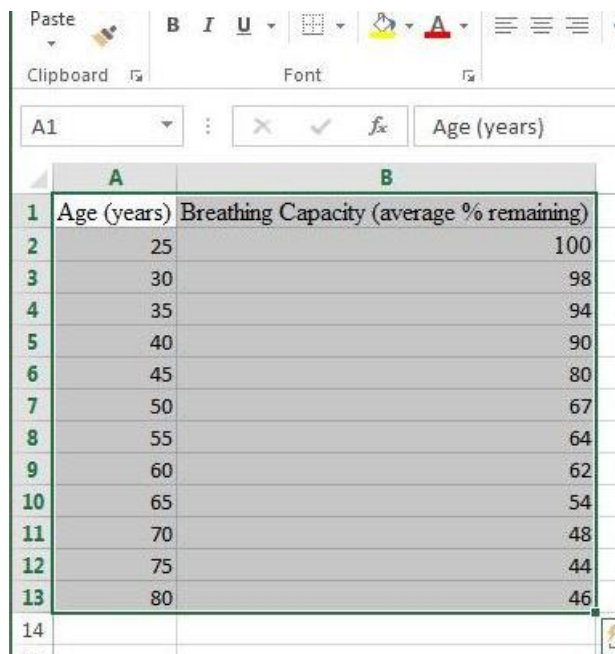3. Use your mouse to highlight the cells that contain data as shown in Fig 1.5

Figure 1.5

4. Convert the data table into a chart by clicking on the **Insert** tab (figure 1.6)
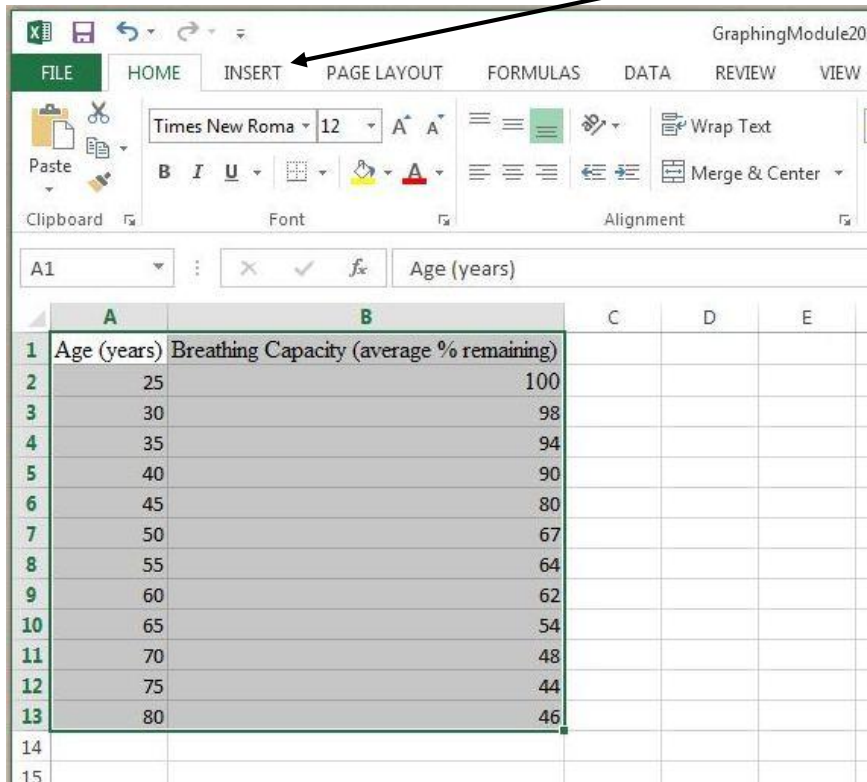

Figure 1.6

The **insert tab** contains the **charts** group with a variety of charts you can choose from.

For this graphing lab, you will click on **scatter**, then choose **scatter (markers only, no lines)**. (Figure1.7).

A **screen tip** displays the chart type name when you wave the pointer over any chart type.
The **screen tip** also provides information of the chart type and when to use each one.

Figure 1.7

Note: If you want to change the chart type after you create your chart, click inside the chart. On the Design tab under Chart Tools, in the Type group, click Change Chart Type, and select another chart type.

