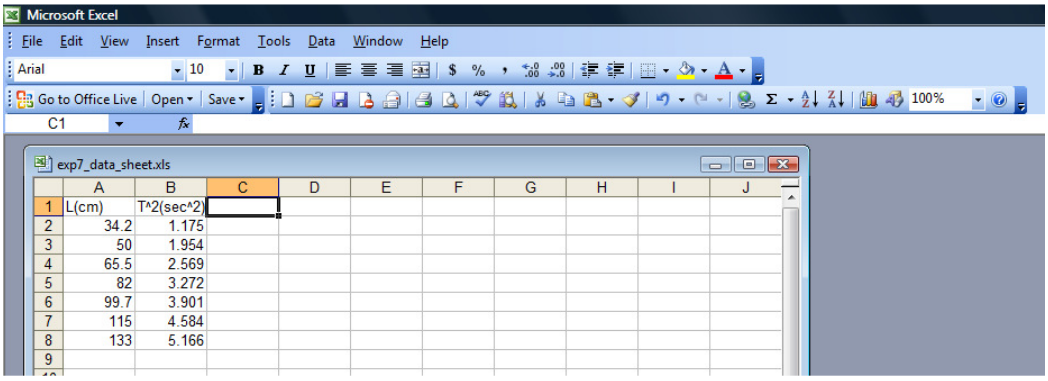
BIRZEIT UNIVERSITY

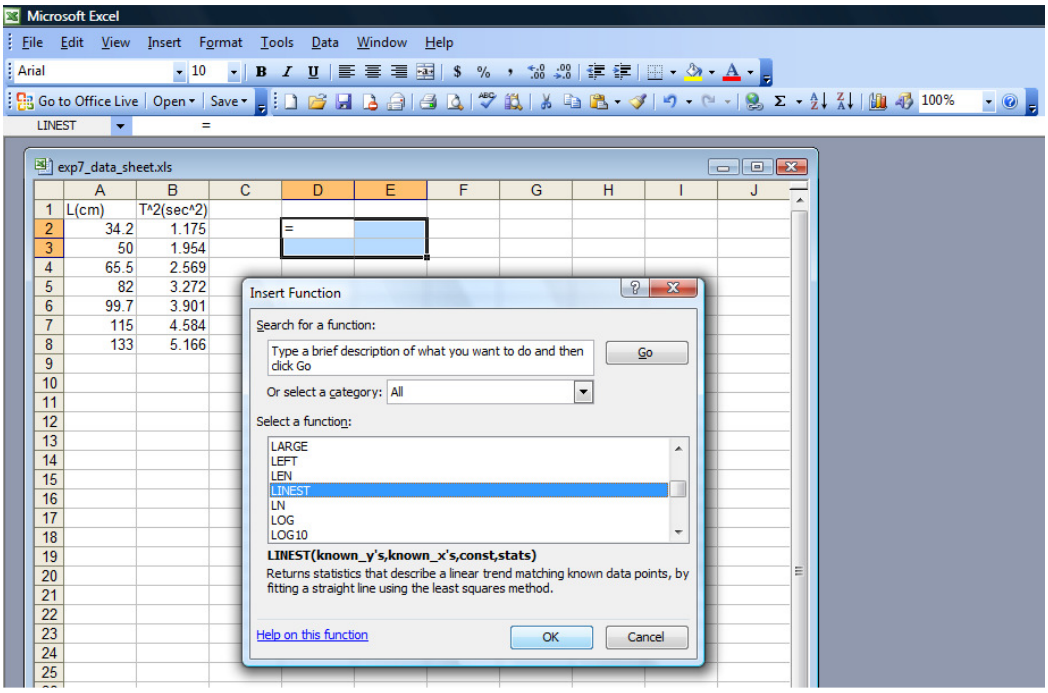
Physics 111

Instructions on how to use the software Excel 2003 for analyzing data for experiment 7 'Measuring g at Birzeit'.

