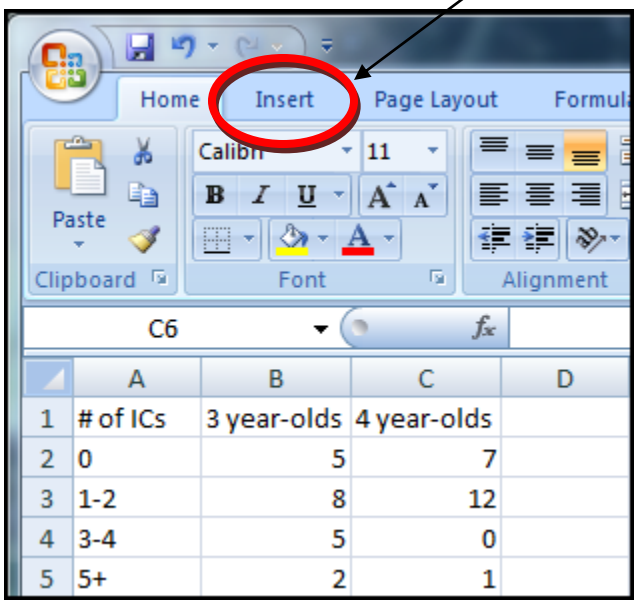
SAMLab Tip Sheet #5
Creating Graphs

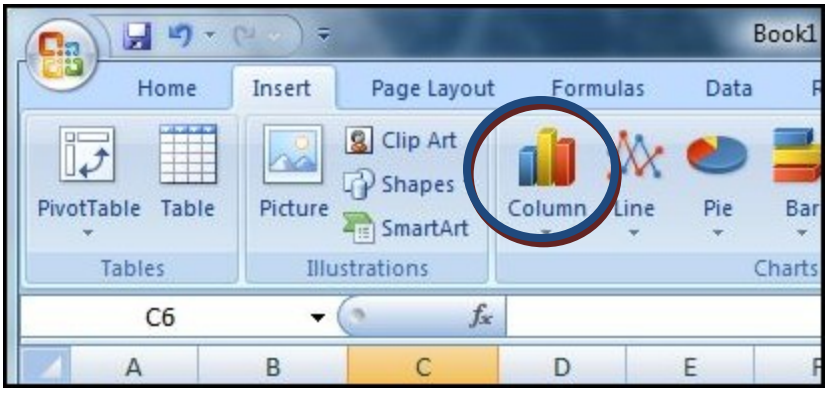
The purpose of this tip sheet is to provide a basic demonstration of how to create graphs with Excel. Excel can generate a wide variety of graphs, but we will use only two as primary examples. Fortunately, many of the steps demonstrated can be generalized to the other types of graphs.

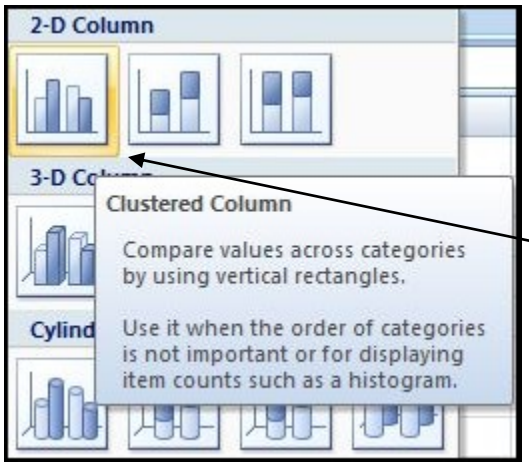
Making a Bar Graph

Excel refers to graphical representations as charts, and thus, we will use the terms interchangeably. The first step in creating a chart is to obtain some data. The data listed below are a fictitious representation of a developmental psychologist's findings on the prevalence of imaginary companions in 3- & 4-year-old children. After entering the data, click on the "Insert" tab located along the top of Excel 2007 (circled in red).



	A	B	C	D
1	# of ICs	3 year-olds	4 year-olds	
2	0	5	7	
3	1-2	8	12	
4	3-4	5	0	
5	5+	2	1	





After selecting "Insert" from the top of Excel you should see some different chart options along the top. We are going to create a "Column" graph, which is also often referred to as a bar graph. Click on "Column" from the "Charts" field (circled above in blue). In the menu that pops up, select "Clustered Column."

