Using histograms to display turntable data

On the explore page there is an option to produce a histogram using the data your students gather as they work their way through each of the different sources and absorbers. If you would like to set this as a task for your students, Microsoft excel has the ability to produce histograms by using the Histogram tool of the Analysis ToolPak. This ToolPak Add-in must be installed before you can use the Histogram tool.

For a walkthrough on how to install this ToolPak, please follow the link below.

http://support.microsoft.com/kb/214269

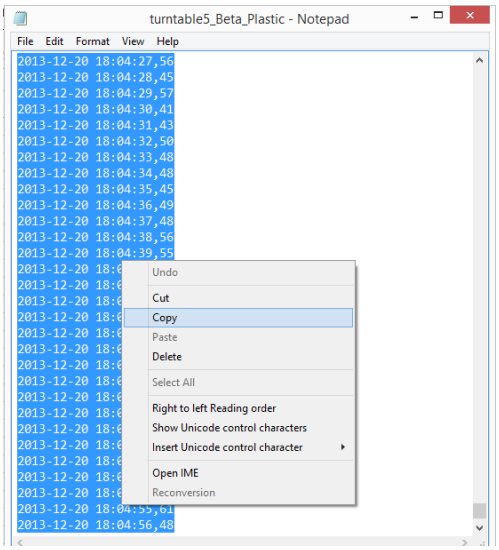
After installation is complete, you can follow the instructions below to produce histograms. For this example, Microsoft Excel 2013 edition has been used.

The downloadable Turntable 5 Reference Data (found in the "For Teachers" > "Nuclear Teachers Notes": Reference Data > Turntable 5: "turntable5.zip") is what has been used in the following example. Specifically, the "turntable5_Beta_Plastic" text file.

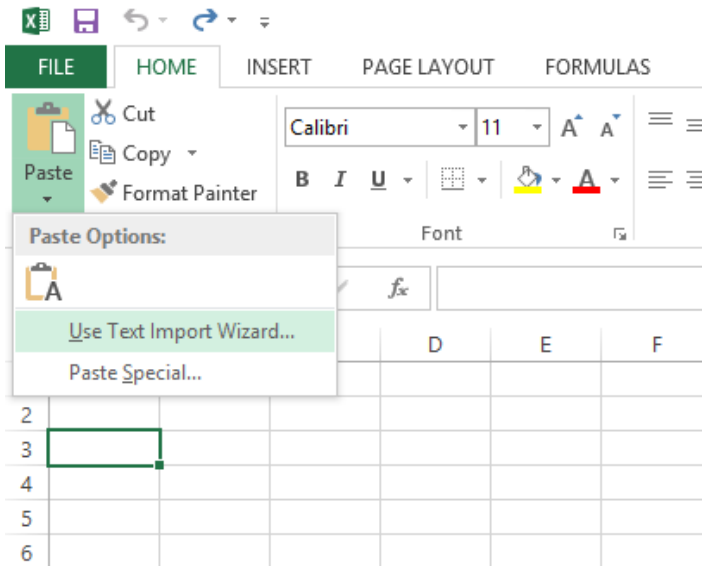
Creating a histogram from a text file

Before you can create your histogram, you must first make a histogram table. This table will have two columns, one for the Frequency data and the other for the Bin values.

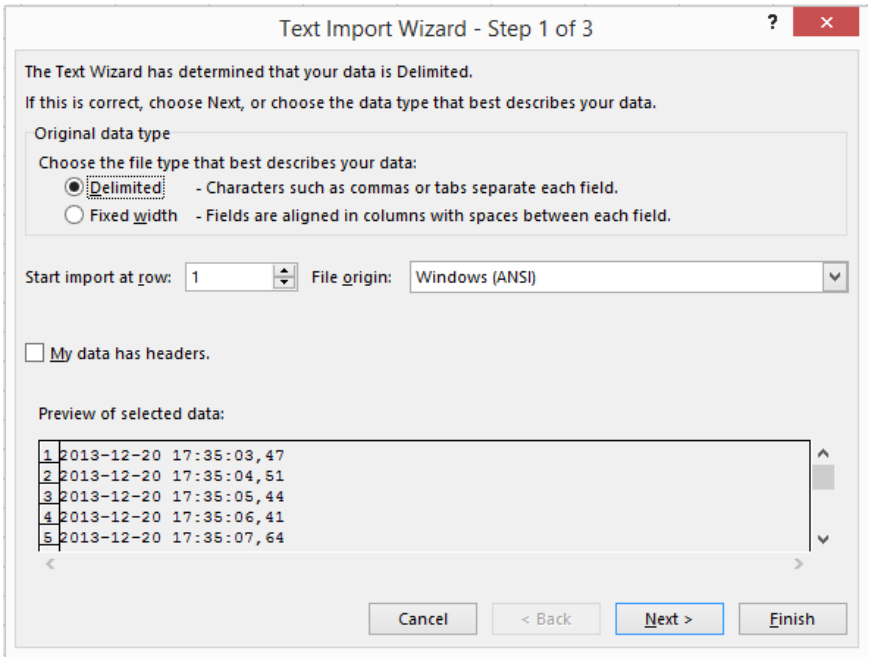
1. First, we need to get the data from the saved text file onto our excel spread sheet. This can be done in more than one way. One way is to open the text file you have downloaded from the FAR Labs website, go to Edit > Select All or simply press ctrl-A to highlight all the data and copy it by right clicking over the highlighted area and selecting "Copy". You can also click on the "Data" tab at the top of the screen, click "From Text" and select your file but make sure you know when you saved it to before doing this.