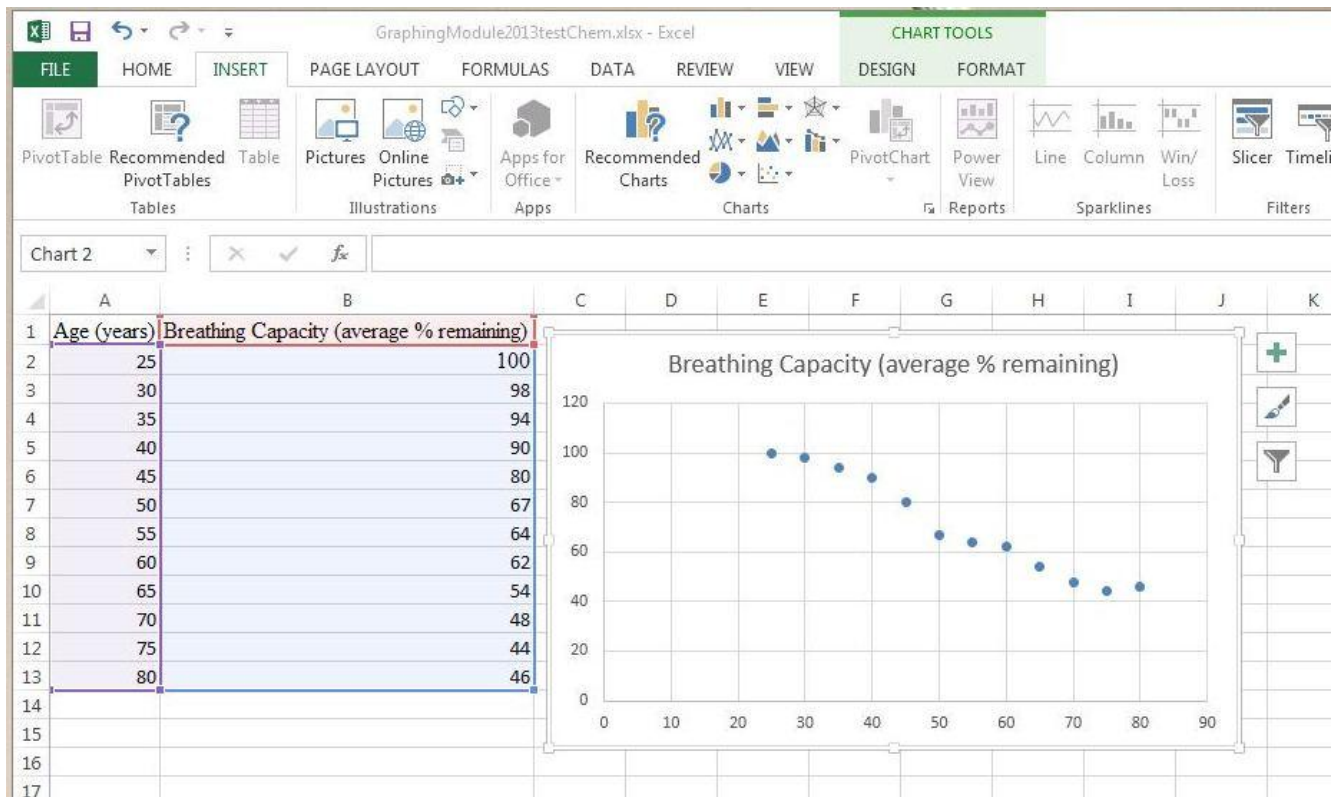4. The graph on the Excel sheet should appear similar to Figure 1.8
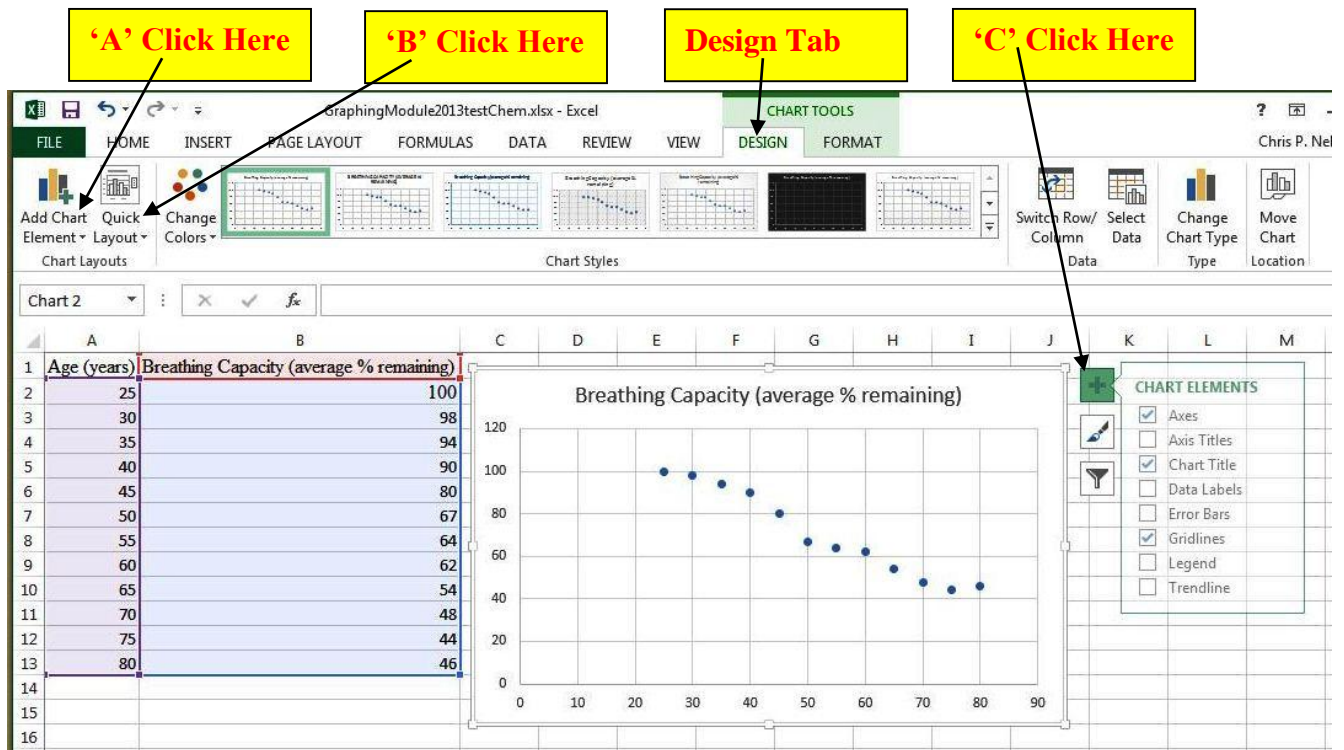

Figure 1.8

Adding a Title:
5. Now it's time to add descriptive titles to your graph so that anybody who views it will know what the graph is all about.
There are two ways to insert your title:
   A. One way is to click the **Design tab**, then go to **Add Chart Element**. Click the **more button** (mini arrow on the right) to see all the elements that you can add. Each option provides features that change the way graph components (X axis & Y axis) are laid out and what information they supply. In this case you would select first **Chart Title**, followed by **Axis Titles** (twice, once for **Primary Horizontal**, the second for **Primary Vertical**).
   B. Another way is to click the **Design tab**, then go to **Quick Layouts**. Click the **more button** (mini arrow on the right) to see all the layouts. Each option shows different layouts that change the way graph components (X axis & Y axis) are laid out.

   Example: Layout # 1 adds placeholders for a chart and axes titles. It also adds a legend, which can be deleted in this case, since we have only one line. You will then type the titles directly on the chart.

C. The other choice is to use the **Add Chart Element** icon (the large + beside the chart), which offers many of the same options as the **Add Chart Element** button from part 'A' of this section.
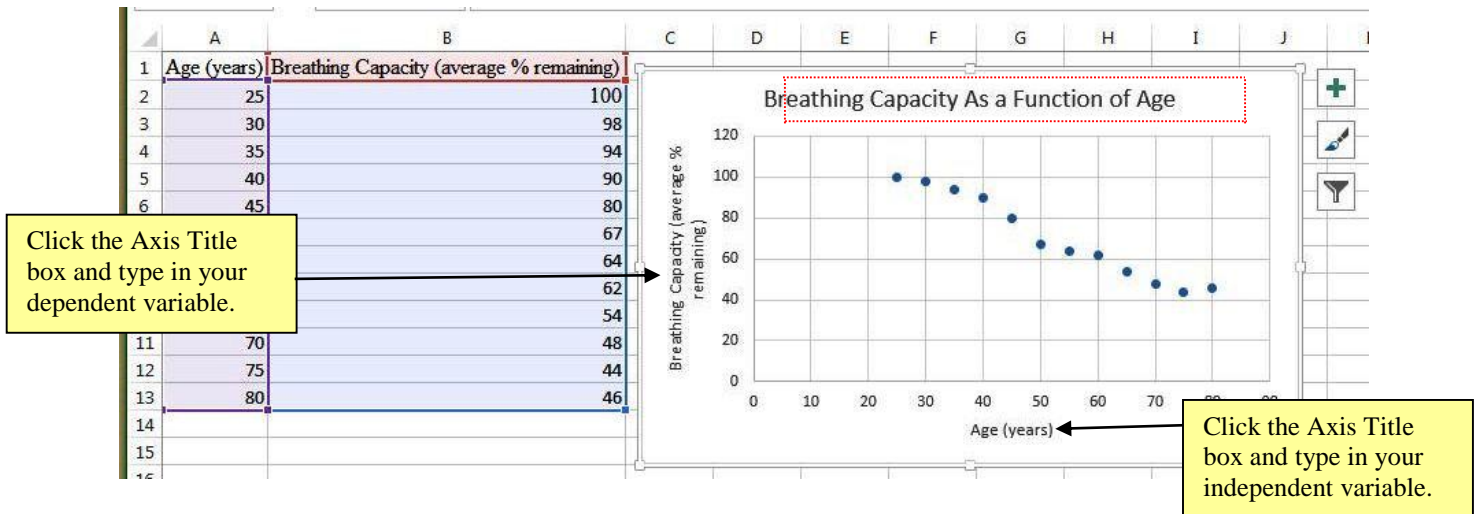

Figure 1.9

6. Adding titles for the chart and axes:

A. In the **Chart title box**, type in the title for the graph: **Breathing Capacity As a Function of Age.**

B. In the **Horizontal axis title box**, type in the title for the graph: **Age (years).**

C. In the **Vertical axis title box**, type in the title for the graph: **Breathing Capacity (Average % remaining).**

When finished, your chart should look similar to Figure 1.10.

