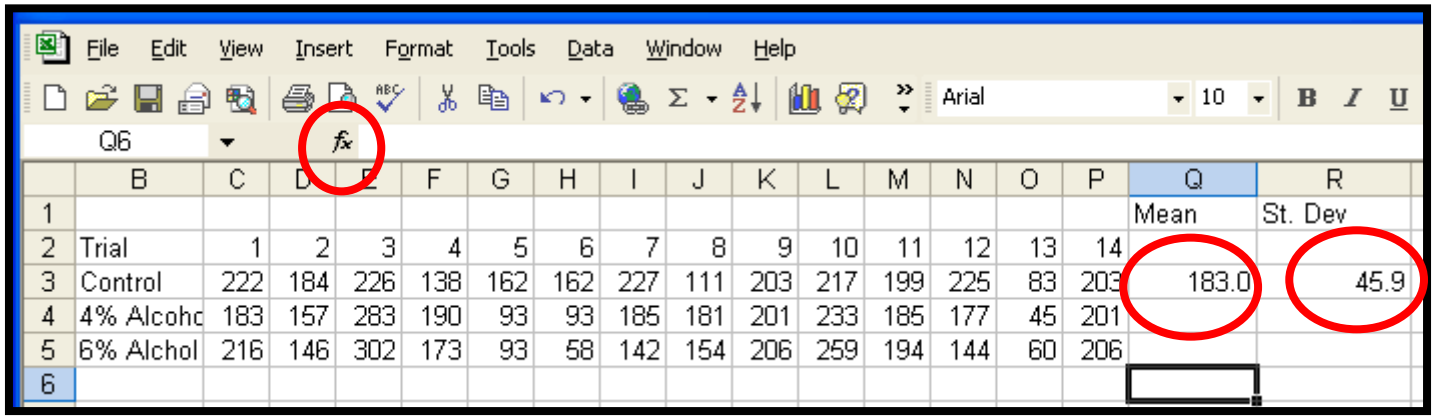
Graphing using Microsoft Excel 2007

Tutorial #3- Graphing with standard error bars

Step 1. Enter data and prepare a graph as described in "Excel tutorial # 1"

For this demonstration, we shall use some class measurements of Daphnia heart rate upon exposure to alcohol.



	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1																Mean	St. Dev
2	Trial	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
3	Control	222	184	226	138	162	162	227	111	203	217	199	225	83	203	183.0	45.9
4	4% Alcohc	183	157	283	190	93	93	185	181	201	233	185	177	45	201		
5	6% Alchol	216	146	302	173	93	58	142	154	206	259	194	144	60	206		
6																	

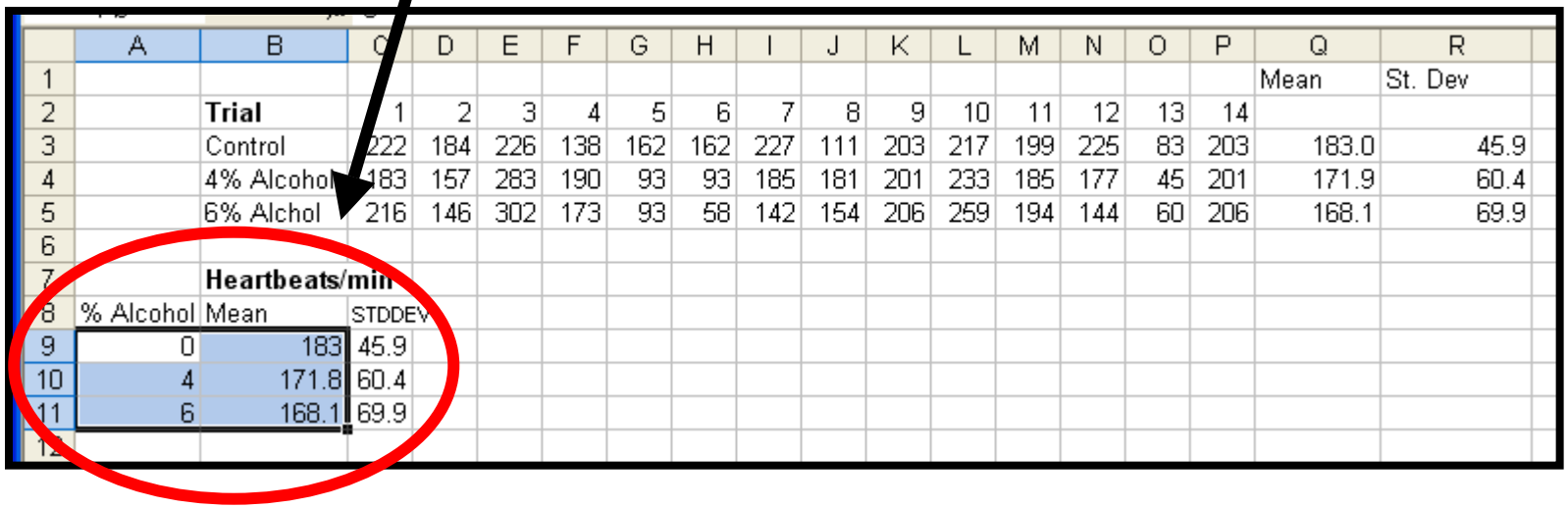
As described in "Excel Tutorial #2", the mean and standard deviation values for each set of data were determined as follows:

The mean and standard deviation are determined by selecting the appropriate box, then selecting "*fx*", then selecting AVERAGE or STDEV, then selecting the data you wish to analyze.

Note: Columns Q and R were also formatted to show only one decimal place.

I also formatted columns Q and R to give only one decimal place.

Step 2 - Retype your mean and standard deviation values below the original table, then use the latter data to prepare a graph with appropriate title, X and Y axes, and trendline

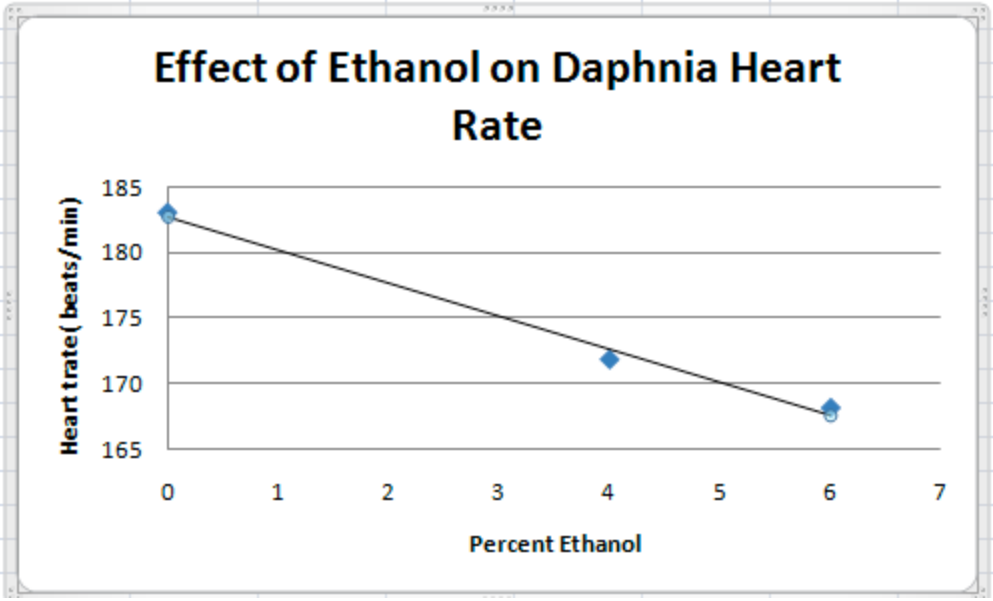


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1																	Mean	St. Dev
2		**Trial**	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
3		Control	222	184	226	138	162	162	227	111	203	217	199	225	83	203	183.0	45.9
4		4% Alcohol	183	157	283	190	93	93	185	181	201	233	185	177	45	201	171.9	60.4
5		6% Alchol	216	146	302	173	93	58	142	154	206	259	194	144	60	206	168.1	69.9
6																		
7		**Heartbeats/min**																
8	% Alcohol	Mean	STDDEV															
9	0	183	45.9															
10	4	171.8	60.4															
11	6	168.1	69.9															