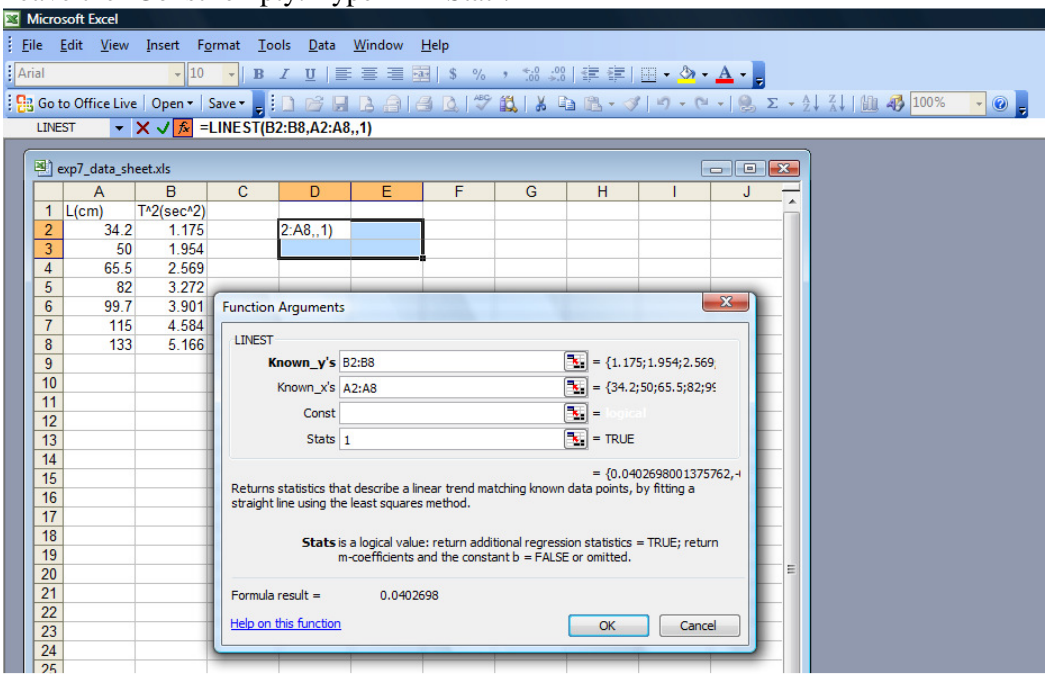
1) Start an excel sheet.
2) Enter the data points (one column for L and one column for T^2). See the illustrative screenshots below.



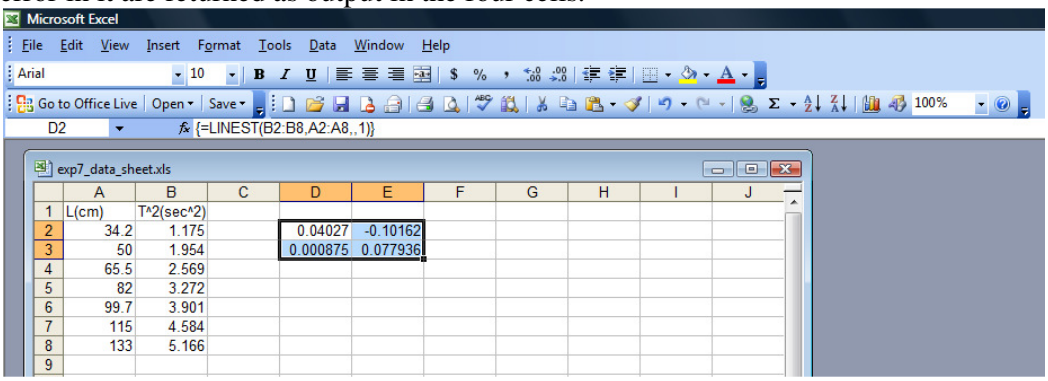
3) To calculate the best slope and the error in it, the best y-intercept and the error in it: Highlight any empty 4 cells where you like the output to be written, click on *fx* (Insert Function): a small window will appear. Chose LINEST and click ok.



4) Fill in the range for the Y and X values: (Remember, Y≡ T^2 and x ≡ L.). Leave the 'Const' empty. Type 1 in 'Stat'.



5) Press the key F2 on the keyboard. Then press the keys CTRL+SHIFT+ENTER. Now the slope, the error in it, the y-intercept and the error in it are returned as output in the four cells.

