

Advanced Facility Management Practices

Excel Guide

Timothy Harvey
Facility Management Officer
WASO – PFMD
National Park Service



Elizabeth Dodson
Training Manager
WASO – PFMD
National Park Service

October 2010



Stephen A. Wolter
Executive Director

Christy McCormick
Project Team

Zachary Carnagey
Project Team

Eppley Institute for Parks & Public Lands
Indiana University Research Park
501 N. Morton Street, Suite 101
Bloomington, IN 47404
812.855.3095

Acknowledgements

The following individuals contributed to the development of the Advanced Facility Management Practices course:

Debbie Brown	National Park Service	Julie Abrams	Eppley Institute
Jamie Cupples	National Park Service	Matthew Berry	Eppley Institute
Jenny Dems	National Park Service	Zachary Carnagey	Eppley Institute
Betsy Dodson	National Park Service	Stacey Doyle	Eppley Institute
Aaron Dowe	National Park Service	Stephanie Fenstermaker	Eppley Institute
Bill Ellis	National Park Service	Allene Lowrey	Eppley Institute
Glen Fickbohm	National Park Service	Christy McCormick	Eppley Institute
Tim Harvey	National Park Service	Andrea Mercatante	Eppley Institute
Ken Hornback	National Park Service	Steve Wolter	Eppley Institute
Tim Jarrell	National Park Service		
Steve Maass	National Park Service	Dana Anderson	Indiana University
Don Mannel	National Park Service		
Jeri Mihalic	National Park Service		
Bill Osterhaus	National Park Service		
Sandy Pusey	National Park Service		
Gus Sanchez	National Park Service		

This publication may not be duplicated without the permission of the Eppley Institute for Parks and Public Lands, acting on behalf of Indiana University. The National Park Service and federal agencies may duplicate it for training and administrative purposes, provided that appropriate written acknowledgement is given. No other state or local agency, university, contractor, or individual shall duplicate this publication without the permission of Indiana University.

Microsoft Excel: The Basics

Microsoft Excel: The Basics	1
Basic Terminology	1
Understanding Menus	2
Entering and Editing Data.....	10
Cell References	13
Fill Command & Patterns.....	14
Using Basic Functions	15
Using Equations	16
Calculating Percent and Using Absolute Cell Reference.....	18
Inserting and Deleting Rows in a Data Set.....	21
Cutting and Pasting in Excel.....	23
Creating Static Charts in Excel.....	24
Microsoft Excel: Sorting, Filtering, and Pivot Tables	31
Introduction to Sorting	31
Introduction to Filtering.....	34
Introduction to Pivot Charts & Tables	37

MICROSOFT EXCEL: THE BASICS

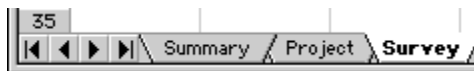
Basic Terminology

Step 1 - Launching Excel - When you launch the application, a workbook opens automatically. An Excel workbook is made of several sheets. Unless you have changed the default setting, you will have three sheets.

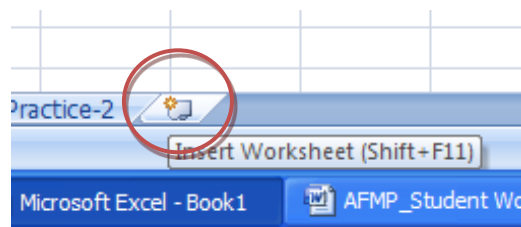
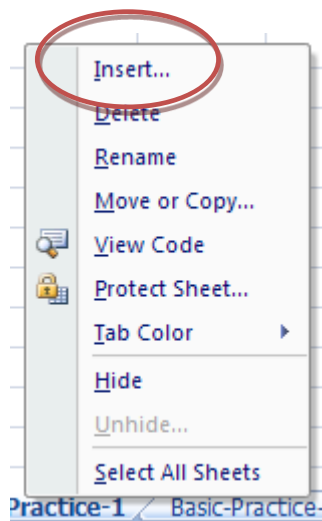


Step 2 - Changing the name of the worksheets - Each sheet is a full spreadsheet. Having a workbook with multiple sheets allows you to easily establish relationships from one sheet to another.


The name of the sheet may be changed. Double-click the name of the sheet or right click and select **Rename**, and type the new name.

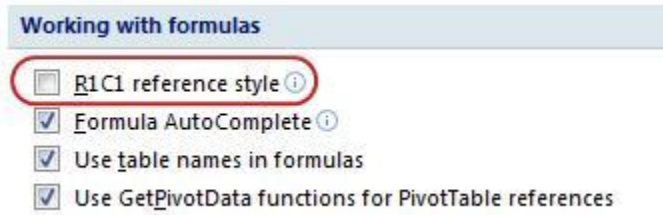


Step 3 - Inserting additional worksheets - If you need additional worksheets, you may also insert a worksheet by right-clicking on any existing sheet name and selecting **Insert...** Additionally, you can click on the **Insert Worksheet** tab located at the far right of the named tabs, or by hitting **Shift** and the **F11** key simultaneously.



Step 4 - Cells - Rectangles in a spreadsheet are called cells. Cells are designated by the intersection of the lettered column (vertical) and numbered row (horizontal) in which it is located. By default, the top left cell, A1, is highlighted. Depending on the default settings, columns may also be numbered. To turn off this setting, click the Microsoft Office Button

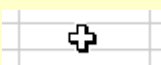


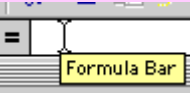
 (or the **File** tab in Excel 2010), and then click **Excel Options**. Click **Formulas**, and then, under **Working with formulas**, clear the **R1C1 reference style** check box.



Try the following ways to move from cell to cell:

- Hit the **Return/Enter** key to move down to the row below.
- Hold down the **Shift** key, then hit the **Return/Enter** key to move up to the row above.
- Hit the **Tab** key to move over to the column to the right.
- Hold down the **Shift** key; hit the **Tab** key to move back to the column to the left.
- Move the cursor to any cell and click there.
- Use the arrow keys to move up, down, left, or right.

Step 5 - Recognizing cursor styles - There are four common cursor styles used in Excel.

