

Excel[®] Tips

EXCEL TIP 1: INPUTTING FORMULAS

To input a formula in *Excel*, click on the cell you want to place your formula in, and **begin your formula with an equals sign (=)**. There are several functions you can use.

- * is used for multiplication
- + is used for addition
- – is used for subtraction
- / is used for division
- \wedge is used for exponentiation (for example: $2^2 = 4$)
- *PI()* is the *Excel* function for π (use w/o argument)
- *SQRT()* is used to take the square root of the thing in parentheses
- *SIN()* is used to take the sine of an angle, where the angle is in radians
- *COS()* and *TAN()* are used like *SIN()*
- *ASIN()*, *ACOS()*, and *ATAN()* also take arguments in radians

Excel knows order of operations, so go easy on the parentheses. For the arguments of your functions, you can use numbers just by typing them in, or you can use the numbers in specific cells by referencing the appropriate cell using its column letter and row number (ex. A2).

EXCEL TIP 2: CLONING FORMULAS

Excel does formula operations by looking at the relationship between the cell where the formula is inputted and the cells that the formula references. For example, if you input the formula $=SQRT(A1)$ into cell $A2$, *Excel* says to itself, “I need to go one cell to the left and perform the square root operation on that, and then give the result in my current cell, $A2$.” This means that you can click and drag formulas down if you want to perform the same operation on a set of numbers. For example, if you have the numbers 1 through 10 listed in cells $A1$ through $A10$, and you want to input the formulas below, you can do it in a way that is much easier than entering all of those formulas by hand.

	A	B	C
1	4	$=SQRT(A1)$	
2	9	$=SQRT(A2)$	
3	16	$=SQRT(A3)$	

The first thing you do is enter the formula $=SQRT(A1)$ in cell $B1$ and hit Enter. With the mouse, click once on the cell that has your formula in it. You should see a little black square in the bottom right-hand corner. Click and hold on this, and drag the mouse down all the way to cell $B3$. If you click on cell $B2$ now, you should see a formula there that is referencing cell $A2$, not $A1$. The spreadsheet should look like this:

	A	B	C
1	4	2	
2	9	3	
3	16	4	

Now, if for some reason you *always* wanted to reference cell $A1$ when you drag the formula down, you could put **dollar signs** in front of the A and the 1 , like so:

	A	B	C
1	4	$=SQRT(\$A\$1)$	

Now when you drag the formula down into cells $B2$ and $B3$, you should see the following:

	A	B	C
1	4	2	
2	9	2	
3	16	2	

This dollar-sign thing is useful if you are using a constant, like $g = 9.8$, that is the same for many cells.

EXCEL TIP 3: SUM, VAR, AVERAGE, STDEV

The functions listed in the box INPUTTING FORMULAS all work on single numbers. However, there are some formulas, known by *Excel*, that work on a whole range of numbers at one time. The four you will need to use the most are **SUM**, **VAR**, **AVERAGE**, and **STDEV**. These work as follows.

- **SUM(A1:A15)** will take the sum of all of the numbers listed in cells *A1* through *A15*
- **VAR(A1:A15)** will find the variance of the numbers listed in cells *A1* through *A15*
- **AVERAGE(A1:A15)** will find their mean
- **STDEV(A1:A15)** will find their standard deviation

EXCEL TIP 4: CREATING PLOTS

We will often create a plot of some experimental data. Follow the steps below to create a plot.

1. Highlight the data you wish to plot. It will generally be in the format of two columns of numbers. The independent variable will go along the *x* axis, and the dependent variable will go along the *y* axis.
2. Click on *Insert* and then click *Scatter*.
3. A number of graph options will appear. Choose the one with no lines between the data points.
4. A plot will appear and the *Design* toolbar will be displayed. Click on *Layout 1* (left-most tool on *Chart Layout* field) to add axis labels and a plot title. For more adjustments in formatting follow the instructions in *EXCEL TIP 6*.

EXCEL TIP 5: ADDING SERIES TO PLOTS

Often, in these experiments we will create a plot of some experimental data and overlay another line – a separate experimental run, for example, or a fit line. Follow the steps below to add a new series to a plot.

1. Right click on the background area of the graph (it is usually gray) and choose *Select Data*.
2. A screen will appear, showing a preview of the graph. There are two tabs above the picture of the graph. Click on *Series*.
3. In the box where all the series currently on the graph are listed, choose *Add*.
4. Choose some data for the new series. Begin by clicking on the small box with the red arrow that is just to the right of the box labeled *X-Values*. Highlight the values of the independent variable for the new series.
5. Choose the corresponding values for the dependent variable by repeating step 4 for the box labeled *Y-Values*.
6. A new series will appear on the graph preview. Click *OK*.

EXCEL TIP 6: ADJUSTING PLOT FORMATTING

Once you have created a plot, make sure it is selected (click on it once) and then follow these instructions to format the different components of the plot.

Axis labels:

1. With the plot selected, go to the main toolbar and select *Chart Tools > Layout > Axis Titles*.
2. Choose the axis you want to edit.
3. When you have clicked on the chosen axis, another menu will appear. Choose *Title Below Axis*.
4. You may now edit the contents of your axis label directly on the chart.

Main plot title:

1. With the plot selected, go to the main toolbar and select *Chart Tools > Layout > Chart Title*.
2. Choose the option *Above Chart*.
3. A title will appear that can be edited directly on the chart.

Changing series labels in legend:

1. Right click on the main area of your plot.
2. Choose *Select Data*.
3. A list of current data series will appear. Choose the one whose name you want to change by clicking on it once.
4. Click *Edit*. A box will appear that says *Series Name*. You can fill in the box with whatever you want your series to be called, and it will appear on the legend.

Changing series style, color, etc:

1. With the plot selected, right click on a single data point of the series whose formatting you want to edit.
2. In the menu that appears, choose *Format Data Series*.
3. A list of options will appear that includes everything you might want to change about the markers, lines, etc. of that series. Choose the option for the component you want to edit and a menu will appear to guide you.