	A	B	C	D	E	F	G	H	I	J	
1	Age (years)	Breathing Capacity (average % remaining)									
2	25	100									
3	30	98									
4	35	94									
5	40	90									
6	45	80									
		67									
		64									
		62									
		54									
11	70	48									
12	75	44									
13	80	46									
14											
15											

Click the Axis Title box and type in your dependent variable.

Chart: Breathing Capacity As a Function of Age — Y axis: Breathing Capacity (average % remaining), X axis: Age (years)

Click the Axis Title box and type in your independent variable.

Figure 1.10

7. Click on the other different buttons or checkboxes (**Axes, Gridlines, legend and data labels**) to customize the graph. Below are some of the more commonly used categories:

Chart Title and Axis Title: These categories will allow you to type in your title and label your dependent and independent variables.
Axes: This option allows you to add, change or remove values on the x or y axes.
Gridlines: This image will allow you to adjust the gridlines on the graph.
Legend: Opening this category will allow to deselect or keep the legend. It will also allow you to adjust the position of the legend on the page.
Data Labels: Clicking this tab will allow certain properties of each data point to show up on the graph. Nothing needs to be done here.

8. **To Format Axis**, under the **Add Chart Element** option (using either the button on the design ribbon or the + beside the chart), hover over the **axes** option (under the button) or click the arrow to the right (under the +) and choose **more axis options**. The 'Format Axis' menu appears to the right (figure 1.11). Left click on the **number scale** beside the desired axis (X or Y) to choose which axis you want to format (figure 1.12).
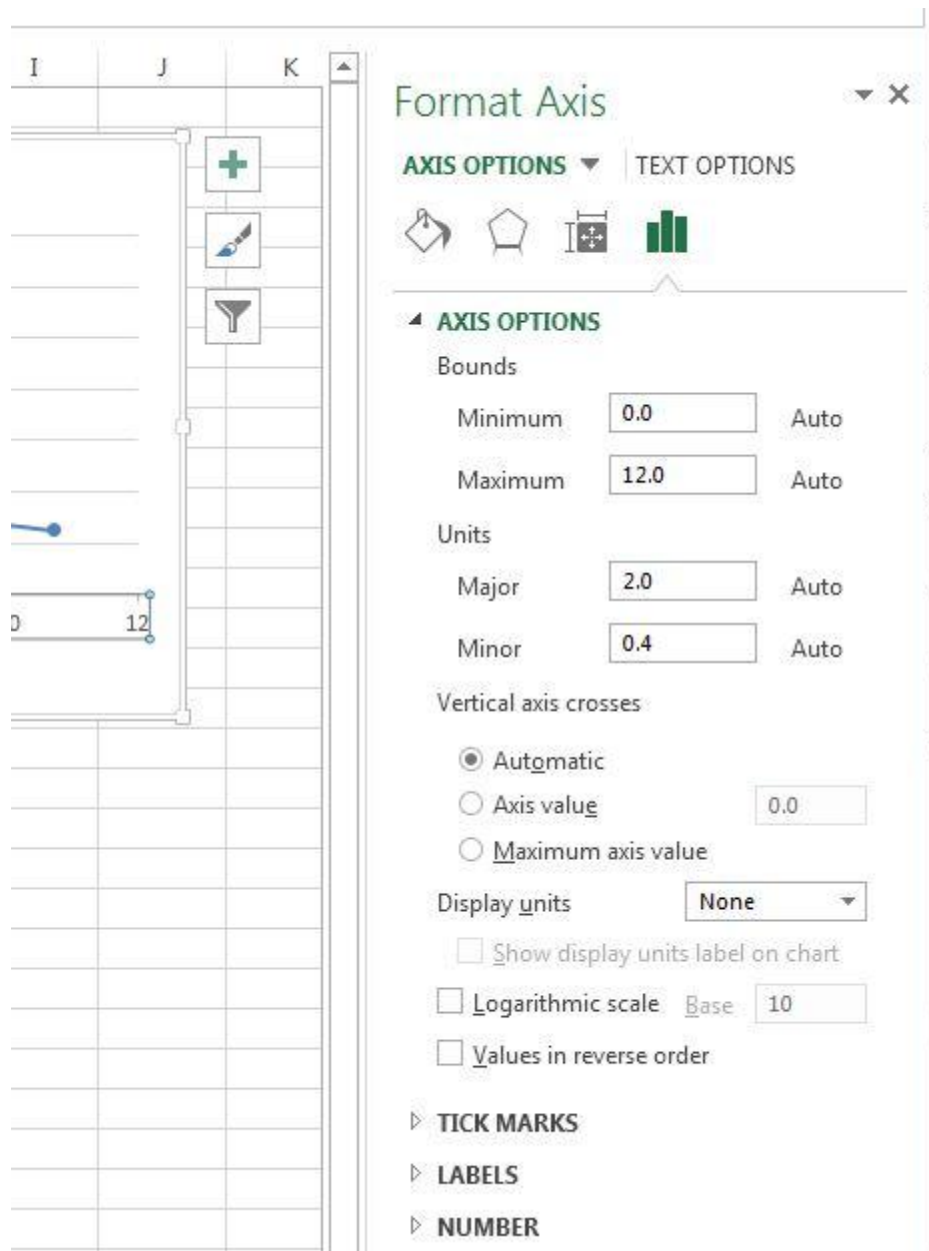
Figure 1.11 window before modifications

The **'AXIS OPTIONS'** section allows you to modify the position of the axis and its numbering scale. The '**TICK MARKS'** section allows you to modify the numeric degradations on the axis. The **'NUMBER'** section allows you to convert between different types of numerical units (currency, date, time, percentage, etc.). For other options (like color, fill, effects and line size), explore the **paint bucket, pentangle** and **size Icons** under the '**AXIS OPTIONS**' heading.
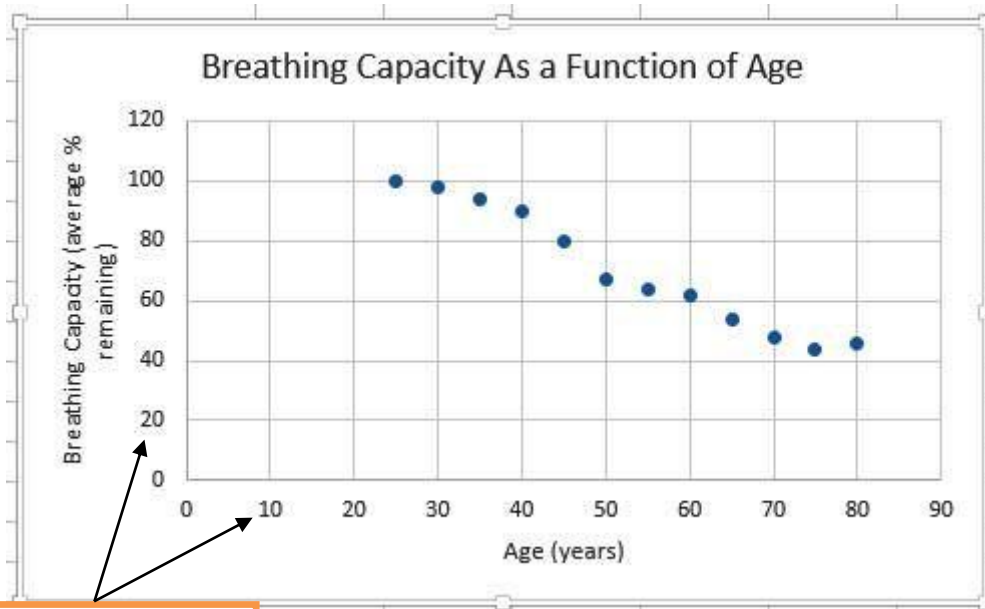
Figure 1.12