	<p>Click and drag to highlight multiple cells with this cursor, or click in a cell to select the single cell.</p>		<p>Click and drag with this cursor to fill cell contents or patterns into cells below or to the right.</p>
	<p>Click and drag the contents of the selected cell to any other cell.</p>		<p>Click to place the cursor into the Formula Bar so that you can edit an equation or function.</p>

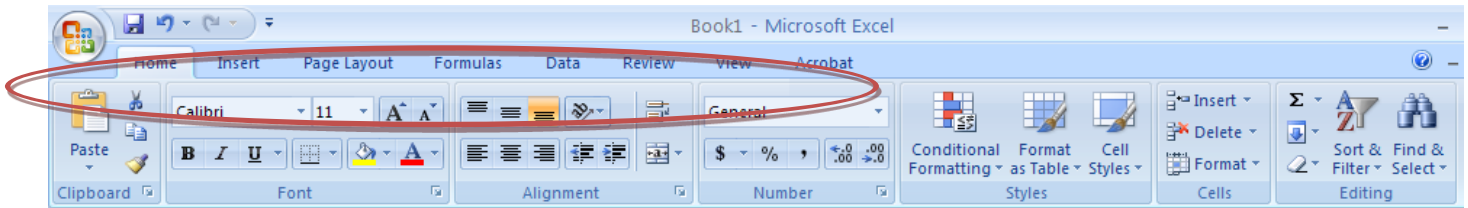
Step 6 - Entering data - Move to the cell where you want to enter data, and enter words or numbers. If data is already in the cell, then it will be replaced without your having to cut or delete the previous data.

Understanding Menus

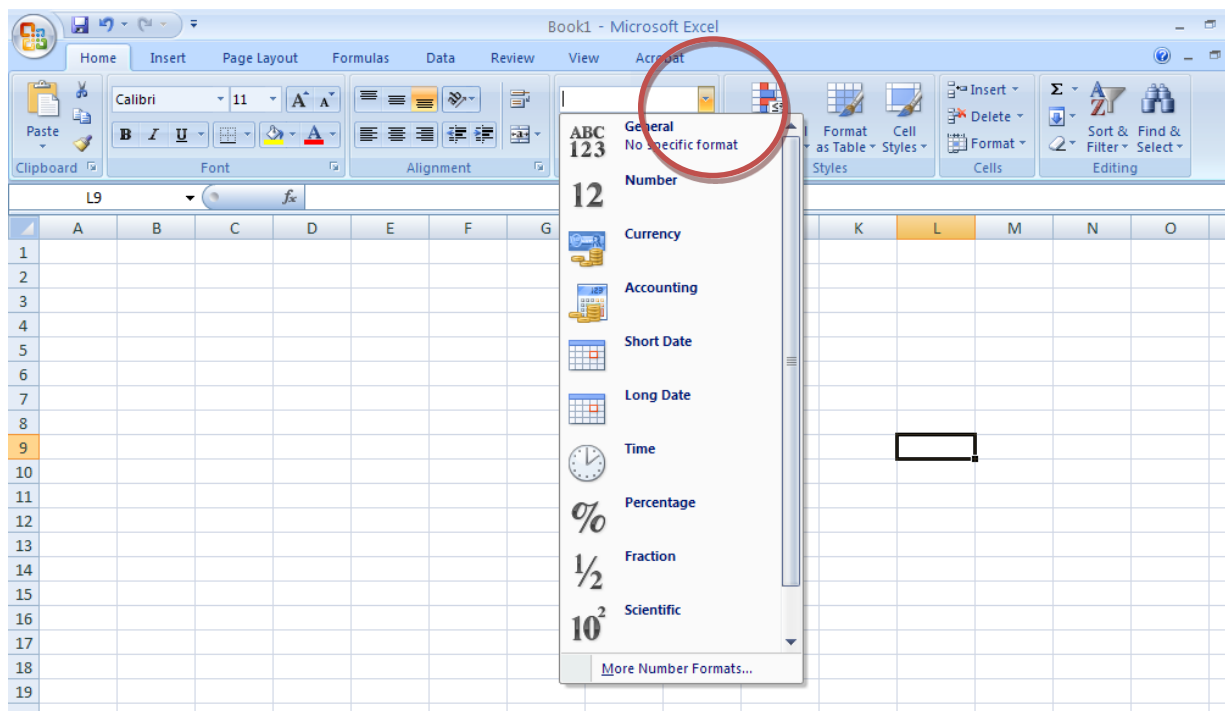
Step 1 – Overview of Menu Options – Excel 2007/10 has moved toward a more intuitive graphic menu, eliminating the text menus and toolbars in previous versions.

Instead, most Excel configurations now feature eight tabbed menus, plus a Microsoft Office Button for file management tasks and a help button.

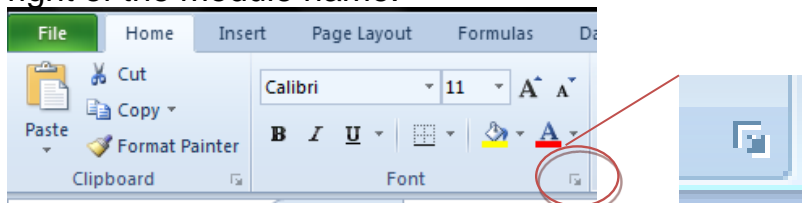
Step 2 – Home Tab – This tab covers clipboard functions (Copy, Paste, etc.), most common formatting options, and the most commonly used filtering options.



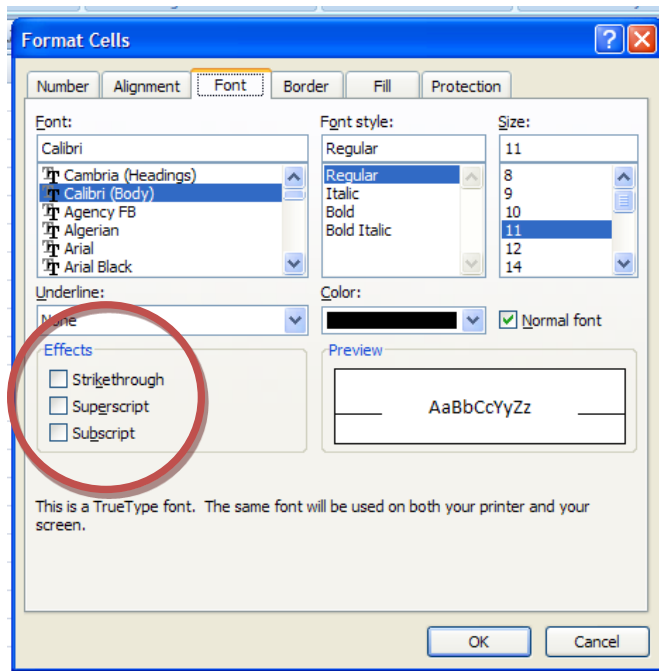
Clicking on the small downward arrow next to many options will show a list of the most commonly used choices. For example, clicking on the formatting tab will show the most common data formats (e.g., number, currency, date, etc.)



