Names: _____

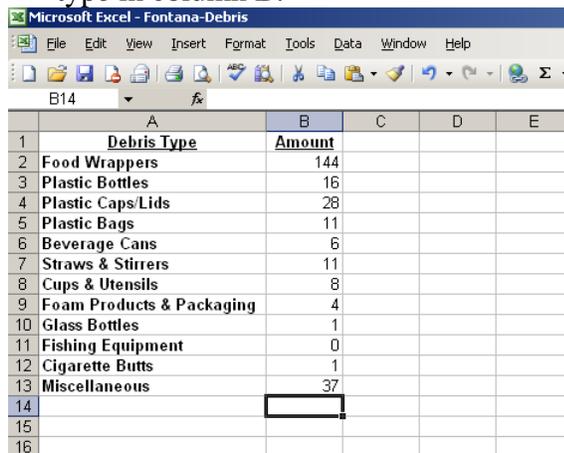## Trash Pick-Up --Data Analysis and Graphing in Microsoft Excel:

Microsoft Excel is a program for entering, storing, and analyzing data. It is available on most PC and Mac computers as part of the Microsoft Office package and is commonly used in many professions. Excel is a valuable skill to know for most college classes, visualizing data, and when applying for jobs.

Today we are going to learn how to practice visualizing data in Excel. We will enter data in a basic table set up to suit our trash pick-up experiment. Then we will use Excel's graphing features to display the data in a way that is easy to analyze, answer question below, and discuss.

Below are step-by-step instructions. Make sure all group members' names are on this packet. Please read ALL instructions carefully and do each step. Make sure ALL questions are answered, questions are marked by lines "_____".

Phase 1: Raw Data Entry

1. Open Excel. A blank document will appear. Go to "File" and then to "Save As." In the "File Name" box type *"AllPartnersLastNames-Debris*." Make sure there are NO spaces in the file name. Under "Save In" at the top of the screen, select "Desktop." Click "Save" in the lower right hand corner.
2. Excel is already set up as a table (also called a spreadsheet). All you have to do is label the rows and columns - rows are the horizontal lines and columns are the vertical ones.
3. The first thing we need to do is enter the data. Please enter the data into your excel table as seen in the picture below. You will enter the different debris types in column A and the amount of each type in column B.

4. We now want to find the **sum** (or the total amount) of all debris collected. In the cell B14 (column B, row 14 highlighted by a black outline in the above picture), type in "*=SUM(B2:B13)*". Press enter and the sum of all your data will appear.

a. What is the total amount or sum of garbage collected ? ___

b. Is the amount of each type of debris what you expected? Why? _____

_____

_____

c. Did you expect to find more or less *total* trash during the debris pick-up? Why? If your results were different than expected, give some possible reasons for the difference._____

_____

_____

_____

_____

5. Next we want to calculate the percent of total that each type of debris makes up. Phrasing your data as a percent makes it easier to understand the quantity of one type of debris relative to another.

a. We first need to type "***Percent***" in cell C1. Then in cell C2 type: "***=(B2/$B$14)*100***". Don't forget the dollar signs and then hit enter.

b. This is telling the spreadsheet to divide the food wrappers by the total amount of debris collected and then multiplying by 100%

  i. *(DebrisType/TOTAL) x 100% = Percent of Debris Type*

c. What is the percent of food wrappers found at your collection site? _____

6. Now we want to repeat this formula and calculation for all the other types of debris. Typing out all of these formulas is kind of a drag, so luckily Excel is smart. Click on the cell C2 with the percent of food wrappers found. Click on the small square in the lower right hand corner of the cell, hold the mouse button down, and drag the little box all of the way down that column to your last row of data, which should be the TOTAL debris collect (Cell C14). When you release your mouse button, the percent for each row will be calculated. Based on the formula you typed in B2, Excel has correctly guessed that you want that formula applied to each row of data. Click on a few of the

cells in the "Percent" column to check if the formula excel guessed is correct and make sure that the number in cell B14 is 100 (100% is all the debris collected).

   a. What is the percent of beverage cans found at your collection site? _____

Now that we have our data entered, let's graph them.