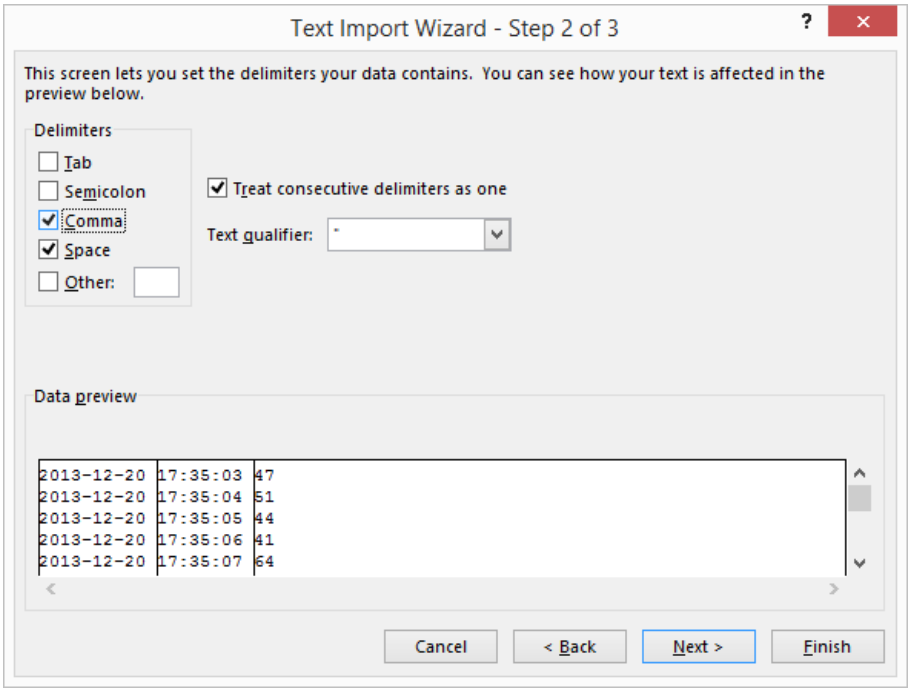
2. Open Microsoft Excel and under the "Home" tab, click on the arrow underneath the “Paste” clipboard icon. Then select “Use Text Import Wizard”. In excel 2007, to bring up the equivalent of the Text Import Wizard you go click on the "Text to Columns" icon under the Data tab. The steps and interface are exactly the same as described below for the 2013 version.