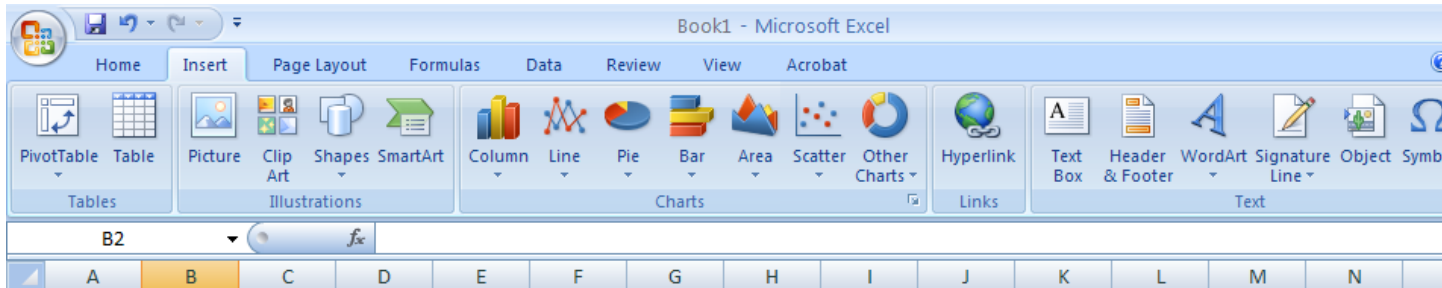
For certain modules, a more in-depth menu can be accessed by clicking on the bottom right of the module name.



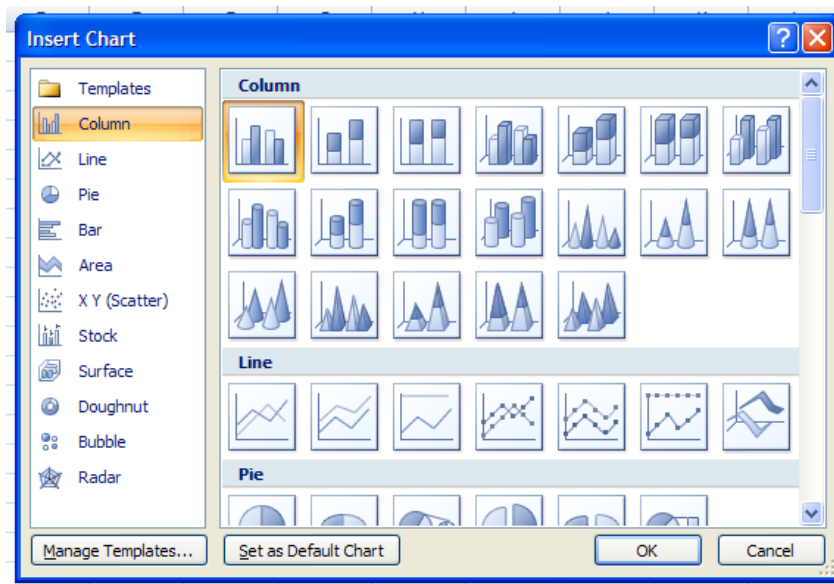
The menu will look familiar to those who have used Excel 2003 or earlier. Most information shown is also shown in the visual menu, but certain options can only be easily accessed in this view. For example, creating Superscript or Strikethrough text can only be easily set in this menu. Generally, each tab in this text menu will correspond to one of the modules shown in the visual menu, although they usually do not match exactly.



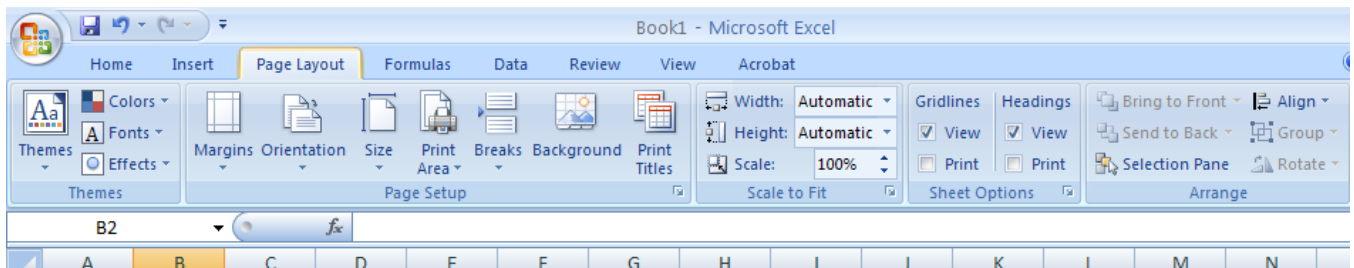
Step 3 – Insert Tab – This tab allows the user to insert a wide range of objects and graphics into the workbook, ranging from pivot charts, pictures & clip art, static charts, hyperlinks, text boxes, embedded objects, and symbols.



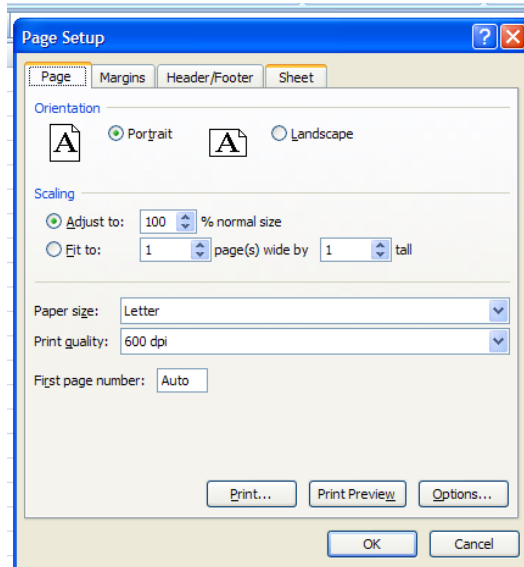
As with the Home Tab, clicking on the small arrow at the bottom right of the Charts module will show the detailed chart menu, with a broader range of options and tools.



