

# Using Excel to Create Data Tables and Graphs

by R. White

If you only need to create a simple data table and graph for a lab report, follow the first set of instructions. If you need to create graphs that compare experimental and theoretical data, you'll need to supplement the first set of instructions with some additional details listed in the second set.

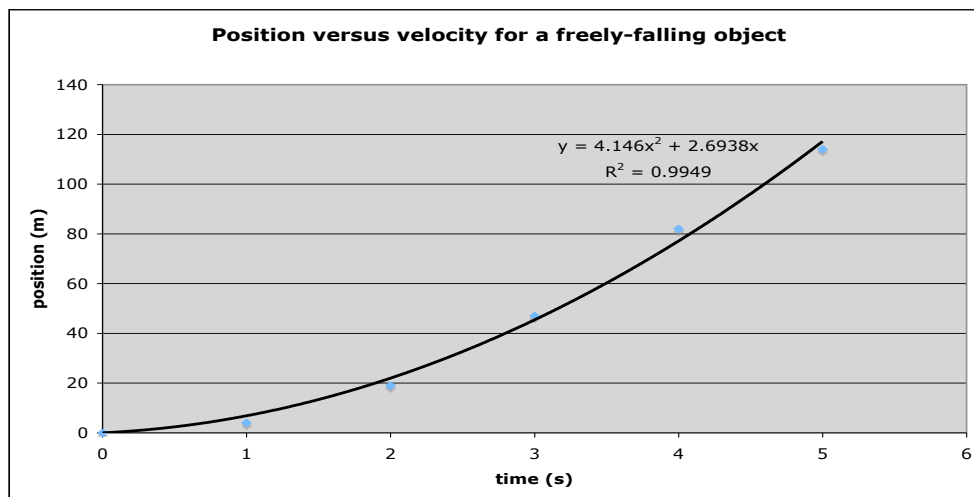
## Using Excel to create basic Data Tables & Graphs

1. Launch the Excel program.
2. Enter the name for your  $x$  quantities ("time," for example, to be plotted on the horizontal axis) in the first column, first row, and fill the rest of that first column with your values. Enter the name for your  $y$  quantities ("position," perhaps, for the vertical axis), and fill the rest of that second column with your values.
3. Click-and-drag from the upper-left to lower-right cell, including the labels, to select the cell data you wish to graph. On the Excel menu at the top of the page, choose **Insert > Chart...**
4. In the series of dialog boxes that follow, choose options appropriate to your graph. These will almost always be:
  - Step 1: Choose an XY-Scatter plot, with "data points only" sub-type
  - Step 2: Choose Series in Columns
  - Step 3: Enter Graph Title and axis titles with units; then select the Legend tab and uncheck "Show Legend"—you don't want a legend for most graphs.
  - Step 4: Choose "As New Sheet" so that the new graph is created in a separate worksheet. Then click "Finish."
5. Click once on a data point to select them.
6. Once the new chart is displayed, choose **Chart > Add Trendline**
  - a. Select the type of function that you anticipate is represented by your data (linear? power? exponential?)
  - b. Under the Options tab, select "Display Equation on Chart" and "Display R-squared on Chart."
7. Double-click on the gray background to change the graph background to white.
8. Double-click on the  $x$ - or  $y$ -axis to change maximum and minimum values, etc., as desired.
9. To use your Data Table and Graph in a written lab report, print each worksheet separately by selecting **File > Print**. Or, to use your Data Table and Graph in an online document, take a screenshot with the table or graph on the screen, then import or upload that graphic to your online document.
10. Note that the regression equation ( $y=4.146x^2+2.6938x$ , in this case) has the form  $x_f = \frac{1}{2}at^2 + v_i t + x_i$ .

time (s)	measured position (m)
0	0
1	4
2	19
3	47
4	82
5	114

Thus, we can use this analysis to determine that the experimental acceleration for this object:

$$\frac{1}{2}a = 4.146, \text{ so } a = 8.292m/s^2$$



# Using Excel to Create Data Tables and Graphs

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## Using Excel to Graph Experimental and Theoretical Graphs

Follow the same steps as above, with these additional steps added:

2. a. In addition to the first two columns, you'll add a third column with the heading "Theoretical Data Values."

2. b. In the first data box in this row, you'll enter an equals sign (=) followed by the theoretical formula you want to graph. Instead of entering the variable  $t$  though, you'll click on the first column cell that contains the value  $t=0$  (cell A2, typically). Complete the formula, and then hit Enter. (See the example here, in which position-time data has been collected for an object rolling down a ramp).

	A	B	C	D
1	time (s)	position measured (m)	position theoretical (m): $a=2/3 \cdot g \cdot \sin(\theta)$	
2	0	0	=0.5*(2/3*9.8*sin(radians(10)))^2*A2^2	
3	0.43	0.1		
4	0.64	0.2		
5	0.77	0.3		
6	0.89	0.4		
7	0.93	0.5		
8	1.04	0.6		
9	1.13	0.7		
10	1.21	0.8		
11	1.28	0.9		
12	1.31	1		

2. c. Once the formula is correctly entered for this cell, click-and-drag to highlight this square and the rest of the column below it. Choose **Edit > Fill > Down** to copy that formula down the column for all of your other data points. You now have two columns of position data for each time entry: one measured position and one theoretical position. You won't show the theoretical data in your lab report data table—it's simply there so that we can graph the theoretical motion.

3. Click-and-drag from the upper-left to lower-right cell, including the labels, to select all three columns of data. On the Excel menu at the top of the page, choose **Insert > Chart...**

4. In the series of dialog boxes that follow, choose options appropriate to your graph. These will almost always be:

- Choose an XY-Scatter plot, with a "data points only" sub-type
- Enter Graph Title and Axis titles with units.

5a. Click once on a data point for the experimental data and continue with step 6 to create a trendline. Click once on a data point for the theoretical data and continue with step 6 to create a second trendline on the same graph.

6c. Click once on one of the theoretical data points to change the Marker Style to "No Marker." These points are used to create the theoretical trendline but don't indicate actual data points, so they shouldn't be on the graph.

The final result of this is seen here, with the data table that will be included in the report, the data table that I used to create the graph (*not* included in the report), and the final graph.

Data Table included in report

A	B
time (s)	position measured (m)
0	0
0.43	0.1
0.64	0.2
0.77	0.3
0.89	0.4
0.93	0.5
1.04	0.6
1.13	0.7
1.21	0.8
1.28	0.9
1.31	1

Data Table *not* included in report

A	B	C
time (s)	position measured (m)	position theoretical (m): $a=2/3 \cdot g \cdot \sin(\theta)$
0	0	0
0.43	0.1	0.104884657
0.64	0.2	0.232345892
0.77	0.3	0.336322948
0.89	0.4	0.44931929
0.93	0.5	0.490615142
1.04	0.6	0.613538372
1.13	0.7	0.724322436
1.21	0.8	0.83051177
1.28	0.9	0.929383569
1.31	1	0.97345895

Graph included in report