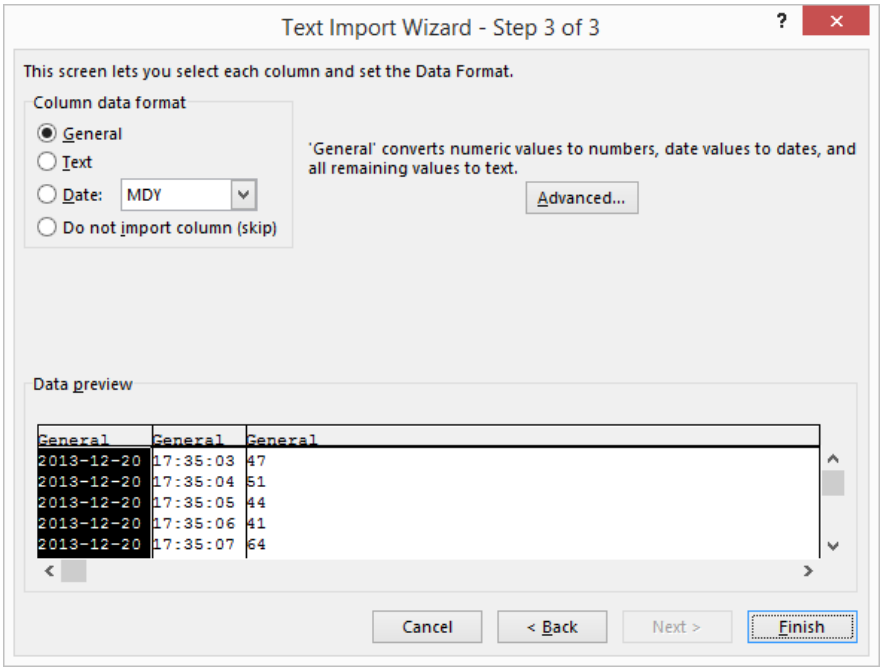
3. Once the Text Import Wizard is open, there are three steps to complete. The first of these (see figure below) determines the file type that describes your data. This basically lets you separate your data based on what characters are in between them. From the text file you downloaded, there is a comma that separates the relevant data (number of counts) from the time stamp. Selecting “Delimited” gives you the opportunity to put the number of counts in a separate column which will come in handy later. Then click the “Next” button.



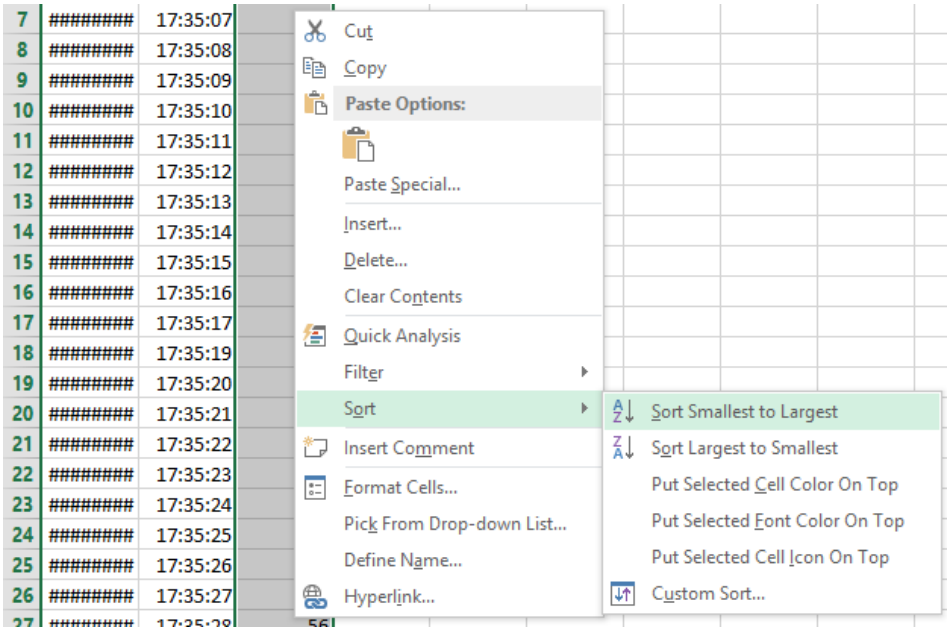
4. Step 2 allows you to set which characters will act as delimiters (separate data into their own columns). As mentioned in the previous step, commas have been used to separate the counts from the date and time so select “Comma” from the options and then click the “Next” button.



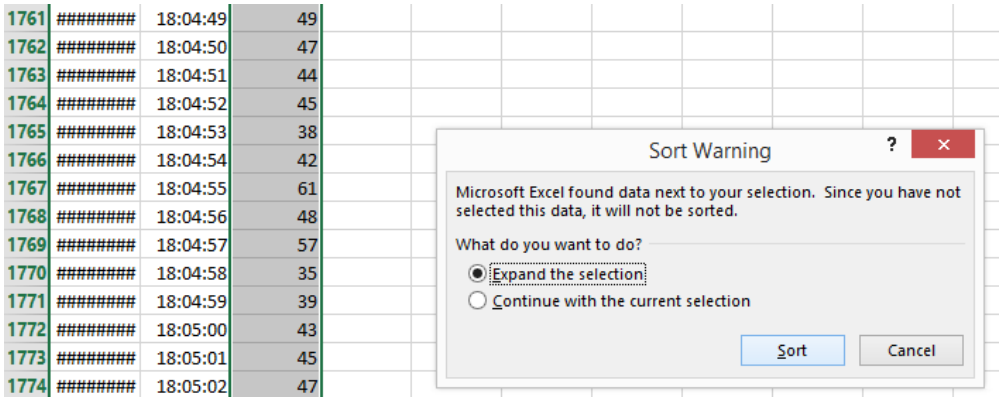
5. The third step lets you select the format of the data for each column. As the only column of interest is the one with the number of counts in it, leaving it on “General” will suffice. Then click “Finish”.