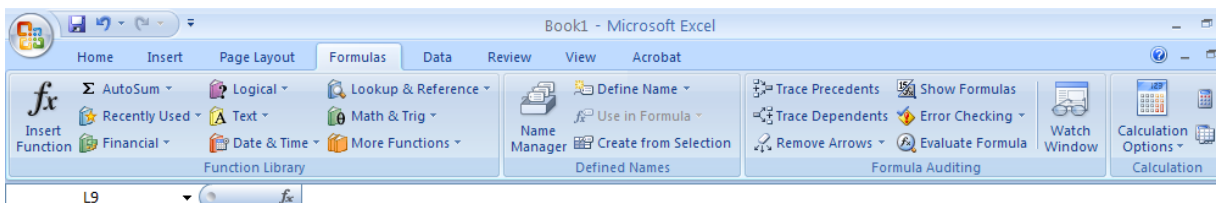
Step 4 – Page Layout Tab – This tab contains most options for controlling the general look of the worksheet, such as selecting layout themes, changing view and print options, and modifying how data appears on the sheet. Note that changes to these visual themes will impact the formatting options displayed on other menus.



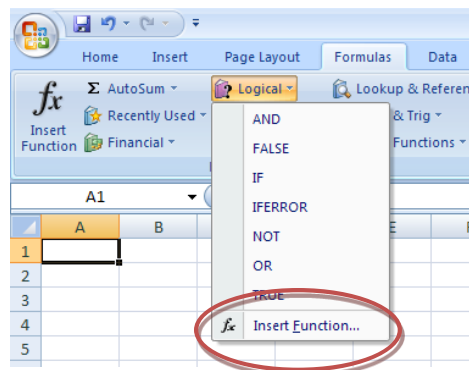
Once again, clicking on the small arrows will open a Page Layout menu familiar to Excel 2003 users.



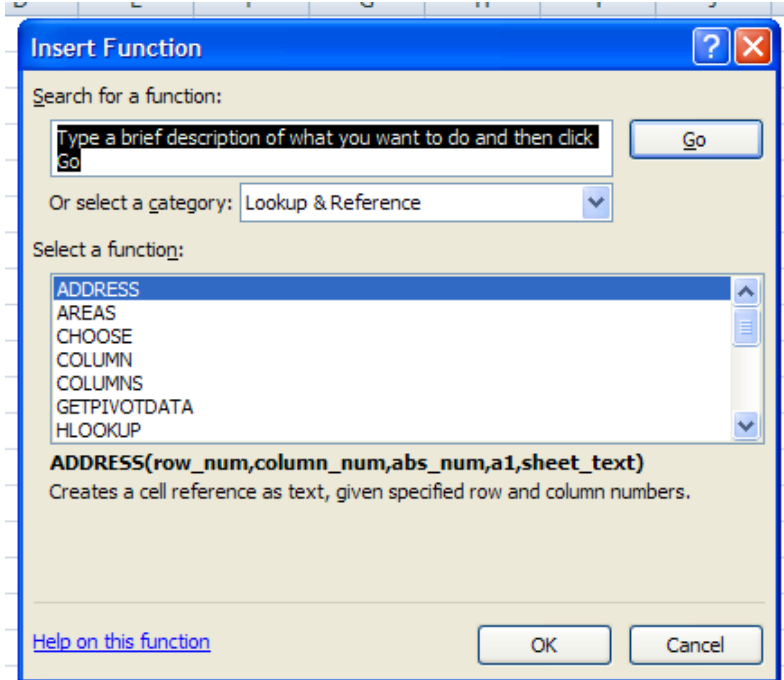
Step 5 – Formula Tab – This tab allows the user to insert functions, define and name ranges of data, audit formulas, and change calculation options.



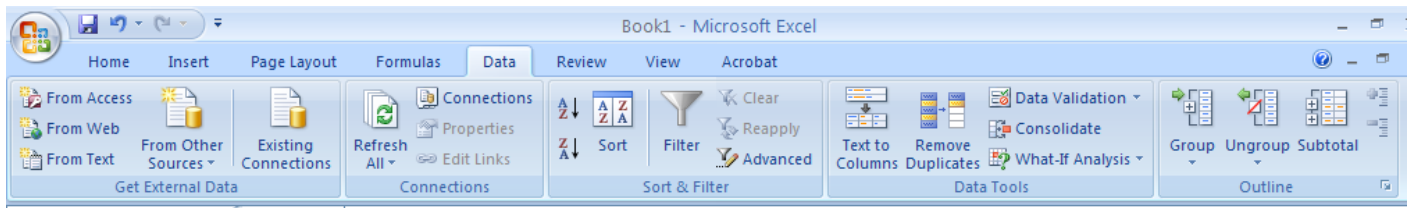
For the Function Library, a text menu can be accessed by clicking the drop down on any function menu and clicking on the **Insert Function** option.



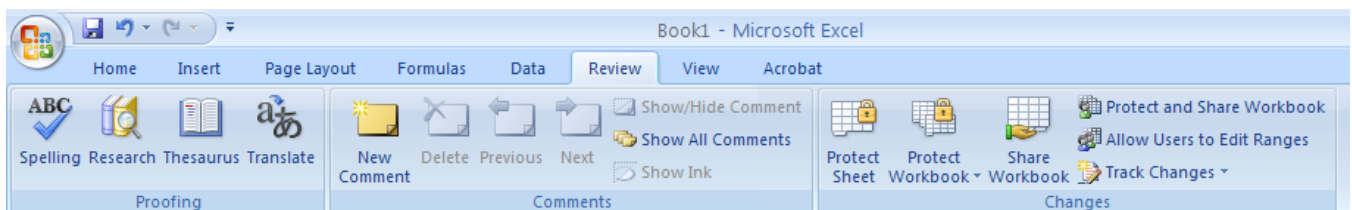
The resulting menu will look familiar to Excel 2003 users.