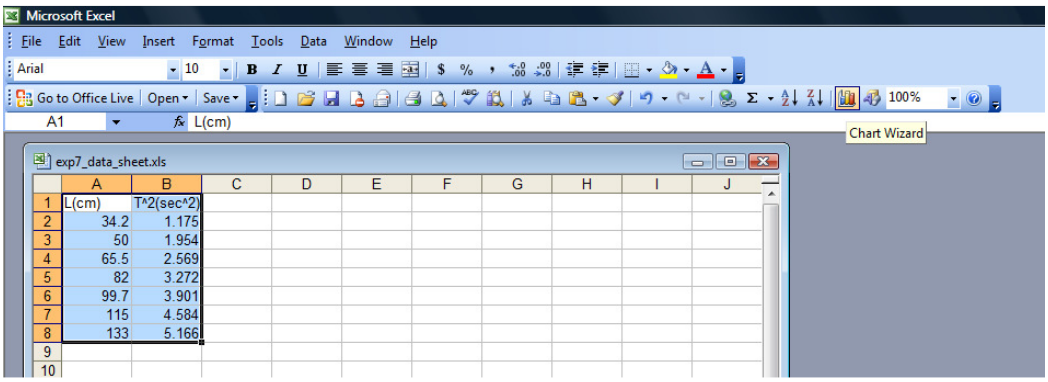


	A	B	C	D	E	F	G	H	I	J
1	L(cm)	T^2(sec^2)								
2	34.2	1.175		0.04027	-0.10162					
3	50	1.954		0.000875	0.077936					
4	65.5	2.569								
5	82	3.272								
6	99.7	3.901								
7	115	4.584								
8	133	5.166								
9										

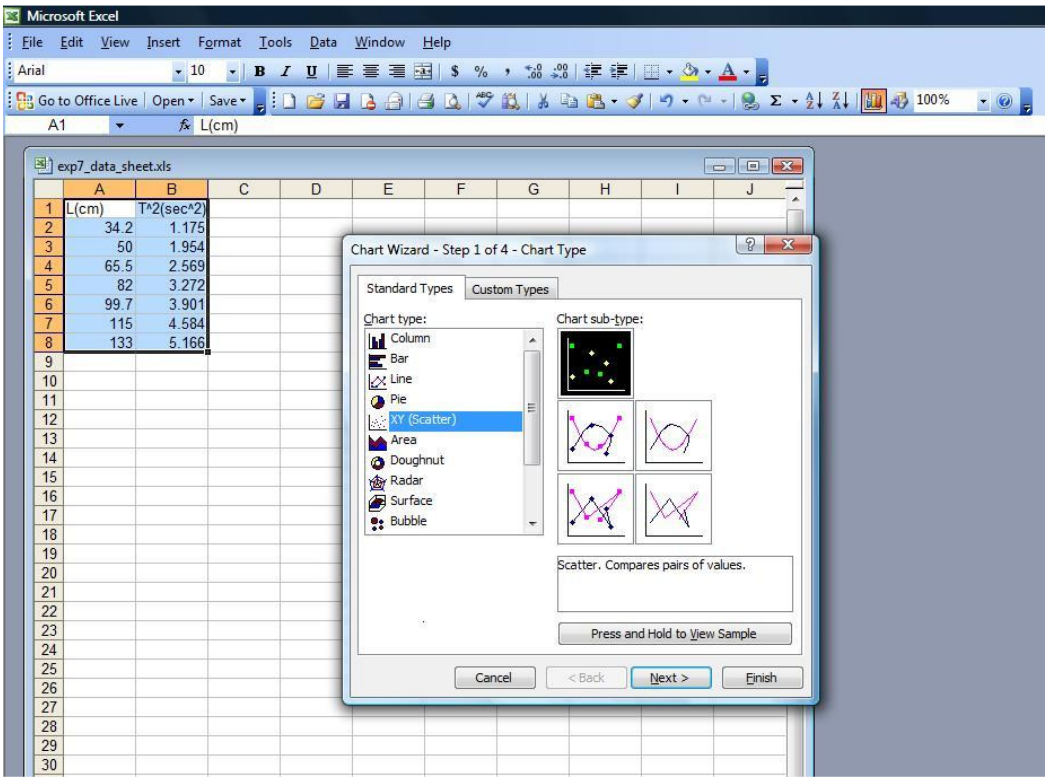
6) From the example above, we read: Slope = 0.04027 ± 0.000875
Y-intercept = - 0.10162 ± 0.077936

Slope = 0.04027 = $4\pi^2/g$ => g = $4\pi^2/0.0403$ = 980.34 cm/s
Δg = (0.000875/0.04027)*(980.34) = 21.3 cm/s
So: g = 980 ± 20 cm/s