6. The data is then displayed in three columns. The one on the right is the number of counts recorded for each second the experiment was run. Highlight this entire column, right click and select “Sort” and then “Sort Smallest to Largest”. In the excel 2007 version you can click anywhere in the column and select "Sort".

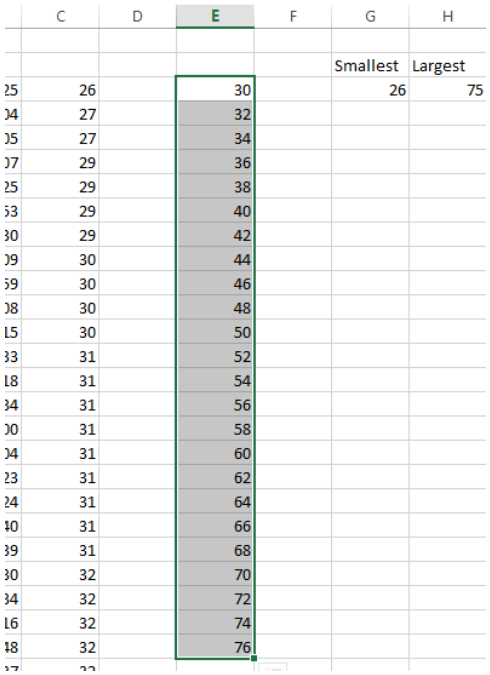


7. Once that is done, you will be asked whether you want to sort the other columns as well in order to keep each row of data together. As we are only interested in the number of counts, it doesn’t matter whether you “Expand the selection” to sort all the data or just the column you selected. Easiest to just click the “Sort” button and proceed.



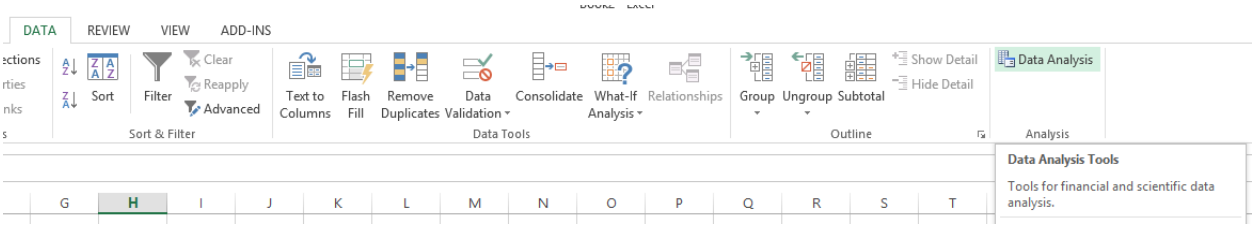
8. Sorting the data from smallest to largest is done in order to determine what size “Bins” you will use for your histogram. A “Bin” is the range of values that will all be grouped together. For example, if you have values of 2,3,6,6,5,3,4,9 and 7, you can have bin size values of 3,6 and 9 which means the numbers 1,2 and 3 all fall in the first bin of value 3, the numbers 4,5 and 6 fall within the second bin of 6 and 7,8 and 9 fall within the final bin of 9. By recording the smallest and largest number of counts, you can determine where your bin range will start from and where it will finish. The smallest value in the data collected is 26 and the largest is 75. As a

general rule, bin values that increase by 2 tend to produce nice histograms for these turntable data. The highlighted column of values in the picture below contains the bin values selected for the number of counts data. These two columns will be the two used to form the histogram. Enter your bin values starting from the smallest value, all the way to the largest value in a separate column.