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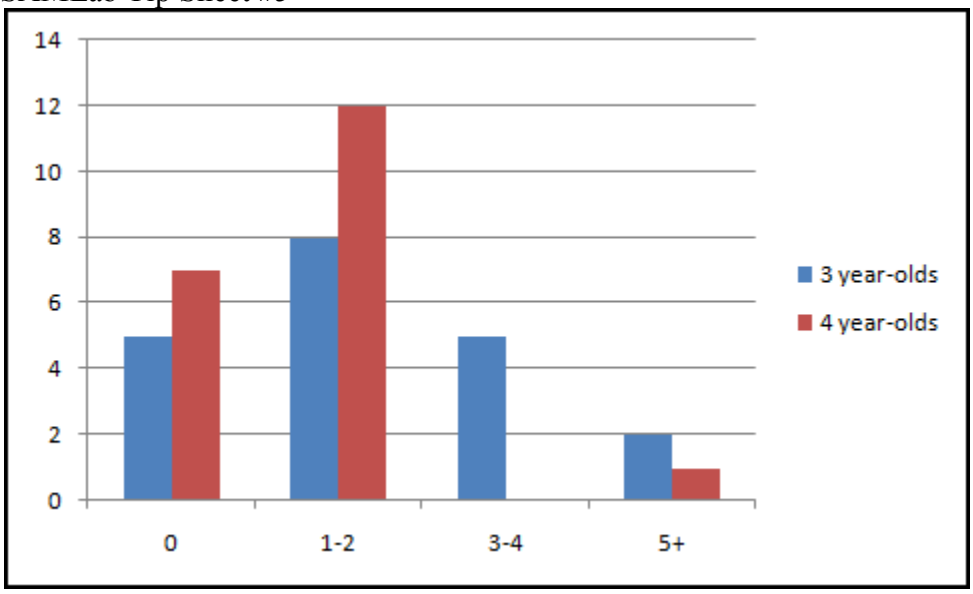
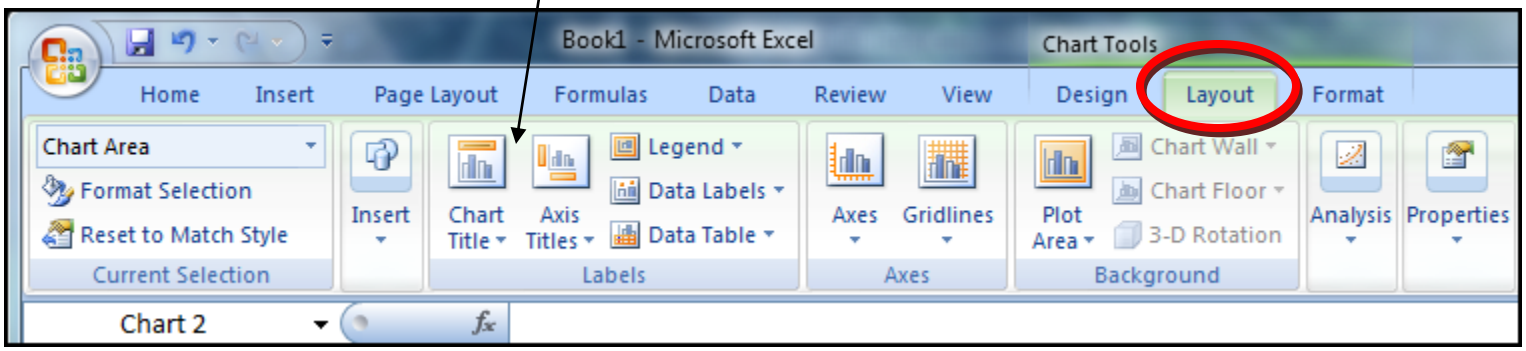
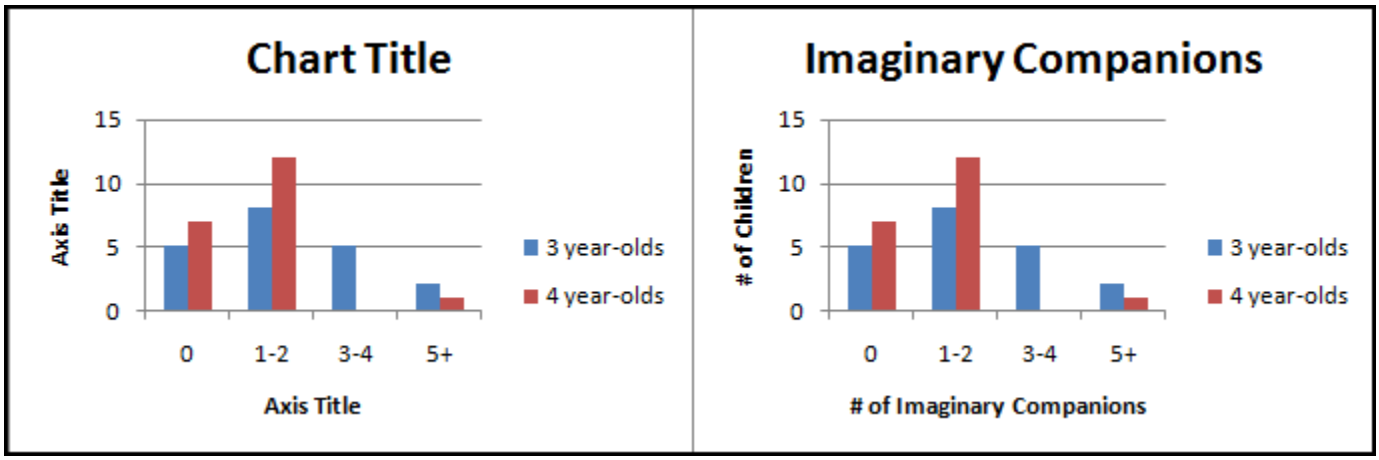


Excel 2007 should have automatically selected the appropriate data[1] and you should see the graph to the left. If you do not, right click on the area within the chart and select "Select Data" from the menu. Add the column for 3 year-olds and then add the column for 4 year-olds to your "Legend Entries (Series) field. For the "Horizontal (Category) Axis Label," add the age ranges. Now all that is left to do is to give titles to each axis and the overall chart[2].