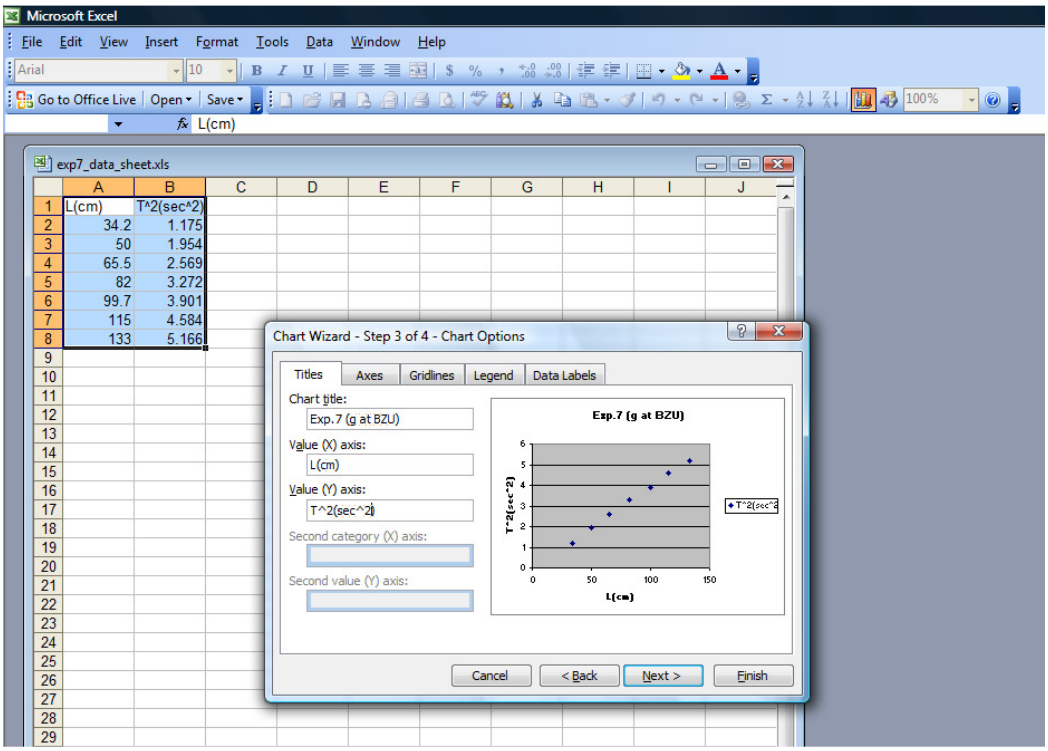
7) To draw the best straight line: Highlight both columns, then click on ‘Chart Wizard’ from the menu.



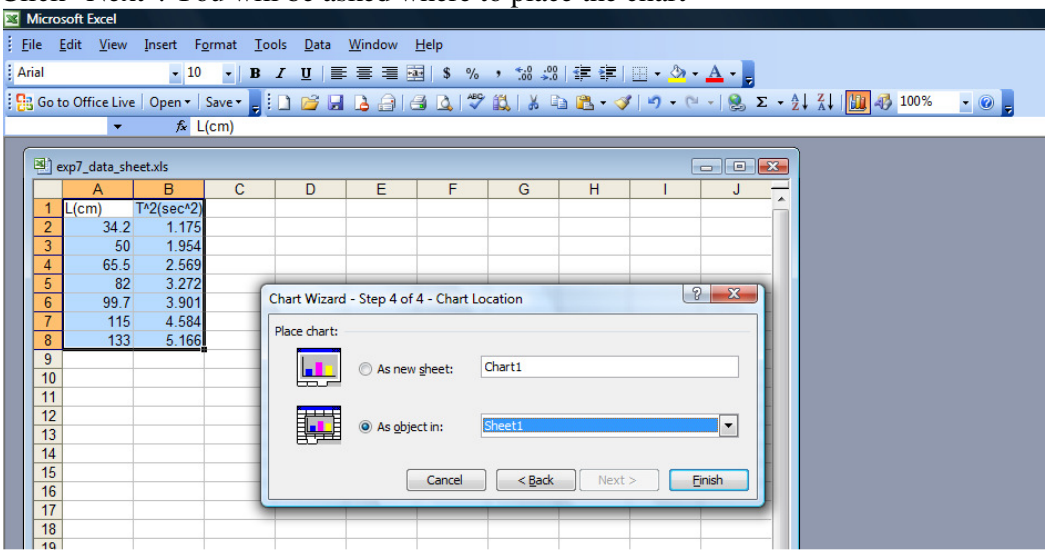
8) A small window will appear: chose XY (scatter). Click ‘Next’, a scattered plot of the data point will appear.