Step 6 – Data Tab – This tab allows the user to link the workbook to external data, share data with other users, filter data (same as Home Tab), add outlining features, and perform various analytical operations.

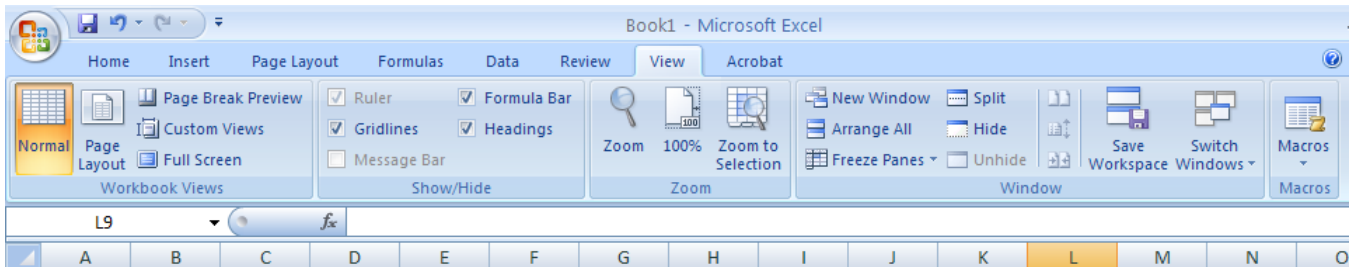


Step 7 – Review Tab – This tab allows the user to review and control the modification of data. In particular, it features editing tools, like the Spell Check; the option to add and modify comments; and the ability to set protection and sharing options.





Step 8 – View Tab – This tab allows the user to control the general look of Excel and the presentation of information. The user can change the type of view, add or remove gridlines (same as Page Layout Menu), zoom in or out, and change the appearance of windows.

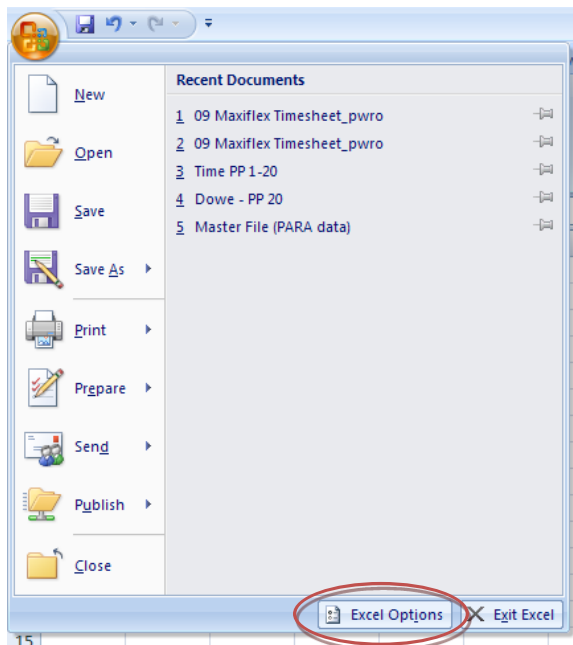
Additionally, this menu allows the user to create and edit Macros. Macro security options can be found under the Microsoft Office Button  (or the **File** tab in Excel 2010).



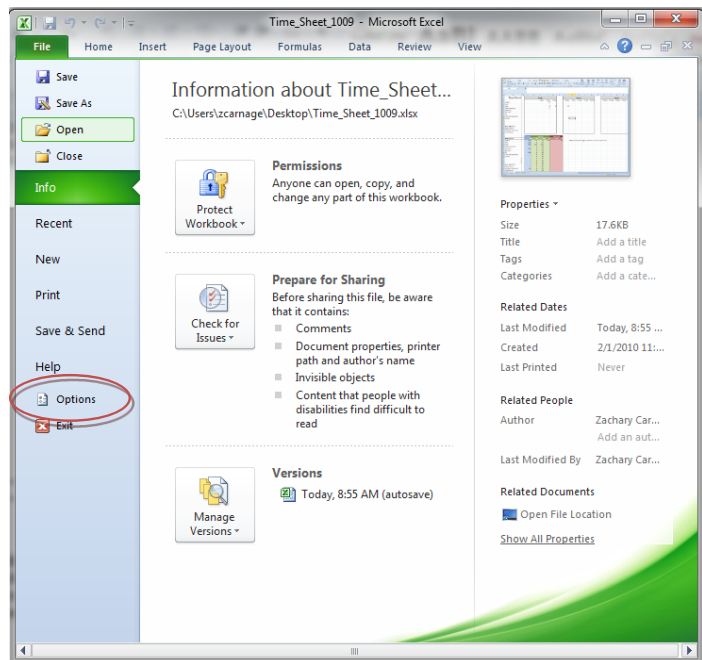
Step 9 – Acrobat Tab – This menu allows the user to create Adobe PDF documents.

Step 10 – Microsoft Office Button  or **File Tab (Excel 2010)** 

The primary purpose of this button/tab is for file management, allowing the user to save, open, print, set security options, or send documents via email or the internet.