Complete all the axis options inside the format axis box as follows: See Table 1.2

	X-axis (Independent Variable)	Y-axis (Dependent Variable)
Axis Options		
Minimum	20.0	30
Maximum	90.0	110
Major unit	5.0	10.0
Minor unit	1.0	2.0
Values in reverse order	--	--
Logarithmic scale	--	--
Major tick mark type	cross	cross
Minor tick mark type	inside	inside
Axis labels	Next to axis	Next to axis
Vertical/ Horizontal axis crosses:		
Axis value	20.0	30
Number		
Category	General	*General*
Format code	General	General
Fill	Automatic	No Fill
Line Color	Solid Line	Solid line
Line Style	0.75 pt	0.75 pt
Shadow	--	--
3-D Format	--	--
Alignment	horizontal	horizontal

Table 1.2

When finished your **'FORMAT AXIS'** menu should look like Figure 1.13 and your chart should look like Figure 1.14 (the x-axis menu is on the left; the y-axis menu is on the right).
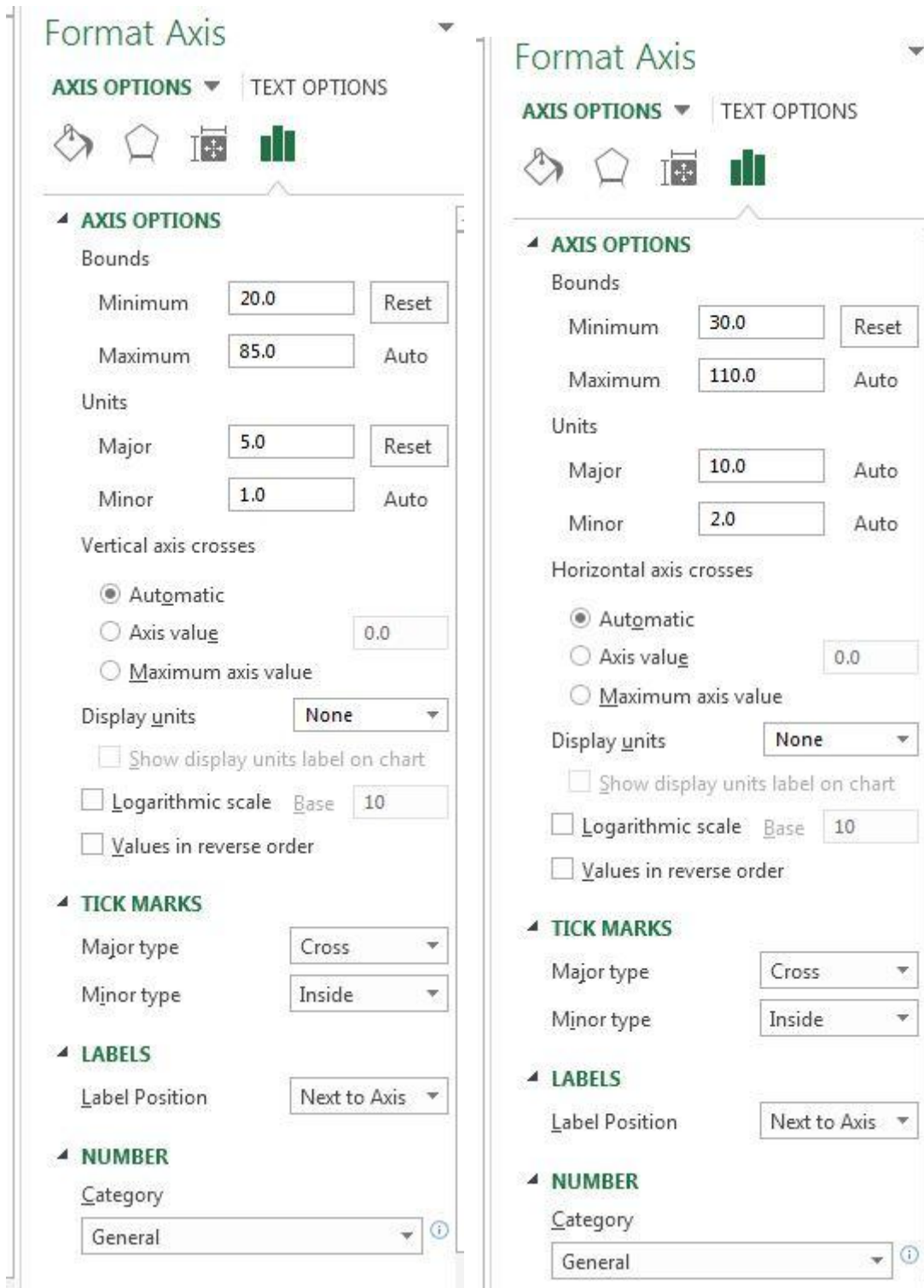