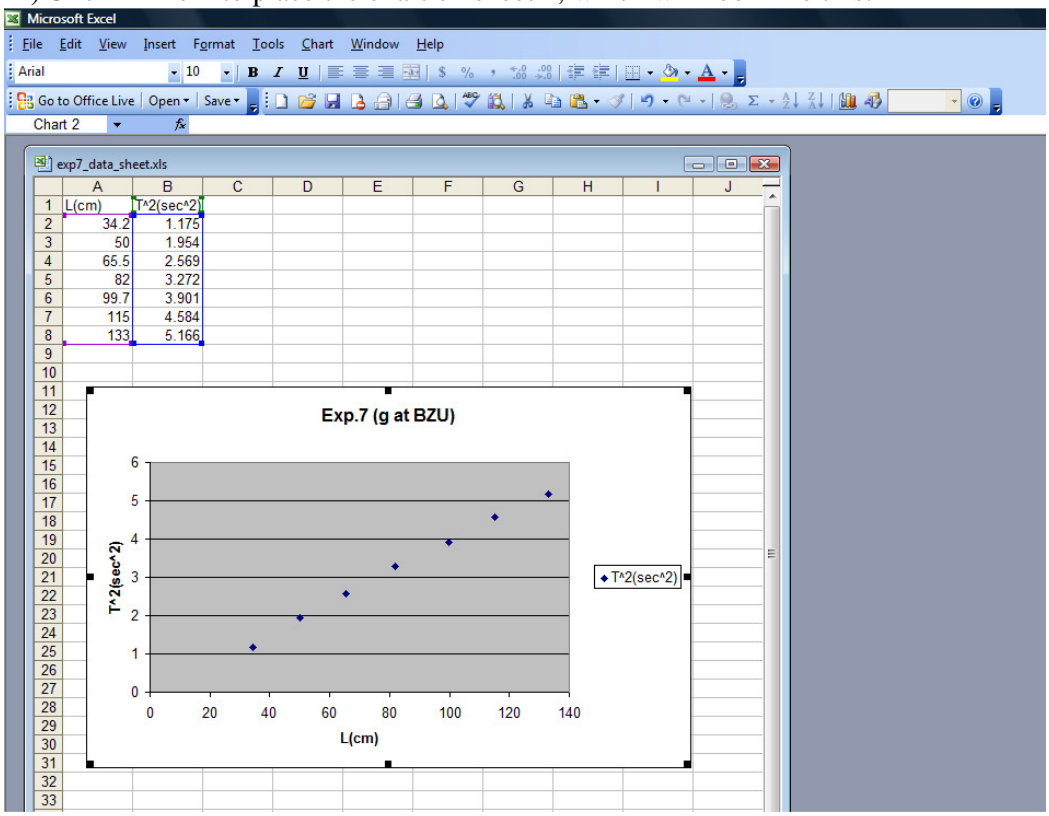
9) Click “Next”. The plot will appear and here you can label the axes:
Chart title: Exp.7 (g at BZU)
Value(x) axis, L(cm)
Value(y) axis T^2(sec^2)



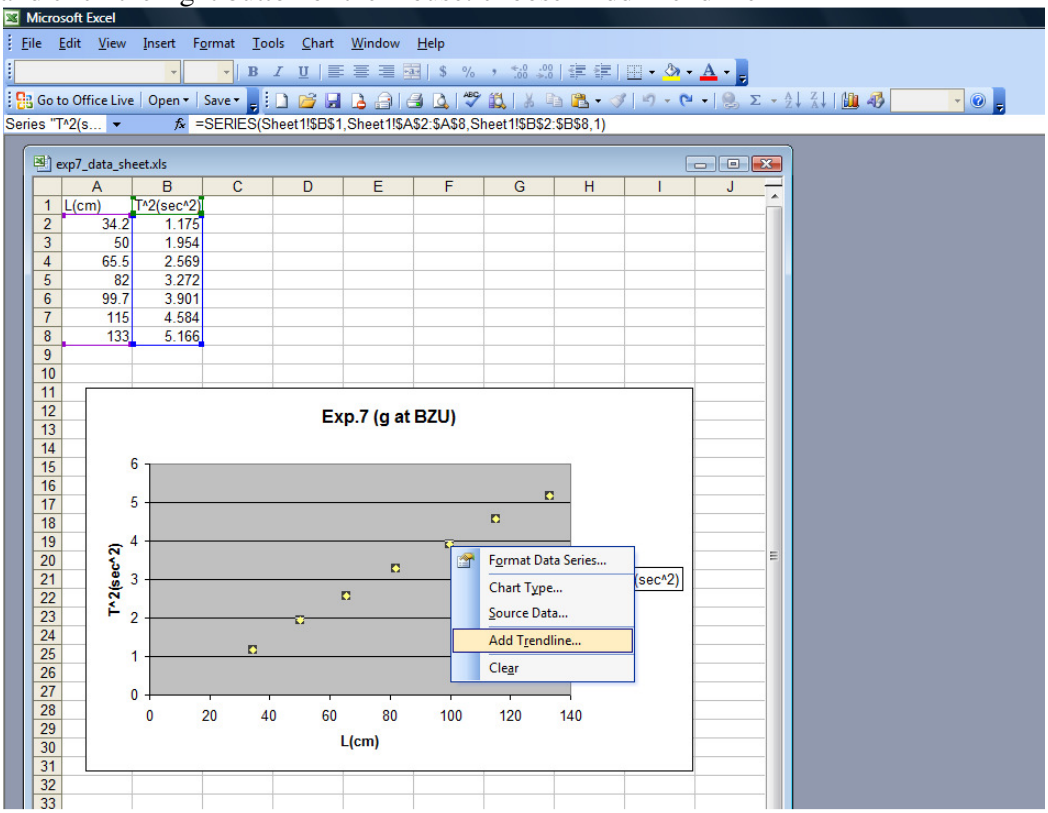
10) Click “Next”. You will be asked where to place the chart