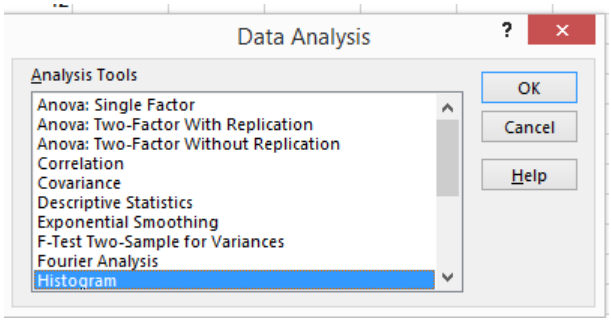


	C	D	E	F	G	H
					Smallest	Largest
25	26		30		26	75
04	27		32			
05	27		34			
07	29		36			
25	29		38			
53	29		40			
30	29		42			
09	30		44			
59	30		46			
08	30		48			
15	30		50			
33	31		52			
18	31		54			
34	31		56			
00	31		58			
04	31		60			
23	31		62			
24	31		64			
40	31		66			
39	31		68			
30	32		70			
34	32		72			
16	32		74			
48	32		76			

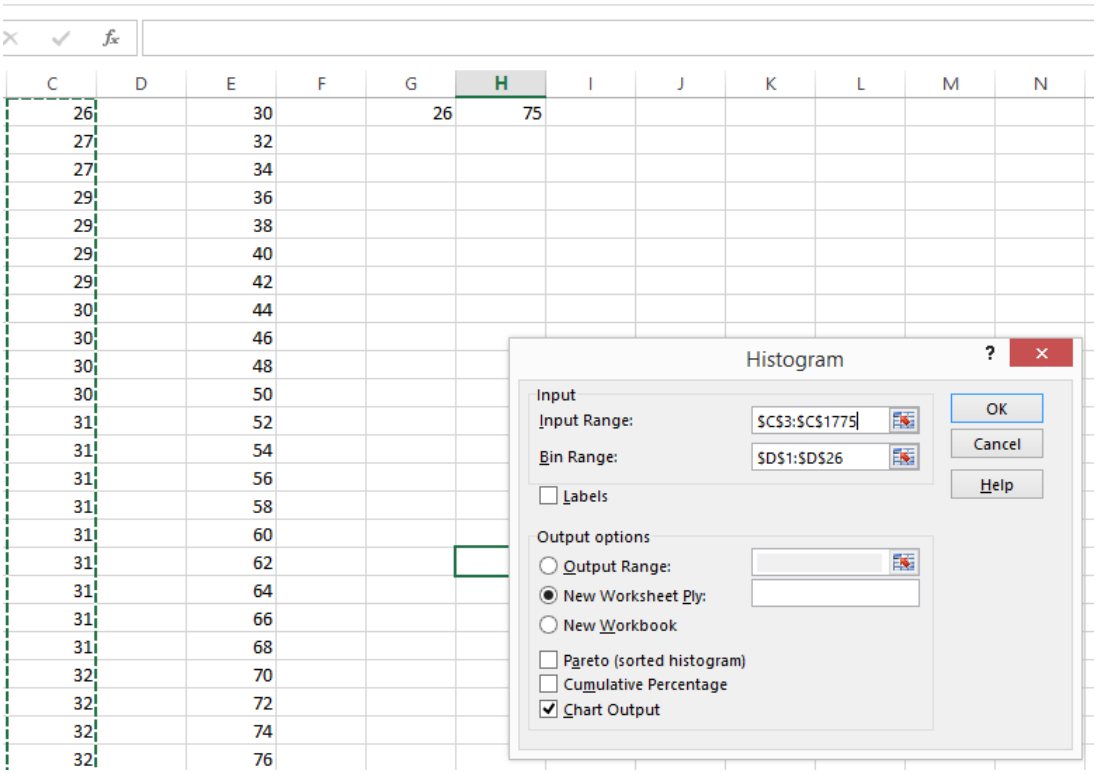
9. At this point you are ready to make your table of values. To access the histogram function, go to the "Data" tab and click on "Data Analysis Tools" (This is where it is located in the 2013 version of excel. It may differ for older versions).



10. Find "Histogram" and click "OK".



11. This will open up a window that asks for cell ranges for each of the "Input Range" and "Bin Range". Make sure that the column you highlight for the "Input Range" is the number of counts data and the column "Bin Range" is the column that you created in Step 8. Before clicking "OK" make sure that you have selected "Chart Output" at the bottom of the "Histogram" window.



12. If you have not selected "Chart Output" you will only get a histogram table (on the left side of the picture below) and not a histogram itself (on the right of the picture below.