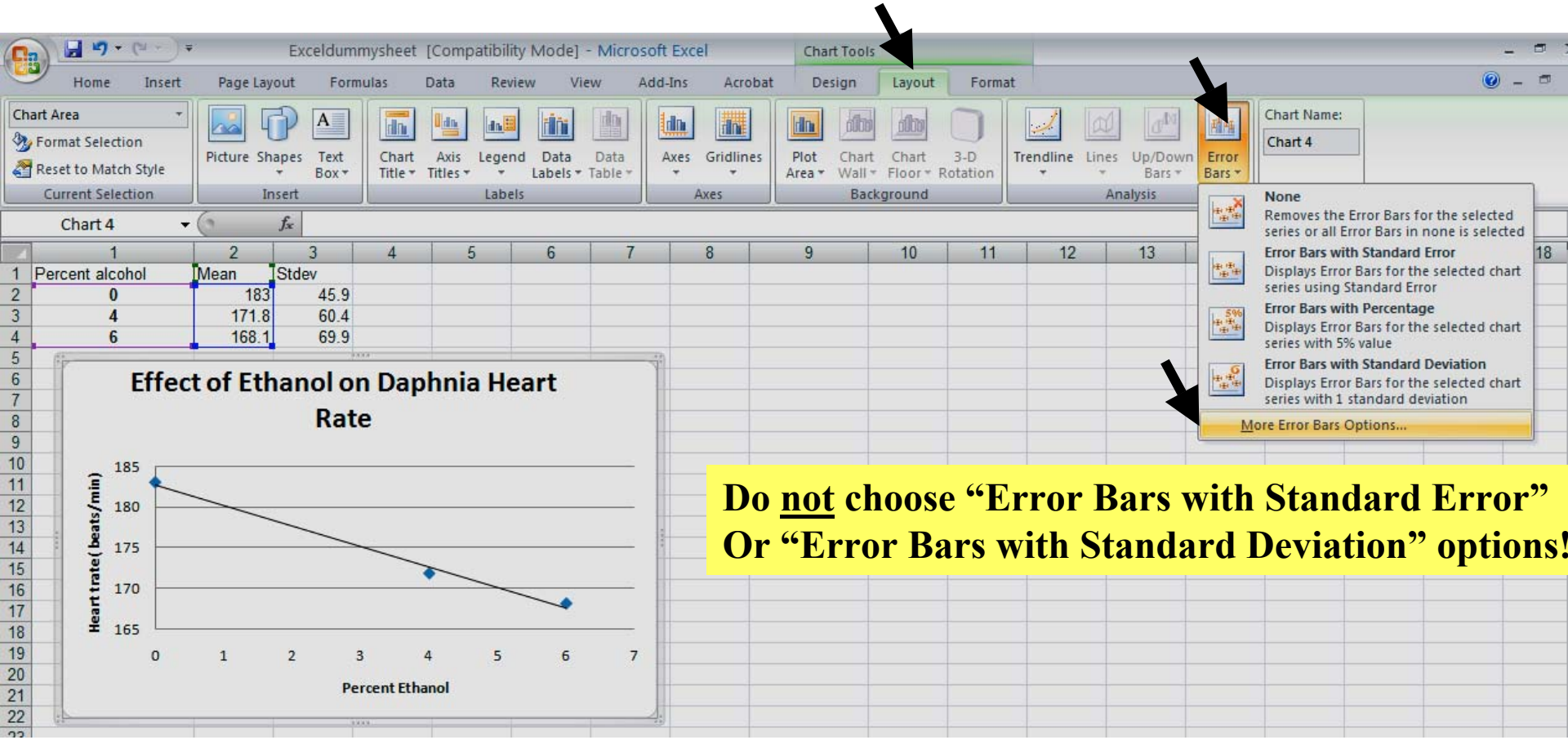
Hint: Alternatively, you can cut and paste the data, but then you will need to use "Paste Special" and select "Values". Otherwise, it will paste the *formula* used to calculate mean or standard deviation..