Figure 1.13 Format Axis window after modifications
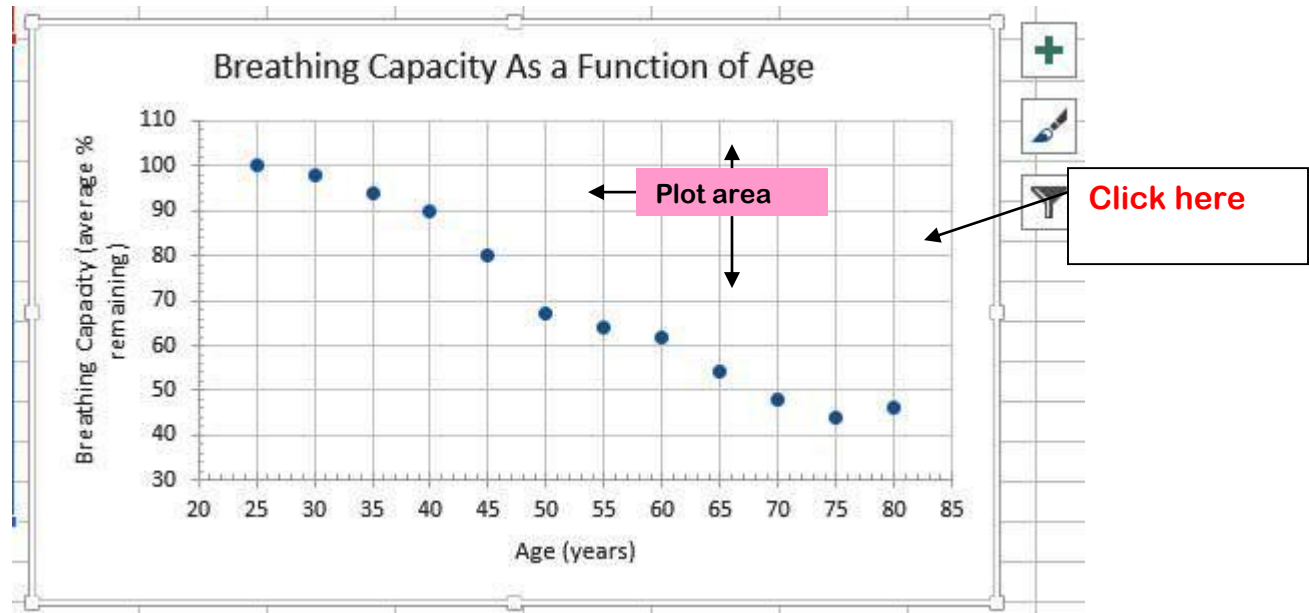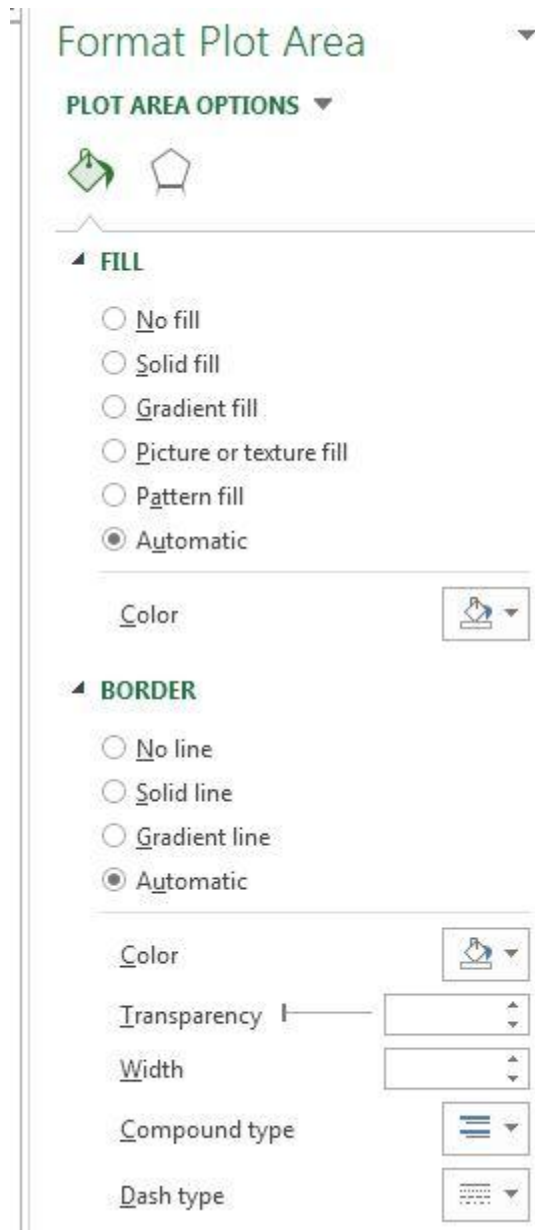
9. **To Format the Plot Area**.

Figure 1.14 Chart after modifications

 If you did not close out the **'FORMAT AXIS'** menu, Position cursor on clear region of the graph (see **Click here** box in Fig 1.14) then left click; the menu will change from **'FORMAT AXIS'** to **'FORMAT PLOT AREA'** . If you did close out the menu, then right click instead.   A pull-down menu will appear, click **Formal Plot Area.**

Delete
Reset to Match Style
Change Chart Type
Select Data …
3-D rotation
Format Plot Area

A 'FORMAT PLOT AREA' menu will appear on the screen similar to figure 1.15

Figure 1.15

Format Plot Area

PLOT AREA OPTIONS ▼

▲ FILL

○ No fill
○ Solid fill
○ Gradient fill
○ Picture or texture fill
○ Pattern fill
◉ Automatic

Color

▲ BORDER

○ No line
○ Solid line
○ Gradient line
◉ Automatic

Color

Transparency

Width

Compound type

Dash type

The Format Plot Area Box has the following selections:
We will use mainly the options under the **paint bucket icon:**
Fill: Allows you to select the background pattern for the plot area.
Border color: Allows you to select the style, color, and weight of the line around the plot area.
Explore the options under the **Effects Pentangle icon**: allow you to adjust various effects, like
Shadow, Glow, Soft Edges, and **3-D Format**.

10. **To format the data** points and the line which connects them, position the cursor on the data points or the line and click it (or right click and choose 'Format Data Series', if you've closed the menu). If you had to right click, a pull-down menu will appear that will allow you to choose Format Data Series.

Delete
Reset to Match Style
Change Series Chart Type
Select Data …..
3-D Rotation…
Add data Labels
Add Trendline …
Format Data Series…

The **'FORMAT DATA SERIES'** menu will appear on the screen. See figure 1.16, left hand side shows the options for formatting the line and the right hand side shows the options for formatting the markers (under the 'LINE' and 'MARKER' options)
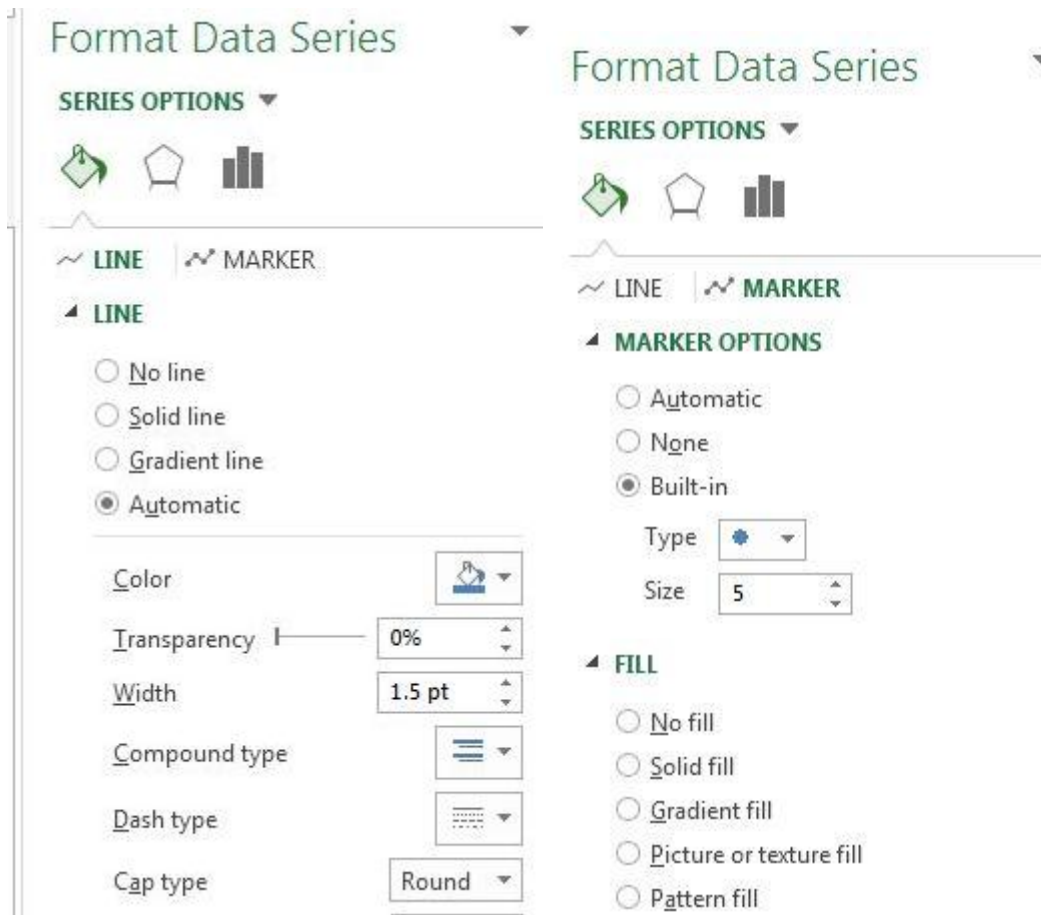