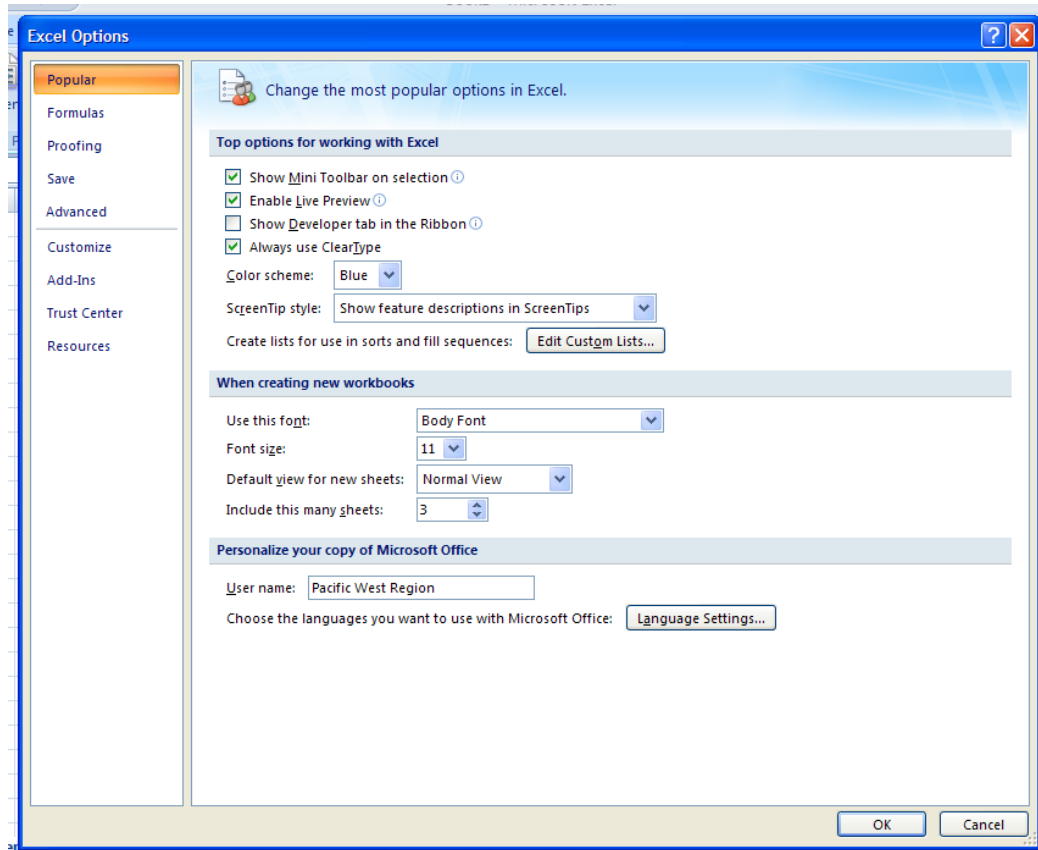


Excel 2007: MS Office Button 



Excel 2010: File Tab

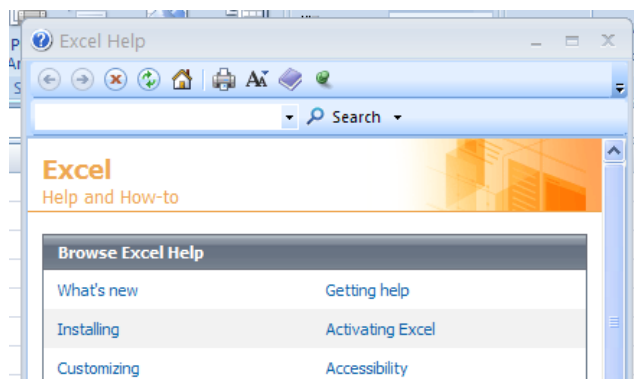
Additionally, clicking the Excel Options button will open a menu that allows the users to set the global options for Excel (see the figure below). Essentially, this sets the default for how Excel looks, operates, and functions. Most of these settings can be modified in other menus, but each new workbook will revert to these default options.



Step 11 – Help Button – This button allows the user to launch the Help Function – Click on the blue question mark near the top right of the screen.



The resulting menu allows the user to look through the list of help topics or use the search bar to search for a specific topics, formulae, or problems.



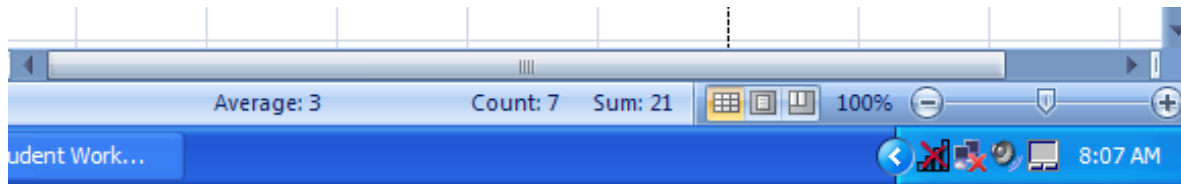
Step 12 – Minimize Ribbon (Excel 2010 only) – This menu allows the user to temporarily make the ribbon disappear.



Click on the Up Carrot next to the Help Button. To make the ribbon reappear, click on the down carrot.



Step 13 – Quick Options – Not really a menu, but a quick and useful way to make a couple common changes, like setting the zoom or changing the page, or set information about a selection. In this case, seven of the cells selected are filled and the numbers they contain sum to 21 and average 3. These latter functions only work when numbers are entered into the cells, but the count feature works with all types of data.



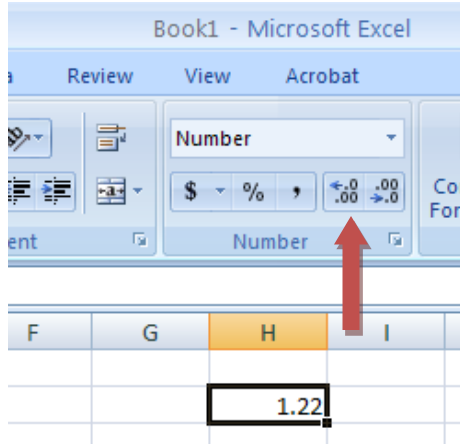
Entering and Editing Data

Step 1 - Cell data - Things that can be entered into a cell:

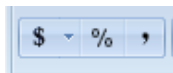
- numbers
- words
- equations, formulas, or functions
- fill color
- images (although they are actually on top of a cell, not in it)

Step 2 - Entering data - Move to the cell where you want to enter data, and enter words or numbers. If data is already in the cell, it will be replaced without your having to cut or delete the previous data.

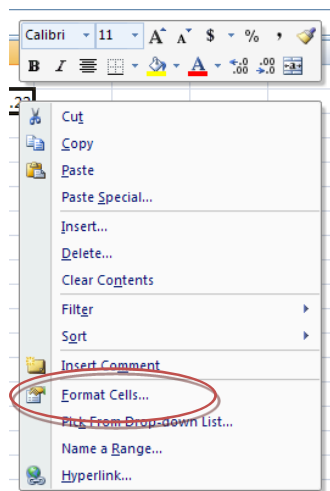
Step 3 - Format data using Menus - Once information has been entered into a cell, you might want to change something about the way the information is displayed. For instance, you may want to limit the decimal places displayed in a cell containing a number. To change the format of the number, select the cell containing the number and go to the **Home** tab. Select the **Number** module and click on the **Increase Decimal** button.