Phase 2: Graphing in Excel – Bar Graph

1. In the upper right-hand corner of your menu bar, locate the little icon that looks like a chart. Click on it.
2. In the window of chart types, select "Column" and then click "Next."
3. At the top of the window, click the tab labeled "Series."
4. Now click "Add."
5. In the "Name" box type the word "Debris".
6. In the "Values" box, delete anything already typed in there but leave the cursor in the box. Without closing that window, go to your main spreadsheet and highlight all debris amounts collected from cell B2 to B13. Now the "Values" box will say "*=Sheet1!$B$2:$B$13*". If the "Values" box does not say that, then type the above into that box.
7. In the "Category (X) Axis Labels", click the mouse in this box and then without closing the window go over to your main spreadsheet and highlight all of the different debris categories (Cells A2 to A13). Your screen should look like so:
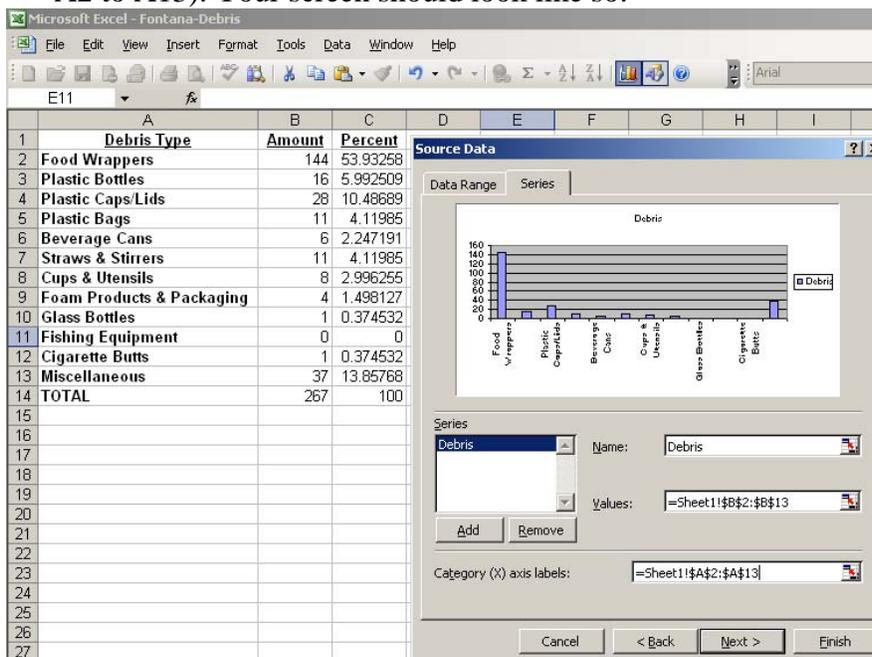
8. If your screen looks like the above, then click "Next>". In the next window, give your graph a title and label your axes appropriately. In the "Chart title" box name your graph with what the experiment investigated, in this case type *"Tomales High School Debris Pick-Up"*. You should label the y-axis with the variable you were measuring and the units, which in our case type: *"Amount of Debris (# items collected) "*.
9. Click "Next" and then "Finish." Now you should have a completed bar graph and it will look something like this:
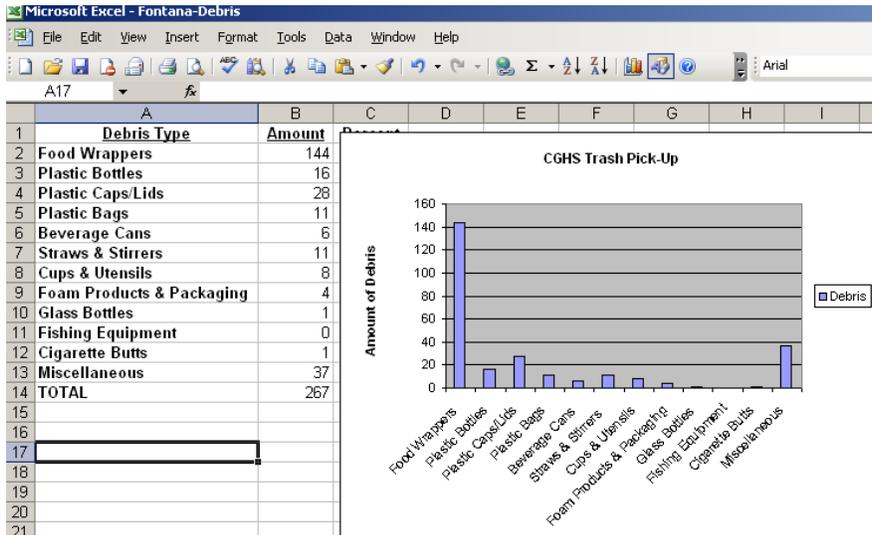
10. Look at the graph below in Phase 4 at the end of this packet. In this graph, the data from all California coastal clean-ups from 1989 to 2008. This is the top 8 types of garbage collected on coastal cleanup days in California. The values are extremely high because this is a combination of many beaches and many years of data.
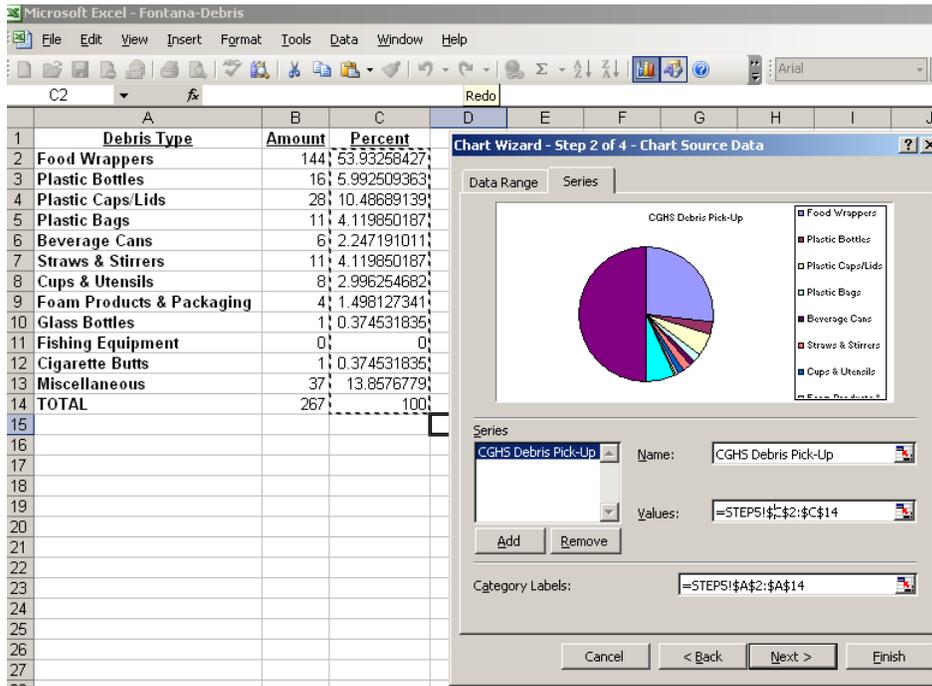
    a. How do the types of debris collected in our trash pickup compare to the coastal cleanup data (and how do they differ)?