To add titles, **make sure you have clicked somewhere within the area of the chart**. This should make some other tabs appear at the top of Excel. Click on the "Layout" tab (circled below). To add a title to the chart, click on "Chart Title" and select "Above Chart." To add a label for the x-axis, click on "Axis Titles" and select "Primary Horizontal Axis Title" and then "Title Below Axis." To add a label for the y-axis, click on "Axis Titles" and select "Primary Vertical Axis Title" and then "Rotated Title." The labels used for this example are shown below.





You should now have a graph like the one above on the left. To edit the titles, simply double-click on the title names and type in the text you want to use. You can change fonts, sizes, and styles using the standard formatting procedures under the "Home" tab. The final graph should look like the one above on the right.

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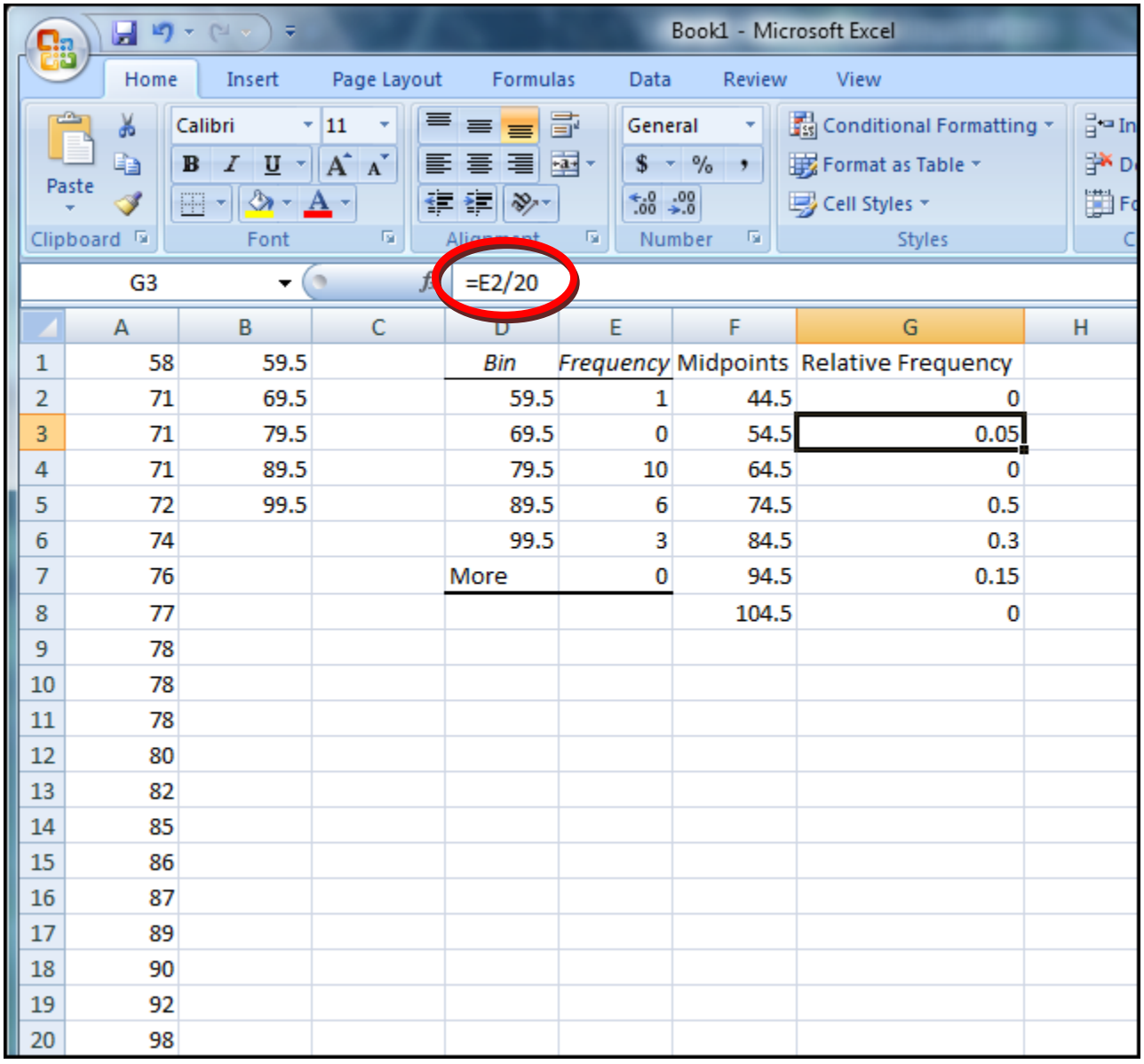
Making a Relative Frequency Polygon

To make a relative frequency polygon, we'll use the same data from Tip Sheet #4. After entering the data, follow the steps in Tip Sheet #4 to create a histogram (and thus a grouped frequency distribution as well), but do *not* check the box next to "Chart Output." Next, create a new column of midpoints and relative frequencies. Check the formula bar (circled) for the basic formula for relative frequency (N=20 in this example) and *note the extra midpoints and the zeros in the relative frequency column*[3]. You should end up with something like the spreadsheet below.