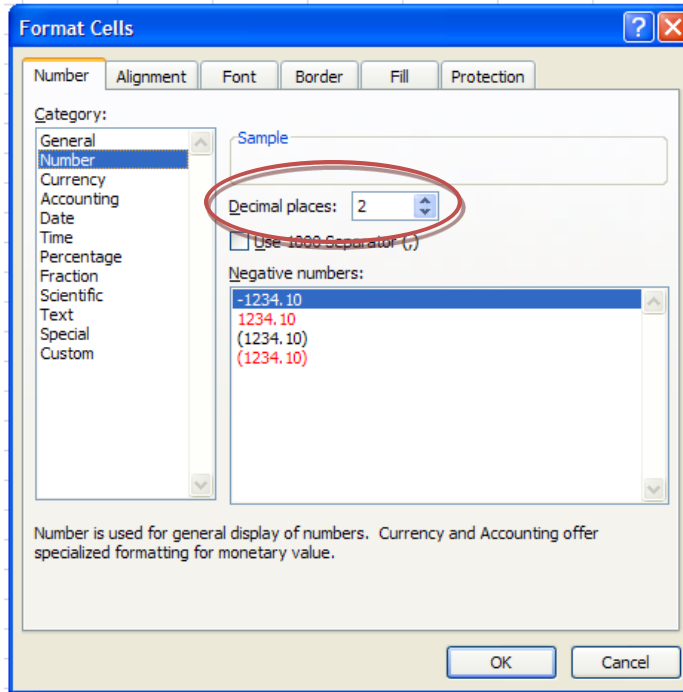
The process works the same for adding a dollar sign, changing a decimal to percent notation, or adding a comma separator.



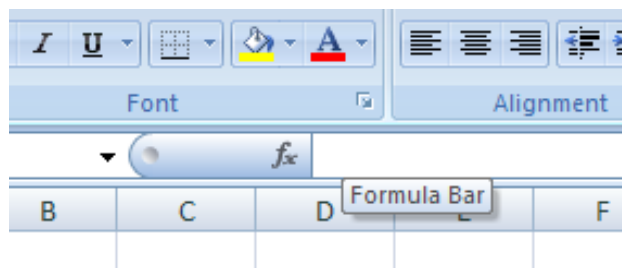
Step 4 - Format data using a drop-down - Another option would be to click on the cell and right click, which bring up the mini formatting toolbar and the drop-down list of the most common operations. In this case, we would select the **Format Cells** option.



Once in the **Format Cells** menus, select the **Number** tab, and select the appropriate number of **Decimal Places** from the dropdown list. Once again, the process would be similar for most cell formatting operations, including text alignment, changing the font style and size, adding a border, or filling the cell.



Step 5 - Editing Using the Formula Bar - If incorrect information has been entered into a cell, one easy way to edit the cell contents is to simply click on the cell and enter the correct information. You do not need to highlight or delete. Typing replaces whatever is in the cell.



If you do not want to replace the data but simply need to correct some part of it, then move your cursor into the Formula bar, which will display the contents of the cell.

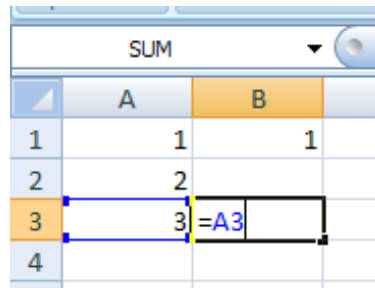
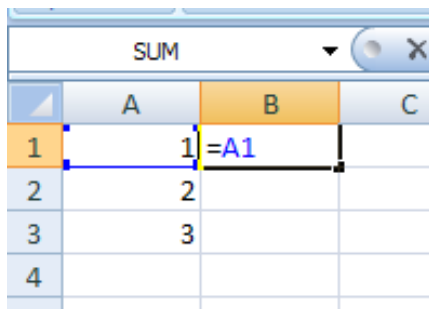
When your cursor turns into an I-Beam, click and edit within the formula bar. This is especially helpful for editing long strings of text or formulas.

Cell References

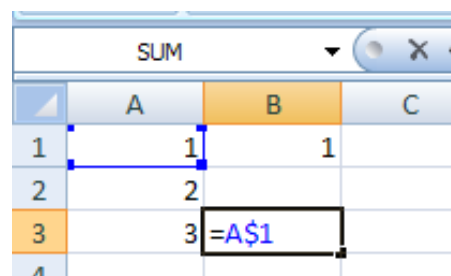
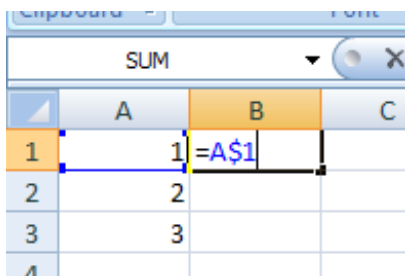
Step 1 - Review Basic References - There are several types of basic references, covering single cells, ranges of cells, row & columns references, and ranges of cells or columns.

To refer to	Use
The cell in column A and row 10	A10
The range of cells in column A and rows 10 through 20	A10:A20
The range of cells in row 15 and columns B through E	B15:E15
All cells in row 5	5:5
All cells in rows 5 through 10	5:10
All cells in column H	H:H
All cells in columns H through J	H:J
The range of cells in columns A through E and rows 10 through 20	A10:E20

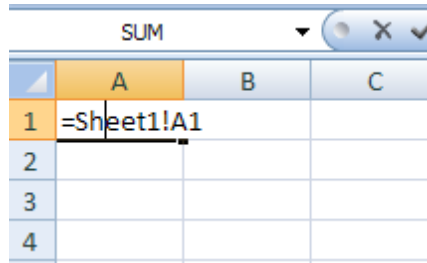
Step 2 – Absolute and Mixed References – When moving or filling data, Excel often automatically changes a cell reference to match its new relative position. For example, as shown below, copying the contents of cell B1 and pasting it into cell B3 will change the reference from A1 to A3.