Figure 1.16 Format Data Series window

There will be several selections inside the **'FORMAT DATA SERIES'** Menu, but we will use mainly the submenus 'LINE' and '**MARKER**' under the **Paint Bucket Icon**. Most of these are similar to the options we've used previously **(Fill, Border, Shadow, Glow, etc)**, but of special interest is the **'Marker Options'** choice, which allows you to change the shape of your data points in the graph.

11. You may customize your data points as you prefer.
Line: Choose none followed by the style, color, and weight that you like. The appearance of the line will appear under sample if you choose custom.
Marker: This will format the symbol for each data series. Choose the shape of the symbol that you like best. If you choose the same color for the foreground and background, the symbol will be filled and solid. If you choose a dark color for the foreground with light color (white) for the background the result is an open symbol.

The other choices do not apply to this data but feel free to click these tabs to be familiar.

12**. To make a line of best fit by adding a trendline,** use the following steps.
Position your arrow on the data points then, right-click.
A pull-down menu will be displayed on the screen similar to this.

Delete
Reset to Match Style
Change Series Chart Type
Select Data …..
3-D Rotation…
Add data Labels
Add Trendline …
Format Data Series…

Go down to **Add Trendline** and click.
To format trendline: right click the trendline then select format OR
Use the + beside the chart, then trendline, then select more options.
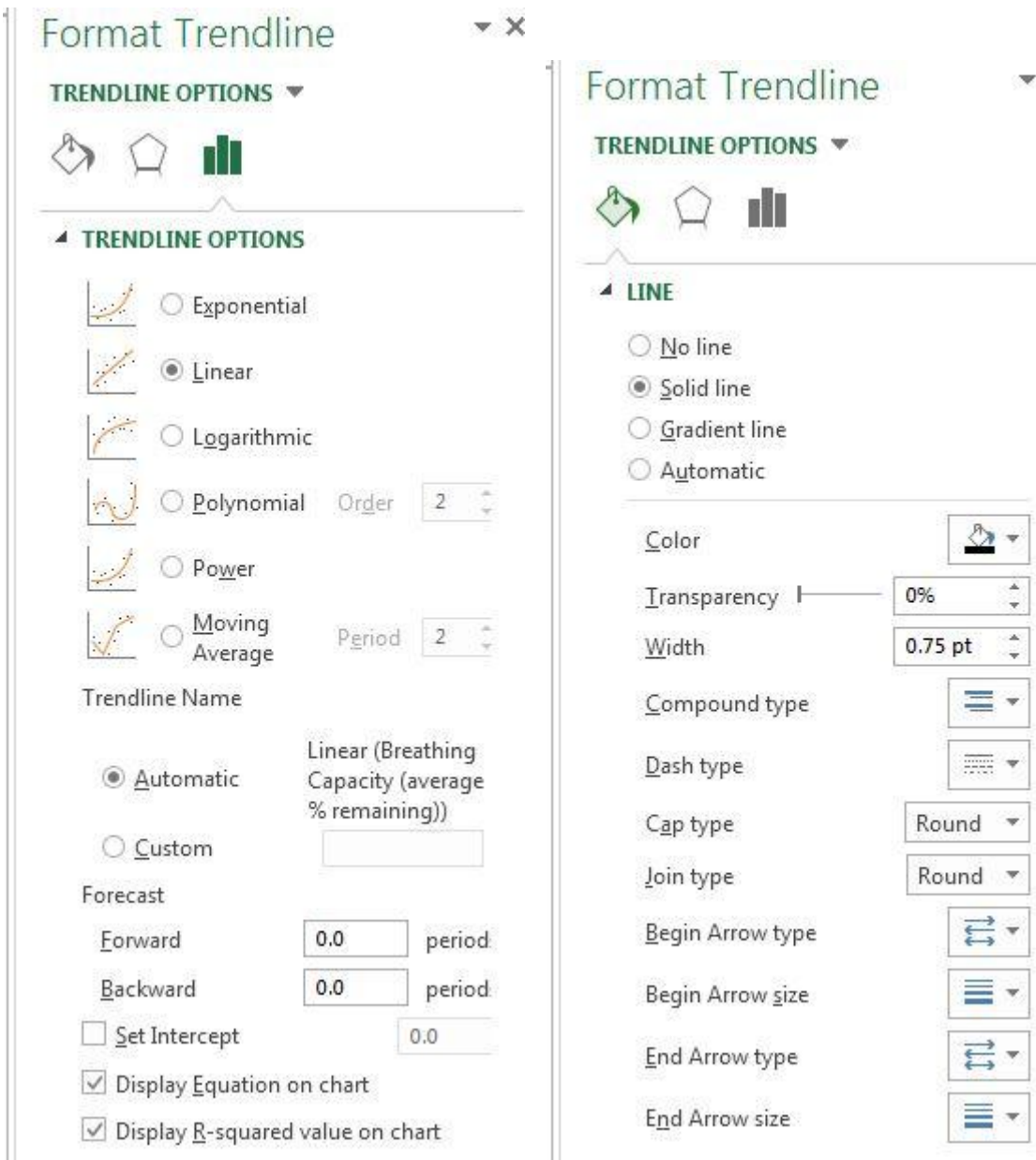
Figure 1.17 a & b

The **'FORMAT TRENDLINE'** menu will appear on the screen (figure 1.17) from which you can choose the type of Trendline you desire for your graph.

Under **Trendline Options** choose **Linear**.

(Optional): You may also choose the 'Display equation on chart'
and the 'Display R-squared values on chart'
to display data analysis information.