	A	B	C	D	E	F	G	H
1	58	59.5		*Bin*	*Frequency*	Midpoints	Relative Frequency	
2	71	69.5		59.5	1	44.5	0	
3	71	79.5		69.5	0	54.5	0.05	
4	71	89.5		79.5	10	64.5	0	
5	72	99.5		89.5	6	74.5	0.5	
6	74			99.5	3	84.5	0.3	
7	76			More	0	94.5	0.15	
8	77					104.5	0	
9	78							
10	78							
11	78							
12	80							
13	82							
14	85							
15	86							
16	87							
17	89							
18	90							
19	92							
20	98							

Now, select an empty cell within Excel. Then, select the "Insert" tab from the options along the top of Excel. Go to the same area you went to when adding the bar graph (from earlier in this tip sheet), but this time, instead of selecting the bar graph, click on the "line" option under "Charts," and select "Line with Markers." A blank graph should appear on your spreadsheet. All of this can be seen on the picture at the top of the next page.

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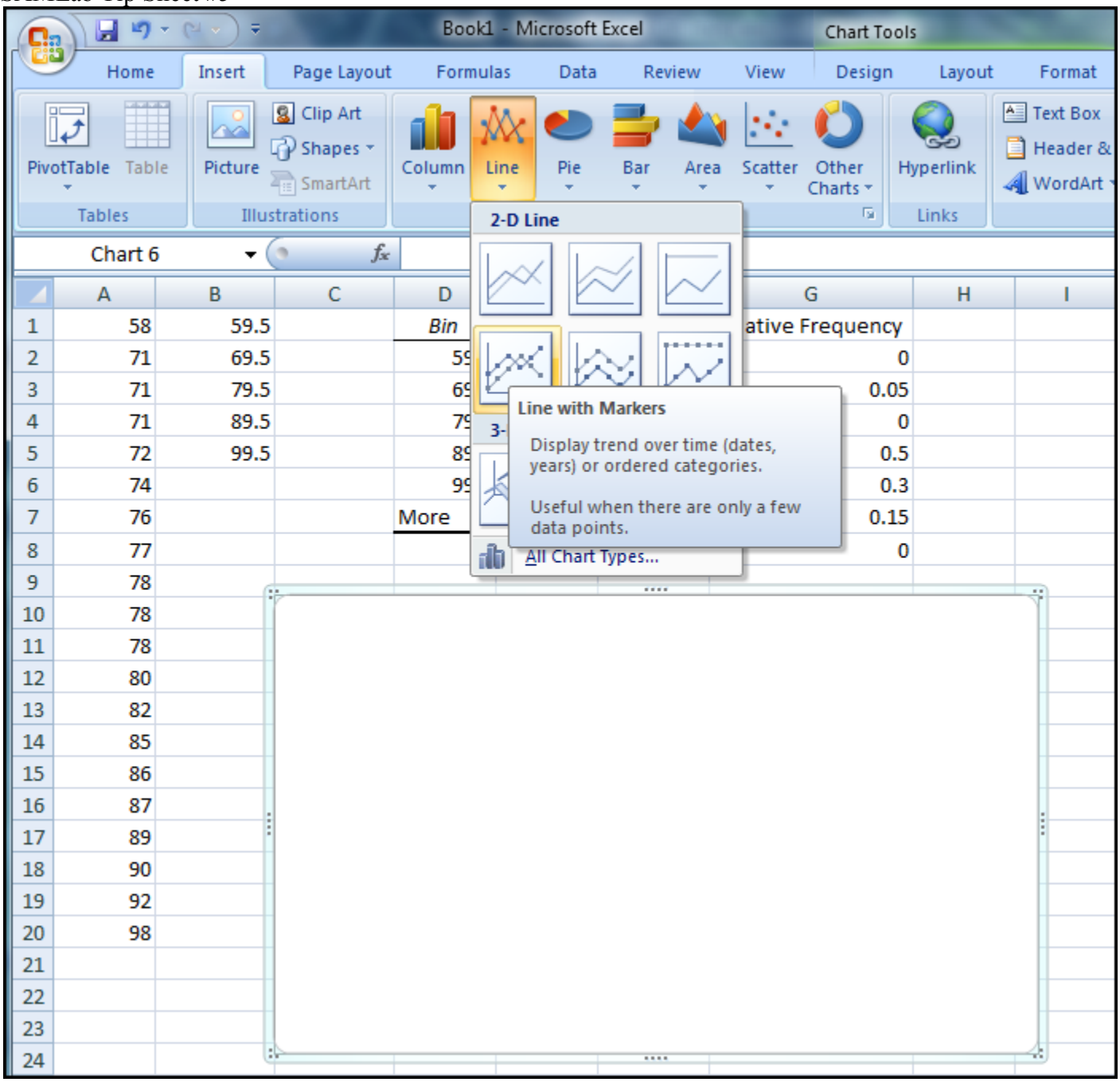

To get your data into graph form, follow the steps outlined next.