Now your graph should something look like this:

Percent alcohol	Mean	Stdev
0	183	45.9
4%	171.8	60.4
6%	168.1	69.9

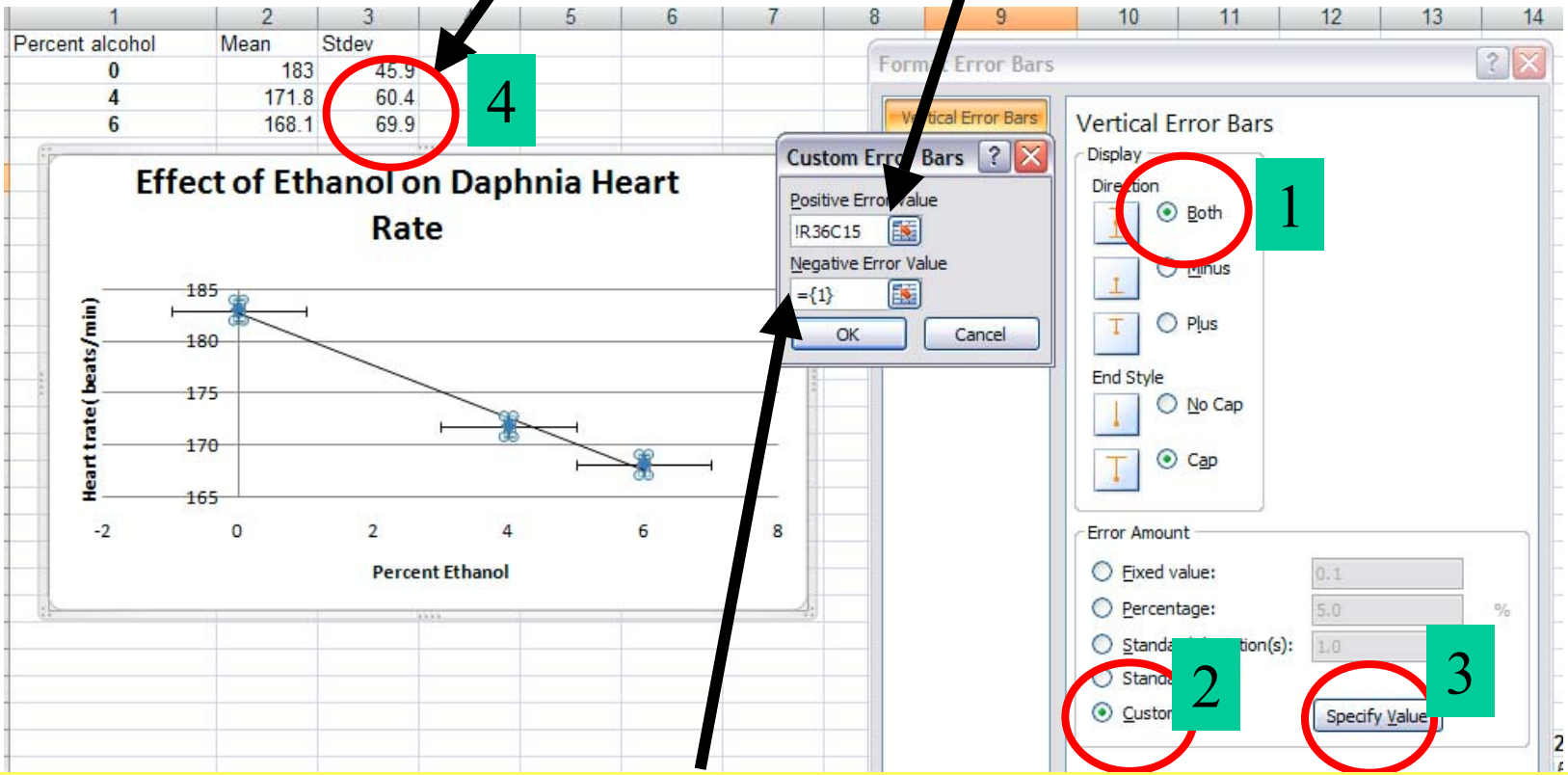


Step 4. To apply error bars, *left click* anywhere on the graph, choose the layout tab/ Error bars/More error bar options