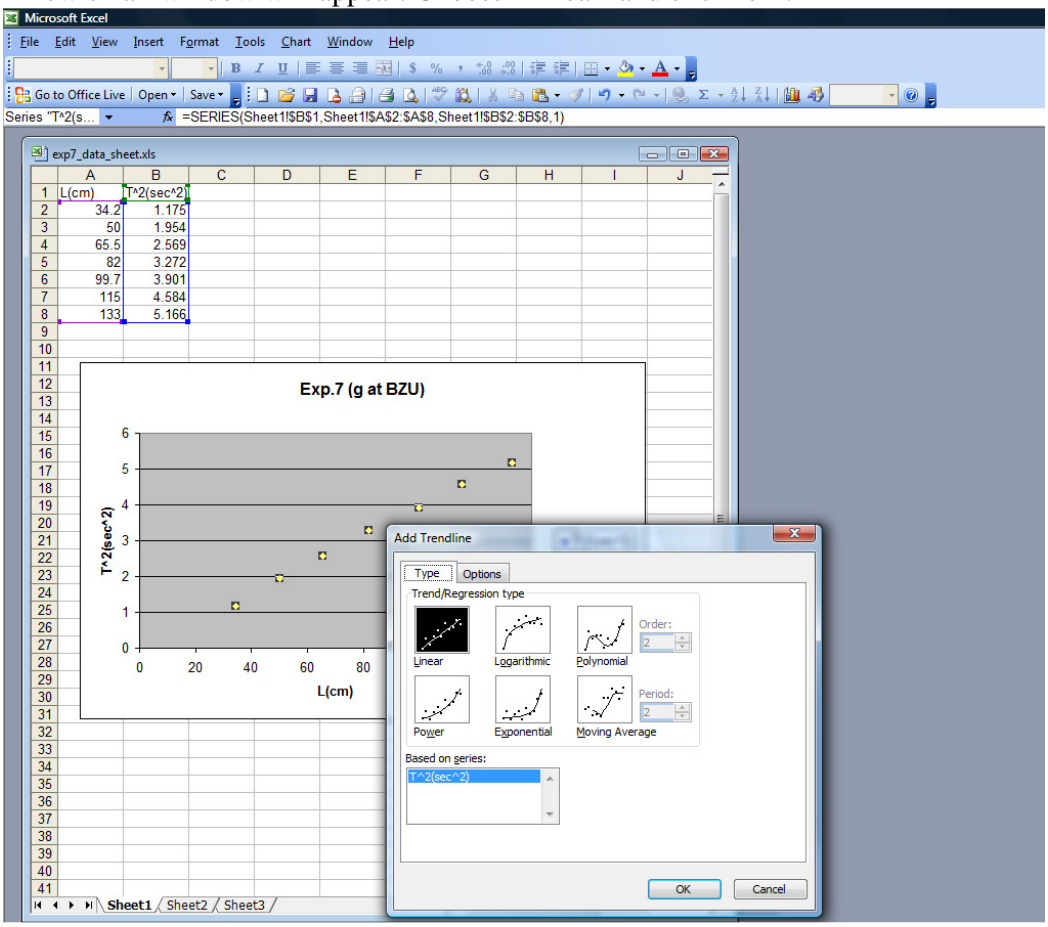
11) Click ‘Finish’ to place the chart on sheet 1, which will look like this:



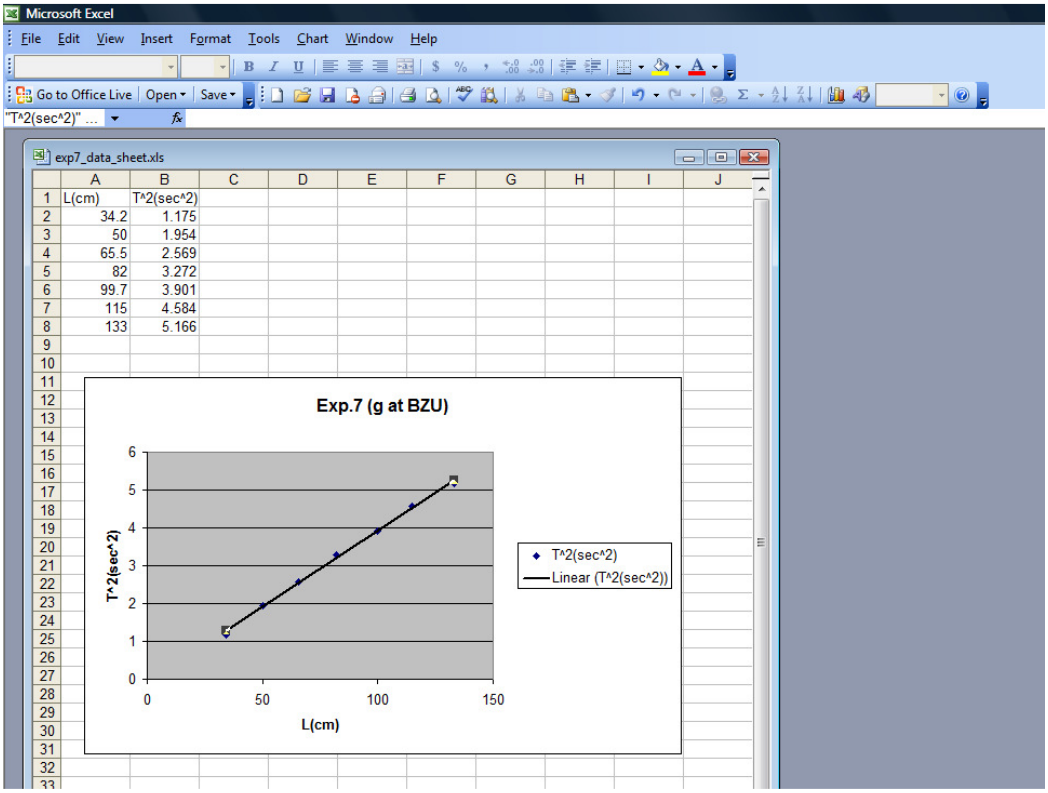
12) To draw the best straight line: put the mouse cursor on one of the data points and click the right button of the mouse: choose ‘Add Trendline’



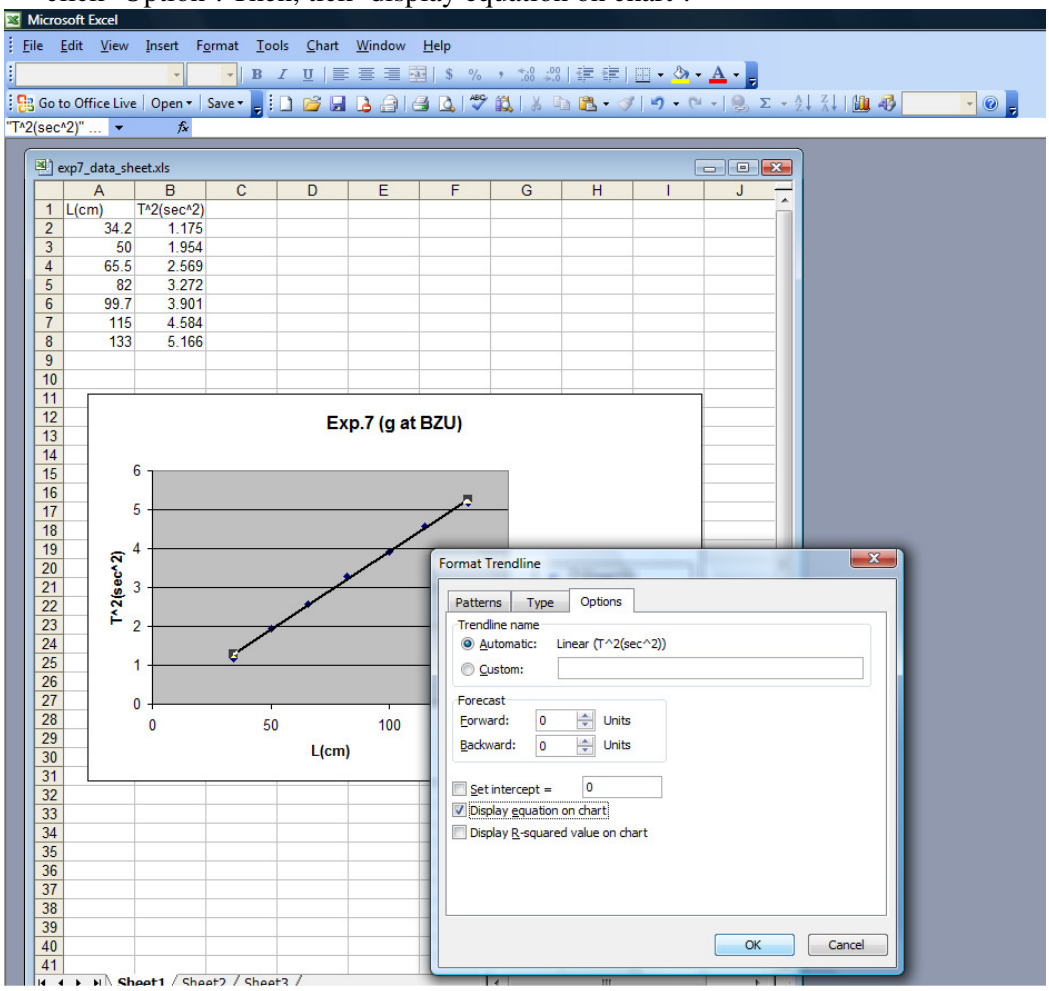
13) A new small window will appear: Choose ‘Linear’ and click ‘ok’.