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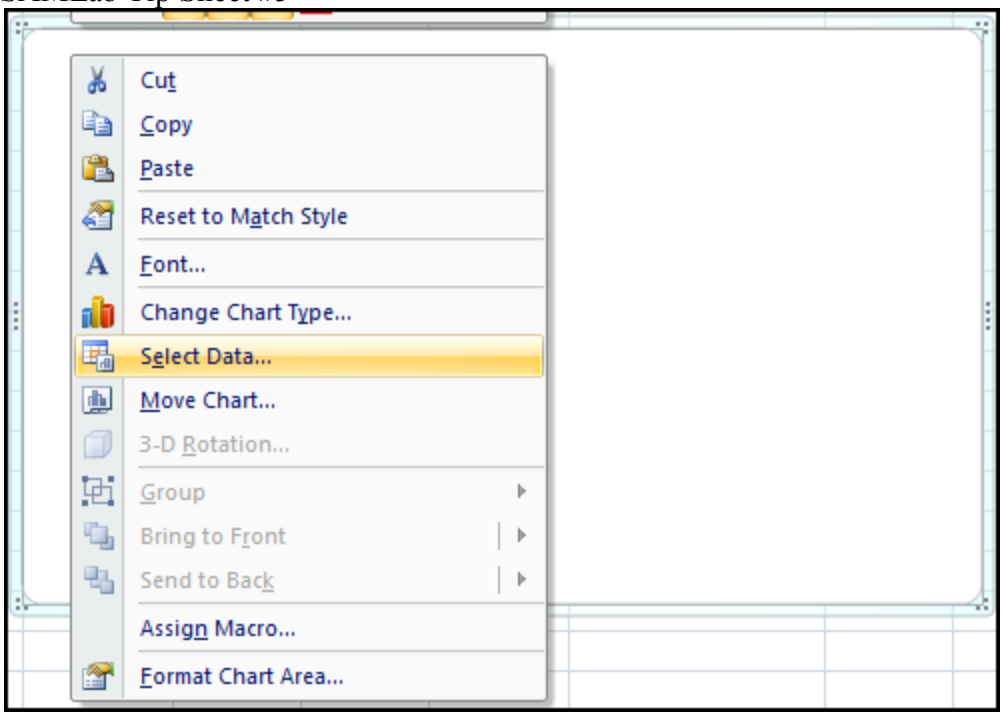
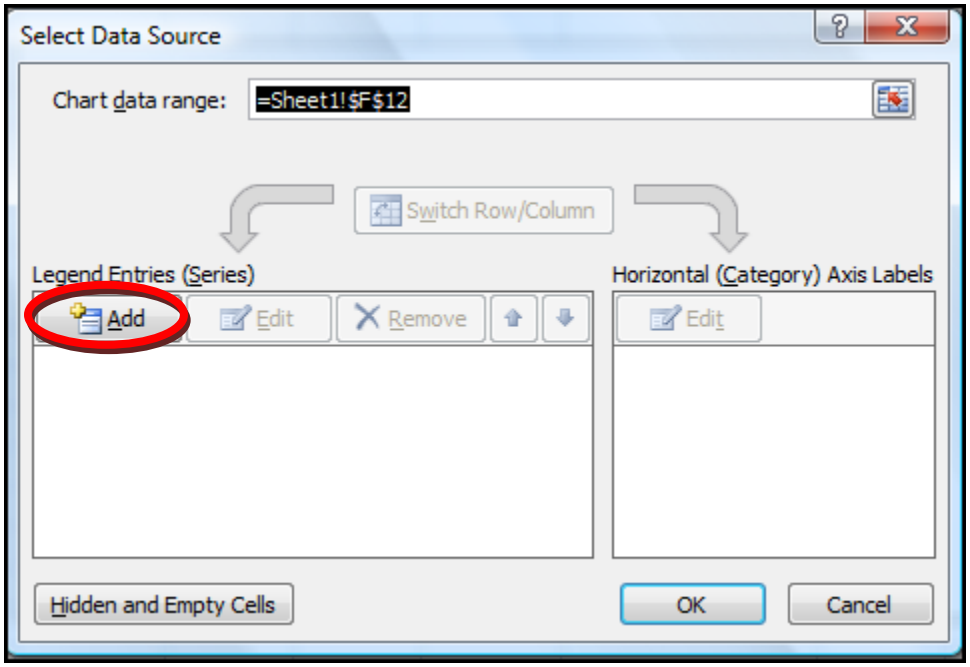
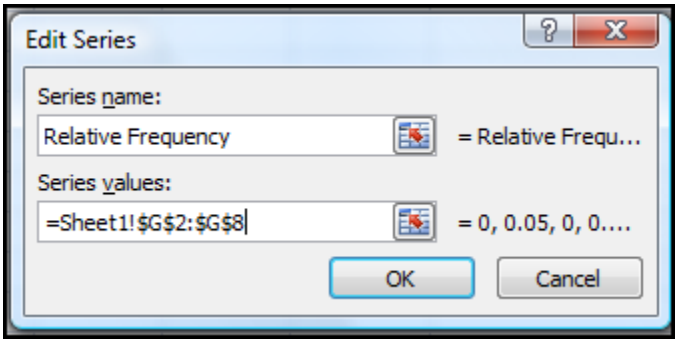