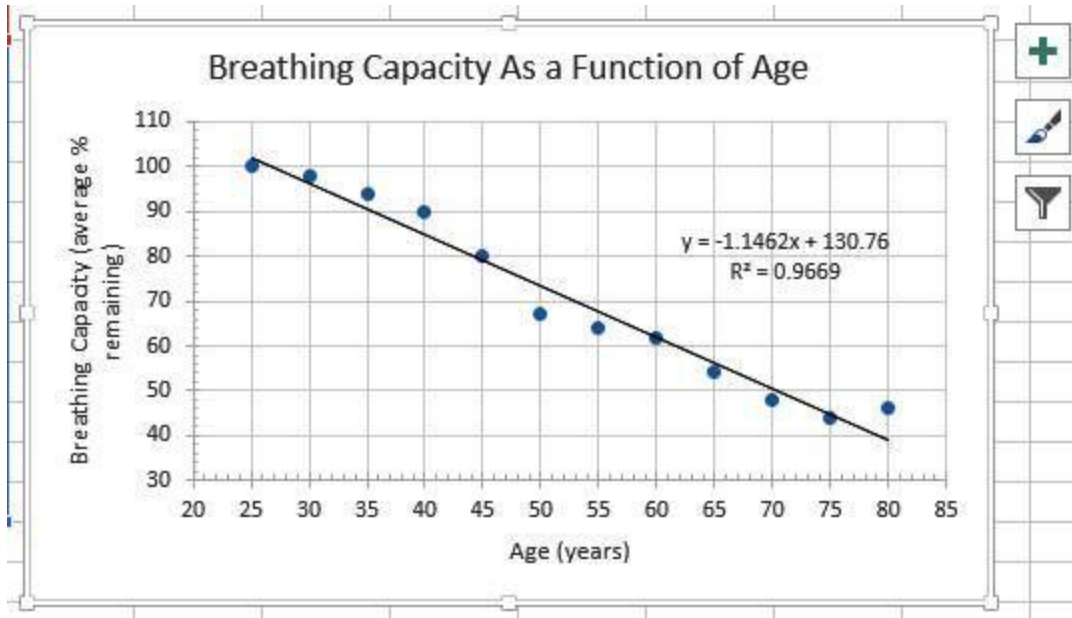Under **Fill and Line (the paint bucket) options** choose **Solid Line** and fill in any other options that you wish.
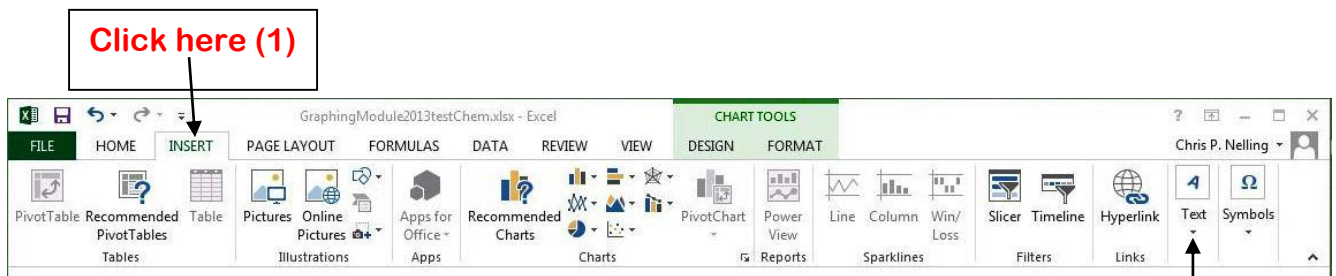

Figure 1.17 c

13. **To add your name:**
Select the graph by clicking on a blank space.
Click on the **Insert tab** then click on the **down arrow** under **Text** and choose **Header & Footer** (Figure 1.18).
The Page set-up box will be displayed. See Figure 1.19

Clicking on the down arrow under '**Text**' brings up the following options box:

Figure 1.18   Finding and opening the Header Menu.
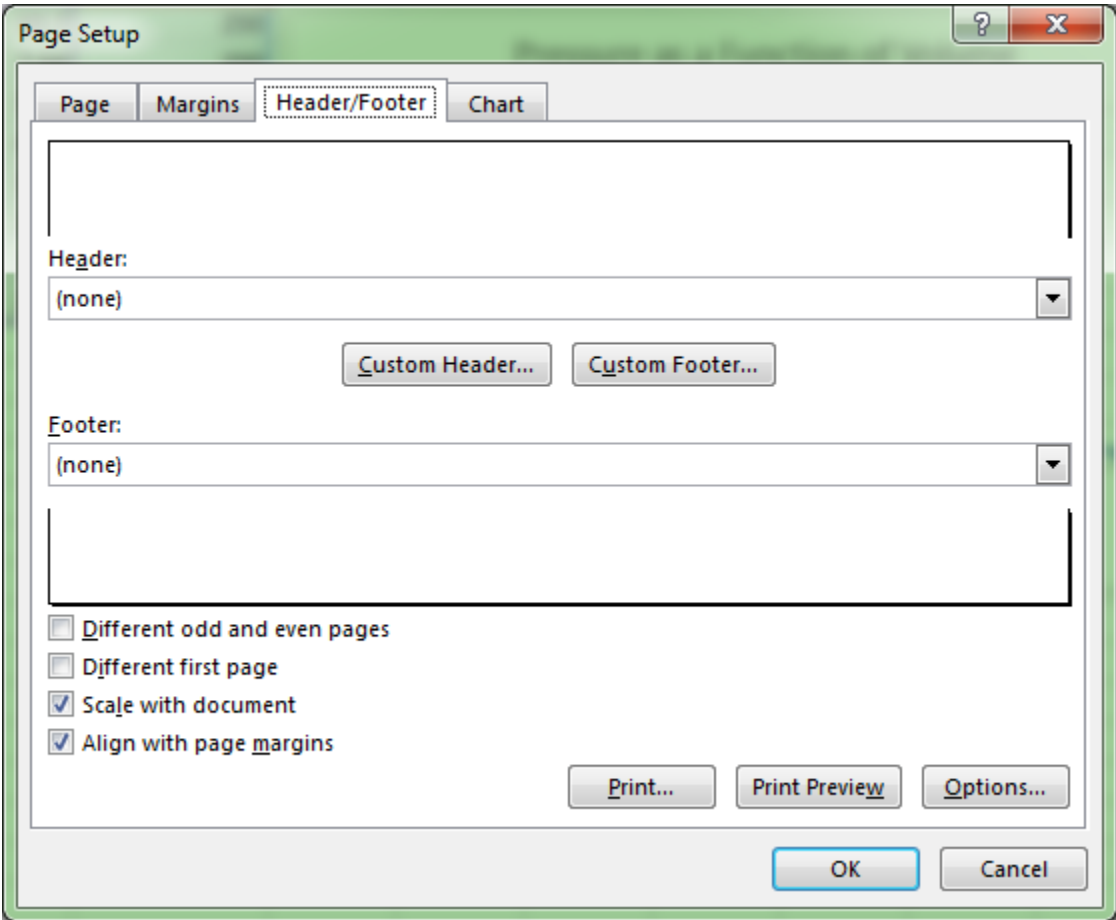