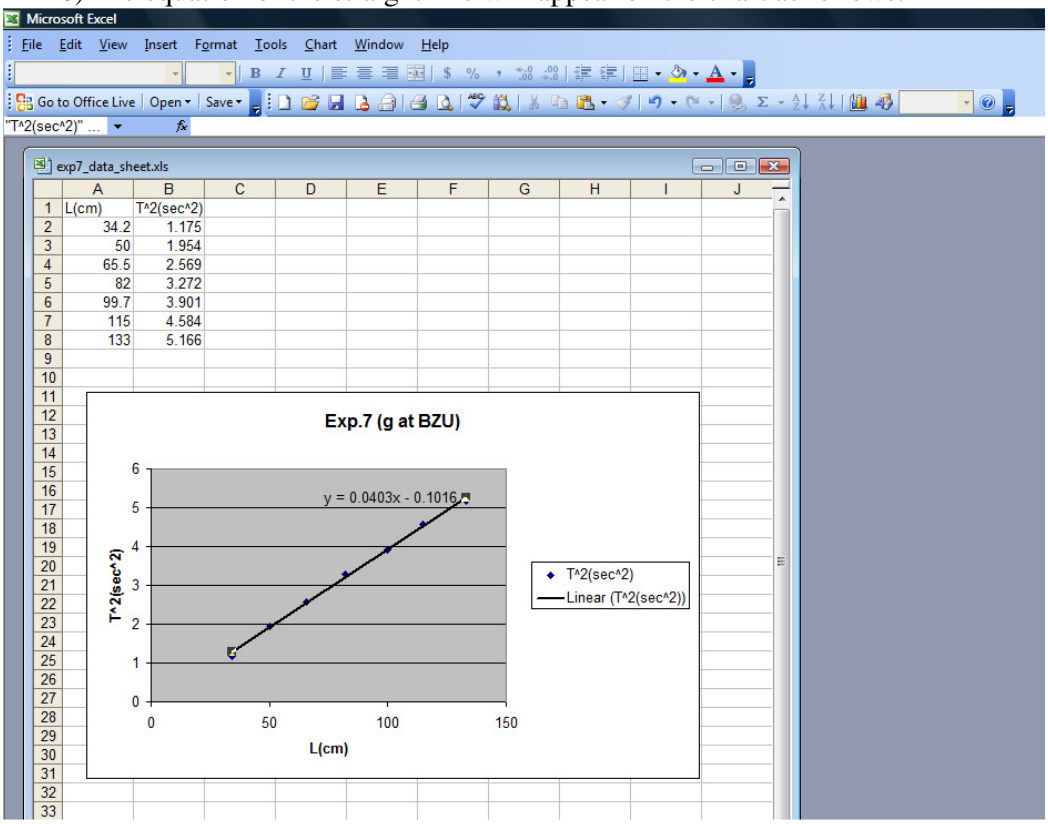
14) A straight line will appear to connect the data points. Your chart will look like this:



15) To find the equation of this best straight line: (i.e. to find the best slope and best y-intercept): Put the mouse cursor on the straight line, then click the right button of the mouse. Chose ‘Format Trendline’. A small window will appear, click ‘Option’. Then, tick ‘display equation on chart’.



16) The equation of the straight line will appear on the chart as follows:



So, for our illustrative example: Y=0.0403 x -0.1016
Remember: Y≡ T^2 and x ≡ L.
Slope = 0.0403 = $4\pi^2/g$ => g = $4\pi^2/0.0403$ = 979.6 cm/s