Right click somewhere within the blank chart area and select "Select Data" (shown to the left).



The window to the left will open. First, click on "Add" under "Legend Entries (Series)" which is circled in red to the left.



Under "Series name" type "Relative Frequency." Under "Series values" select the cells under the "Relative Frequency" heading on your spreadsheet. Click "OK."

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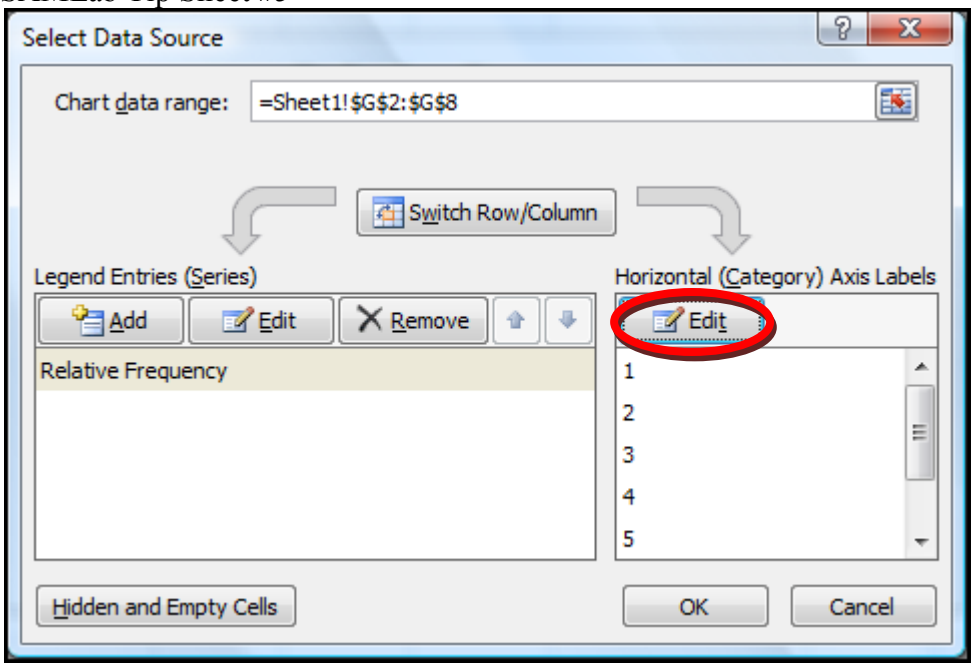
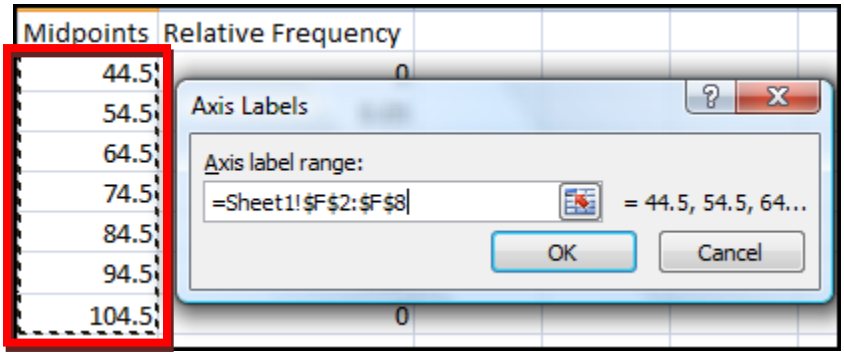
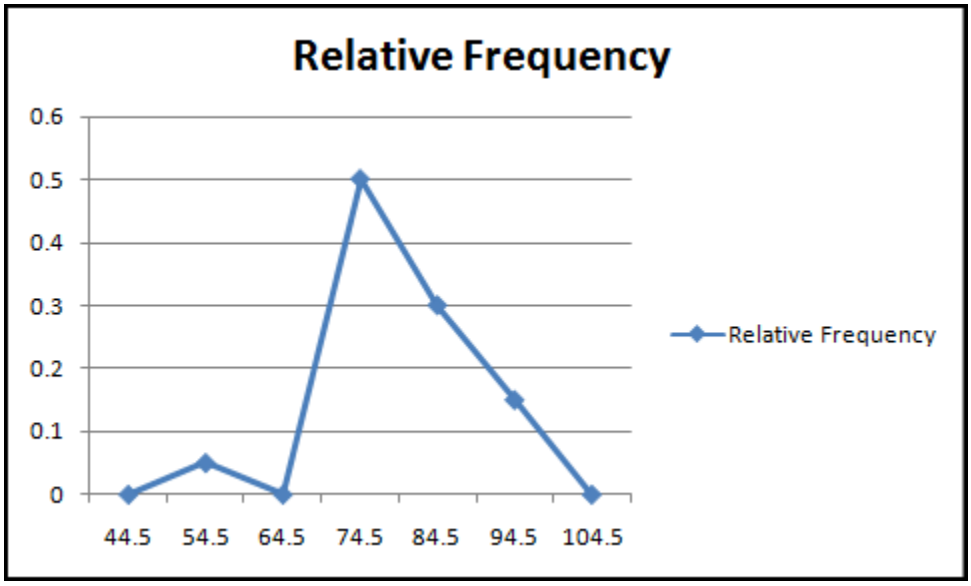