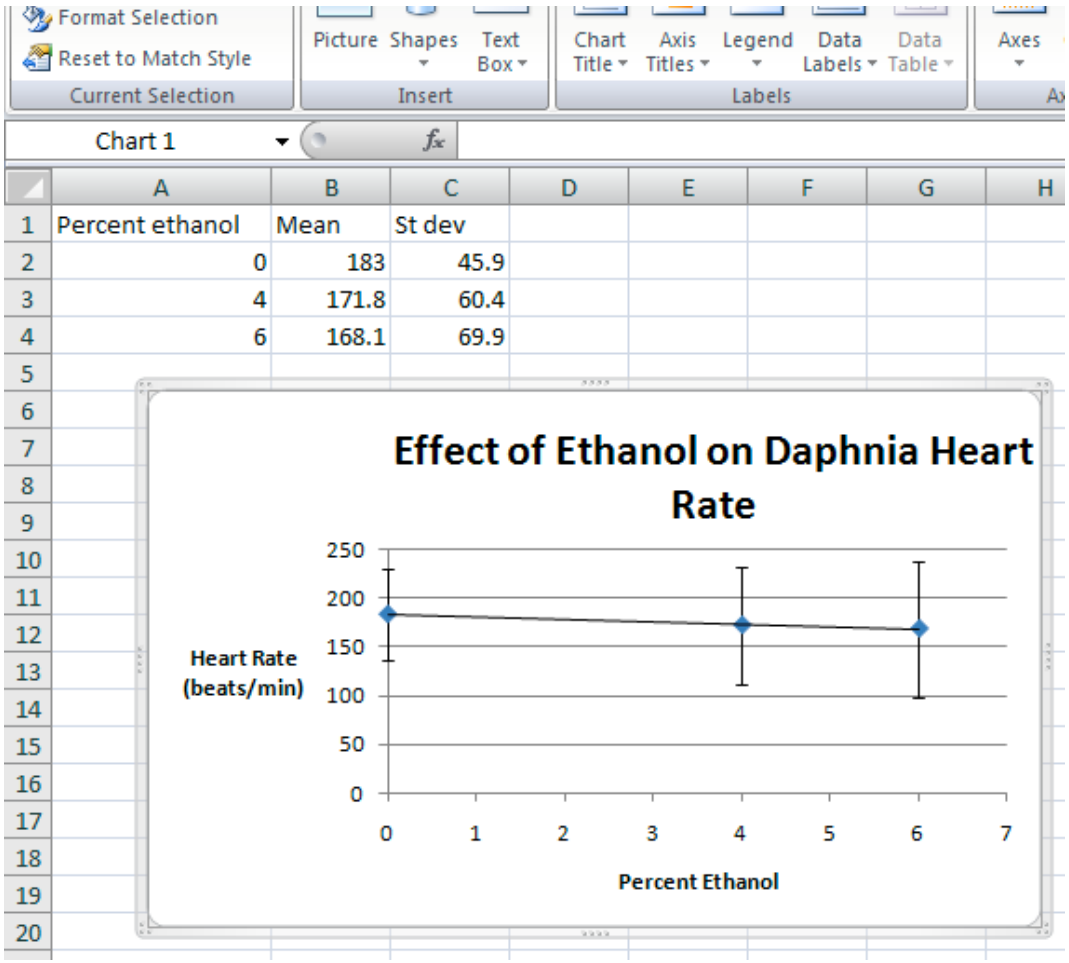
Do <u>not</u> choose "Error Bars with Standard Error" Or "Error Bars with Standard Deviation" options!

In the pop-up window, select ‘Both”, “Custom” and “Specify Values” buttons. In pop-up window, delete text in “Positive Error Value” box, then left click on the standard deviation data set.



Now delete text in “Negative Error Value” box, then left click on the *same* standard deviation data set. Now select “OK” and close pop-up window.

Now your graph should contain error bars.



	A	B	C
1	Percent ethanol	Mean	St dev
2	0	183	45.9
3	4	171.8	60.4
4	6	168.1	69.9

Note- If horizontal error bars are in your final graph (they often appear for no obvious reason), click and delete them.

These are large error bars due to the fact that the data is widely variable between groups of data. The larger the error bars, the less likely the reliability of differences observed between conditions.