Figure 1.19   Page Set-up box

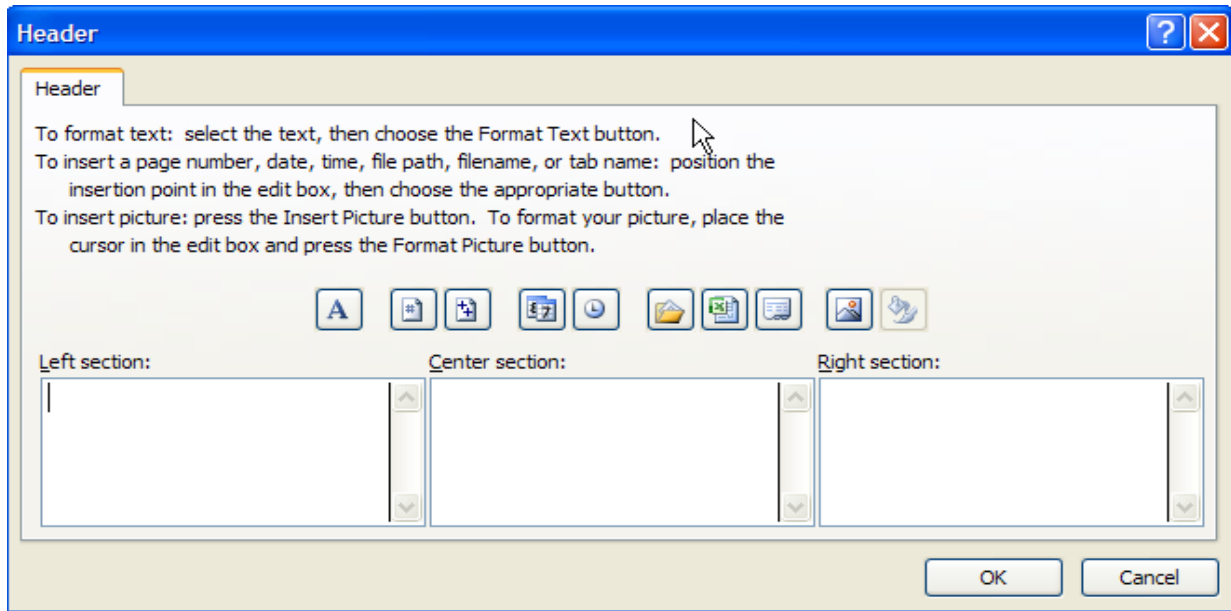Click **Custom Header** and the Header box will appear.

Figure 1. 19 Header window

Type your name and other information required by your instructor in the **left section.**

Leave other sections as is (unless instructed otherwise by your instructor).
Click **OK** twice.

14. **To print your graph**.
Choose the FILE menu on the top left corner of the screen.
In the new menu, click **print** and then **print** again to print your graph (Figures 1.20 and 1.21).
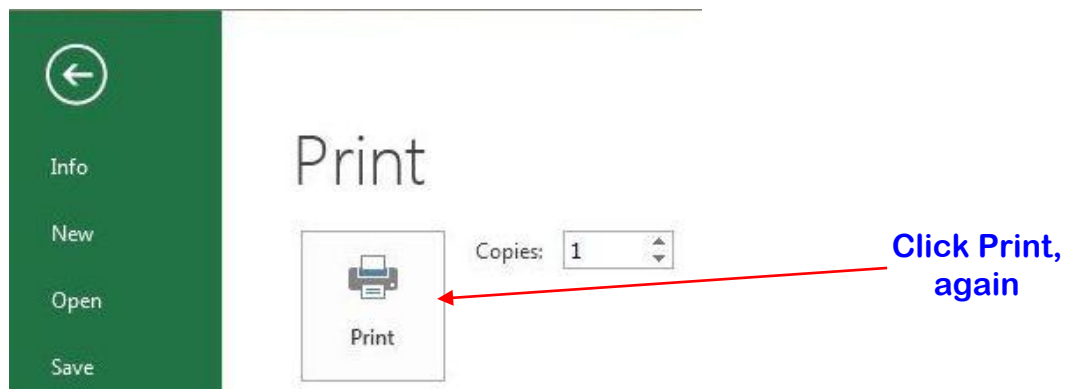

Figure 1.20

Figure 1.21

Caution: Do not close until you have your print-out!
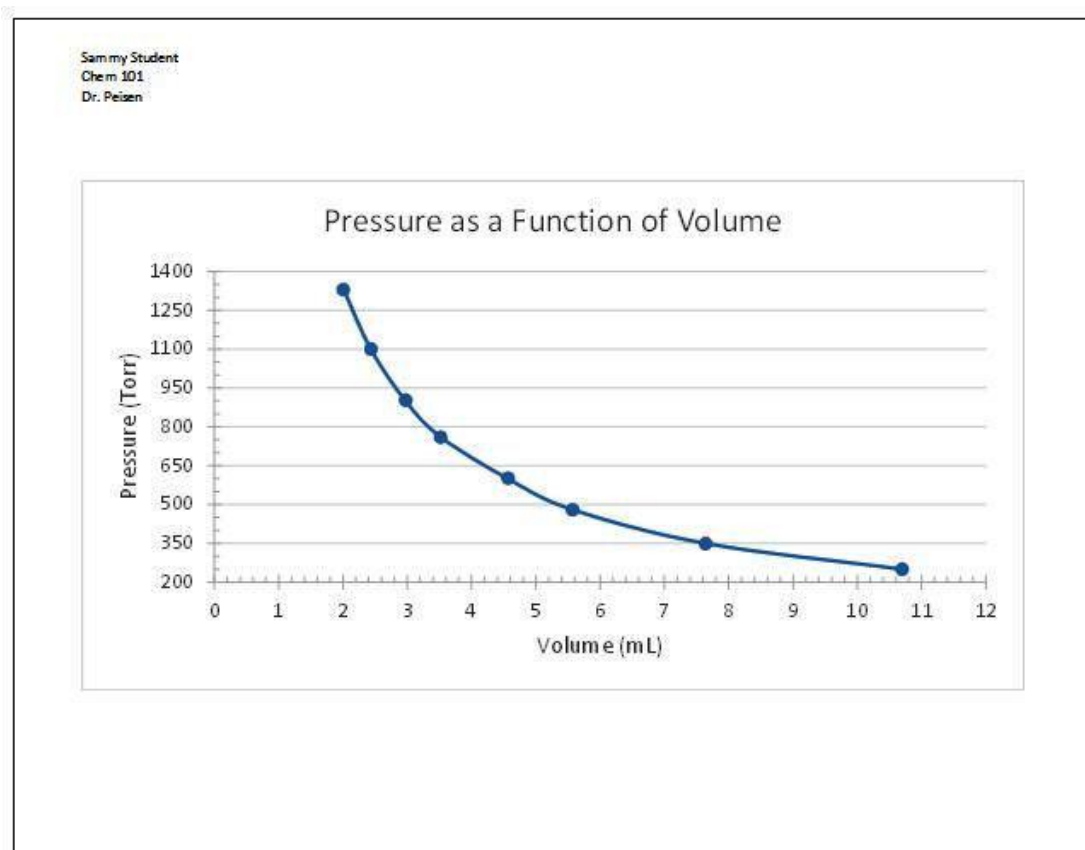

Figure 1.22: Your finished graph, complete with header.

Sources: Microsoft Excel 2013
Updated 6/2014