_____
_____
_____
_____

    b. Can Tomales High School trash end up on a California beach and become part of the debris picked up during a coastal cleanup day? If yes, then how? If not, then why not?

_____
_____
_____

Phase 3: Graphing in Excel – Pie Chart

1. Data can also be visualized by the percent of the total debris collected in pie charts. In the upper right-hand corner of your menu bar, locate the little icon that looks like a chart. Click on it again.
2. In the window of chart types, select "Pie" and then click "Next."
3. At the top of the window, click the tab labeled "Series."
4. If any words are listed in the "Series" box, then highlight them and click "Remove". Now click "Add."
5. In the "Name" box type the word "***Tomales High School Debris Pick-Up***".
6. In the "Values" box, delete anything already typed in there but leave the cursor in the box. Without closing that window, go to your main spreadsheet and highlight all debris collected amounts from C2 to C13. Now the "Values" box will say "***=Sheet1!$C$2:$C$13***". If the "Values" box does not say that, then type the above into that box.

7. In the "Category (X) Axis Labels", click the mouse in this box and then without closing the window go over to your main spreadsheet and highlight all of the different debris categories (Cells A2 to A13). Your screen should look like so:

8.

9. If your screen looks like the above, then click "Next>". In the next window, your title should already be listed as "*Tomales High SchoolDebris Pick-up*". You will notice that a pie chart does not have any x and y labels.
10. Click "Next>" and then "Finish." Now you should have a completed pie chart.
11. On the last page of this document, once again take a look at the second graph (pie chart) of California Coastal Cleanup Data:
    a. Do you notice any further similarities or differences between THS and the coastal cleanup data? If so, what are they? _____
    _____
    _____
    b. Which type of graph did you find more useful for comparing THS and Coastal Cleanup data? Why? _____
    _____
    _____

12. In a few weeks, we will be dissecting albatross boluses (puke like the owl pellet). Which type of debris do you think will be the most likely to be found in the boluses? Why? _____
    _____
    _____

13. Before the albatross bolus dissection, we will briefly analyze how our data compares to other schools garbage pick-up.
14. Once you are done. Make sure:
    a. To click the "Save" icon in the top left corner. Make note of the computer you completed this assignment on so that you can find it later, or send it to yourself in an e-mail. Then close excel.

b. All questions are answered and make sure all your names are on this packet. Hand this in to Tawny.

Phase 4: Compare to Coastal Cleanup Data

Graph 1) Bar Graph

Graph 2) Pie Chart

BONUS ACTIVITY:

If you completed all of the previous parts of this activity, use the data you collected, and the data from the Coastal Conservancy clean-up (see table below) to create one bar graph that compares to two data collections side by side. To make this work, you will need to convert the two data sets into the same units and make sure that the data is categorized in the same way. You will also need to use the "Series" function in Excel's graphing program to add two series to the graph, rather than just one as we did above. If you need help, please raise your hand.

Coastal Conservancy Coastal Clean-up Data

Debris Type	Amount
Food Wrappers	1252749
Plastic Bottles	327724
Plastic Caps/Lids	1154740
Plastic Bags	1024070
Beverage Cans	340038
Straws & Stirrers	558410
Cups & Utensils	797309
Cigarette Butts	5236619