

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<sup>2</sup>). See the illustrative screenshots below.

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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

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1 L(cm) T*2(sec*2)
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6 99 7 3 201 Insert Function
7 115 4.584 Search for a function:
8 133 5.166 Type a brief description of what you want to do and then Go
9 dick Go
10 Or select a category: All
12 Select a function:
19 LINEST(known_y's,known_x's,const,stats)
20 Returns statistics that describe a linear trend matching known data points, by
21 ntting a straight line using the least squares method.
23 Help on this function OK Cancel

4) Fill in the range for the Y and X values: (Remember,  $Y \equiv T^2$  and  $x \equiv L$ .). 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.

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

Slope =  $0.04027 = 4\pi^2/g \Rightarrow g = 4\pi^2/0.0403 = 980.34$  cm/s  $\Delta g = (0.000875/0.04027)*(980.34) = 21.3$  cm/s So: g =  $980 \pm 20$  cm/s 7) To draw the best straight line: Highlight both columns, then click on 'Chart Wizard' from the menu.

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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)

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

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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'





14) A straight line will appear to connect the data points. Your chart will look like this:
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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 =  $0.0403 = 4\pi^2/g \Rightarrow g = 4\pi^2/0.0403 = 979.6$  cm/s