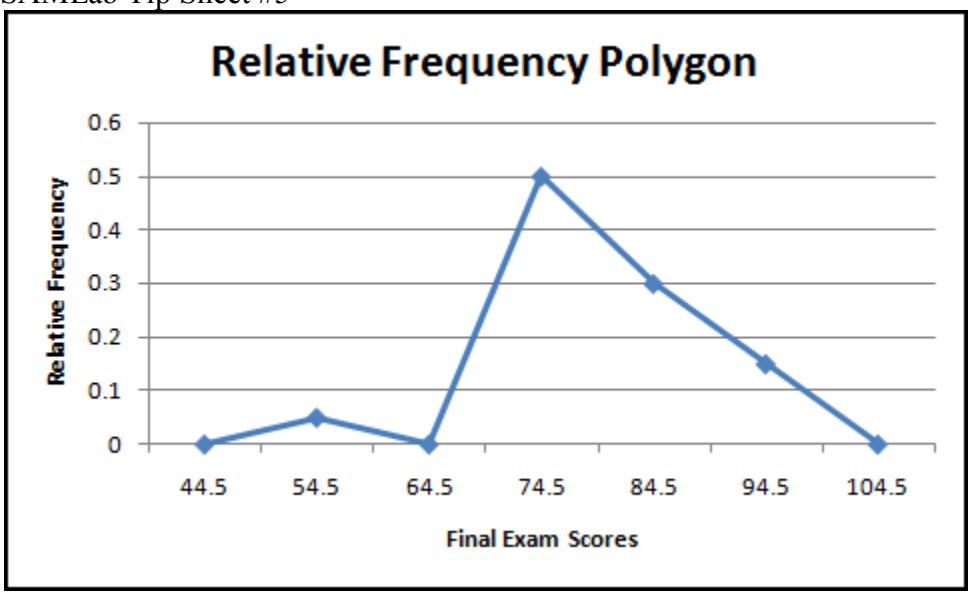
You will come back to the "Select Data Source" window. Now, click on "Edit" under the "Horizontal (Category) Axis Labels heading (circled to the left).



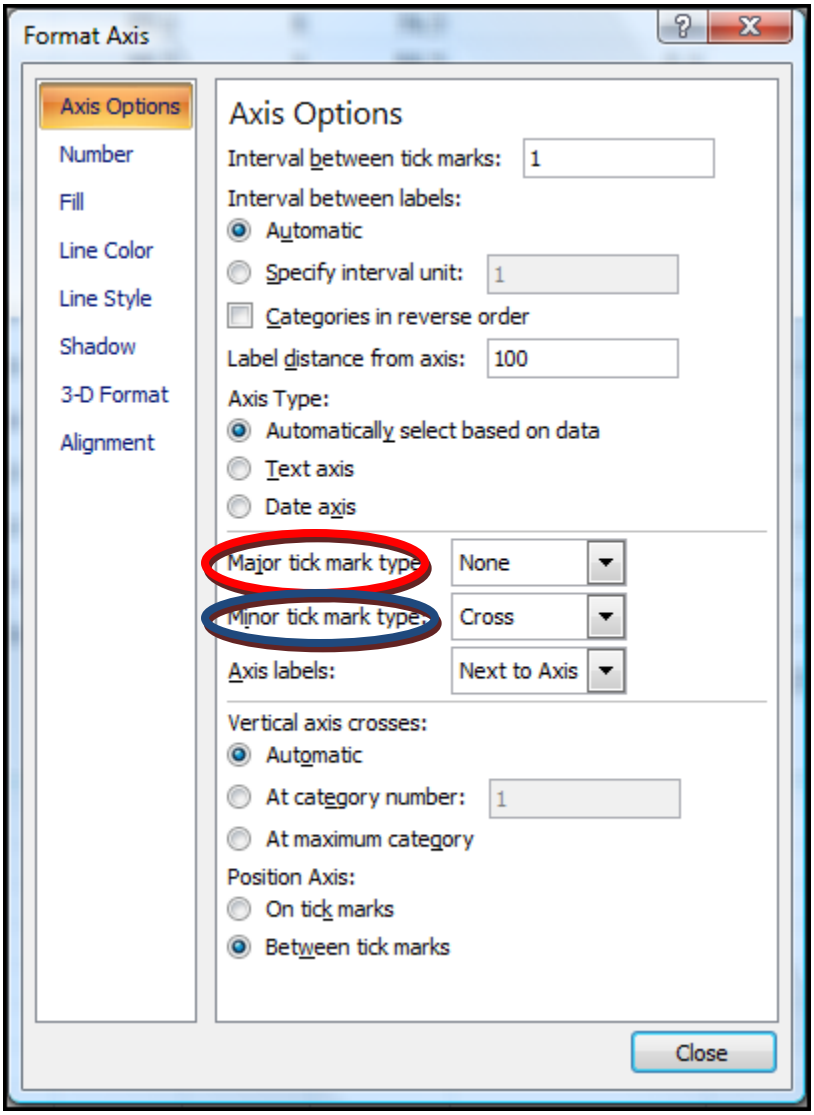
In the "Axis label range" field, select the values under the "Midpoints" heading you created in your spreadsheet (squared to the left). Click "OK" to return to the "Select Data Source" window. Click "OK" again to see your graph.



You should see the graph to the left. The legend isn't really useful here, so if you want, you can right click on it and select "Delete." To add labels to each axis, follow the same steps that you followed above for the bar graph. For our example, we will label the x-axis "Final Exam Scores" and the y-axis "Relative Frequency." We will also change the title of our graph to "Relative Frequency Polygon."



You should now have a graph that resembles the one shown on the left. One more slight change needs to be made. You want to change the tick marks on the x-axis to correspond with the midpoints. You are going to do the same thing outlined in Tip Sheet #4 for histograms. Right click on one of the numbers in the x-axis on the graph and select "Format Axis."



In the window that opens up, choose "None" in the menu next to "Major tick mark type" (circled in red) and choose "Cross" in the menu next to "Minor tick mark type" (circled in blue). Click Close. Your graph should now resemble the graph at the top of the next page, which is our final product.

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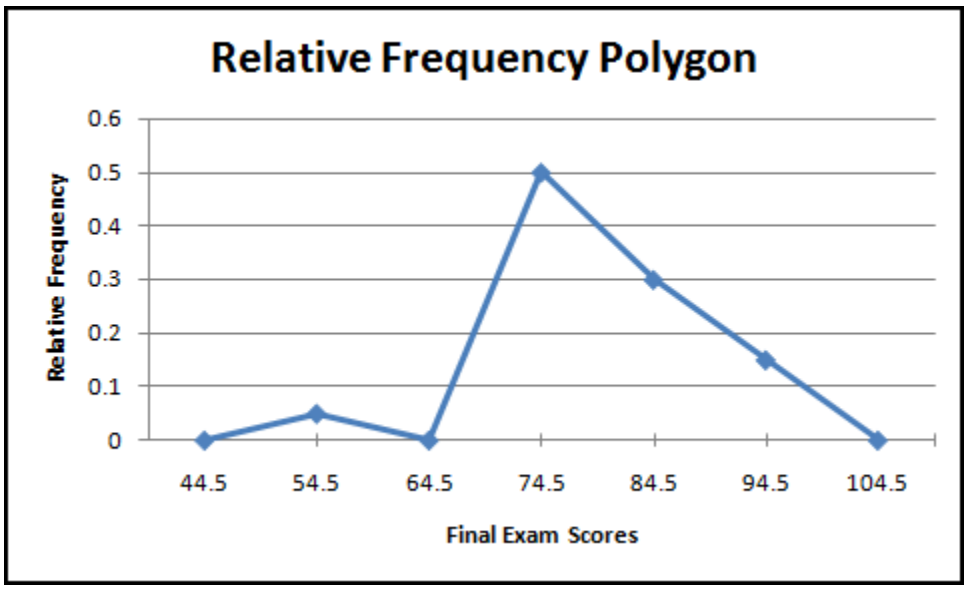

Notes

[1]One way to try to make Excel automatically select the data you want is to highlight it before inserting your chart. This may not work, however, when you have many data on one spreadsheet. Also, it is a good exercise to select your data from the spreadsheet manually because it makes you aware of what you actually want to display.

[2]It can be useful to be able to see both the data and the chart on the same screen (which is what Excel 2007 does by default as long as you insert the chart on the same sheet as your data). To see why, try changing the value of one of the cells containing your data and see what happens on the chart.

[3]These extra values are added to both columns so that the ends of the relative frequency polygon will "attach" to the x-axis, thus making a technically correct polygon.