This is helpful in some cases, but in others it is not. Excel allows users to control this effect by using absolute and mixed references. These are created by placing a \$ before the column letter and/or row number. Using the same operation as above with an absolute reference for the row would keep the new formula in B3 referenced to A1.



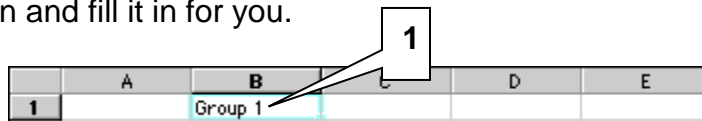
Step 3 – External References – Excel allow users to not only link to data within the current sheet, but to data in other sheets or other workbooks. The easiest way to see this is by selecting a cell in the current workbook, typing an equal sign, and, without clicking off the destination cell, tabbing to the source worksheet, and clicking on the appropriate cell in that workbook. Assuming the cell you want to link to is Cell A1 in Sheet 1, the reference would appear as below.



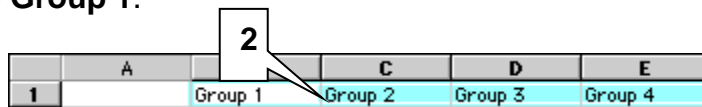
Advanced users may find it more efficient to type in the formula directly, but for novice users, this method prevents most problems. Additionally, users of all levels may find it useful to add an absolute reference to an external reference, if the data is not meant to change when filled or moved.

Fill Command & Patterns

Step 1 - Using Auto Fill - If there is a pattern in the data you are going to enter, Excel can often detect the pattern and fill it in for you.



1 In Cell B1, type **Group 1**.



2 Place the cursor on the bottom right of cell B1, and a black plus sign appears. Click and drag to the right to cell E1. Excel detects the pattern and fills in the other groups.

	A	B	C	D	E
1		Group 1	Group 2	Group 3	Group 4
2		10/4/99	10/5/99	10/6/99	10/7/99
3		January	February	March	April
4		1	1	1	1
5		1	2	3	4

The image above illustrates some other patterns and a potential problem with this feature. In row 4, the Auto Fill feature did not work because there are too many possibilities; Excel couldn't recognize the intended pattern. For Excel to recognize the pattern, you would have to skip to cell C5, and type a 2. You should then highlight the cells B5 and C5 to “teach” Excel the pattern. Now that Excel knows the pattern, the Auto Fill feature will work, and you can simply click and drag to the right to auto fill the rest of the cells.



Using Basic Functions

Step 1 - Enter data - One of the principal reasons for using a spreadsheet is to perform calculations. To illustrate, begin by adding a column of numbers. This is from a class survey about the favorite ice cream flavor of a class. **Caution:** *If you plan to ask Excel to add a column of numbers, make sure that they **are** numbers. If cell B2 contained "6 students" rather than just the number 6, Excel would read the entry as a word, **not** a number.*

	A	B	C
1	Ice Cream Survey	Students	
2	Chocolate	6	
3	Strawberry	5	
4	Vanilla	4	
5	Peach	3	
6	Chocolate Ripple	2	
7	Butter Pecan	2	
8	Neapolitan	1	
9	Black Cherry	1	
10	Total		
11			

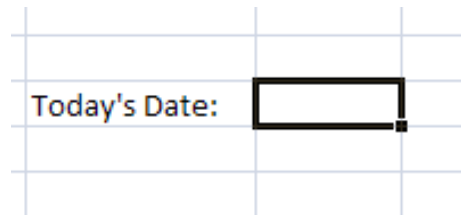
Step 2 - Placing a function - In the example above, the total of the column of numbers would naturally go in cell B10. Before placing a function (a built in equation) make sure the selected cell is where you want the function to go.

From the **Formula** menu select the **AutoSum** function and click on **Sum**.

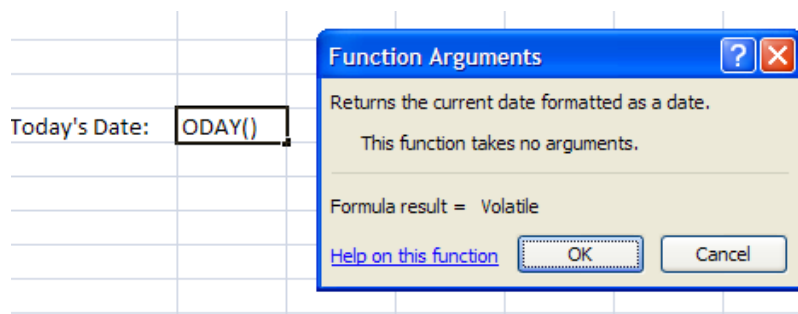
	A	B	C	D
1	Ice Cream Survey	Students		
2	Chocolate	6		
3	Strawberry	5		
4	Vanilla	4		
5	Peach	3		
6	Chocolate Ripple	2		
7	Butter Pecan	2		
8	Neapolitan	1		
9	Black Cherry	1		
10	Total	=SUM(B2:B9)		
11				
12				

Step 3. - Using another function - Excel has many built-in equations (functions). One more will be used as an illustration.

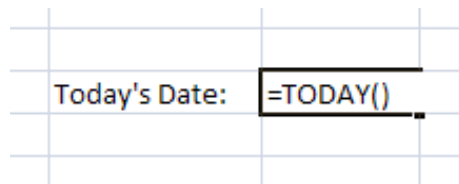
Once you know how to write your own functions (next topic), Excel can be used as a substitute for a calculator. Before building functions, note another Paste function to create a cell within the worksheet that will automatically remind you of today's date.



Cell C2 is where a Date & Time function will be placed. From the **Formula** menu, select **Date & Time**, and then select the **Today** function. The following menu will appear.



Click OK and the following formula should be entered into the cell. Click on the cell and look at the formula bar, or double click on the cell to open it for editing.



Step 4. - Explore - Look through the Function Library to discover what equations are built into Excel. For most users, every imaginable data operation is probably in the library, ranging from mathematics, logical operators, scientific calculations, engineering calculations, and more. Once you are familiar with the formulas, you can type them directly into the worksheet to save time.

Using Equations

Step 1 - Preparing to enter an equation - Functions are an easy way to complete simple calculations, but at some point you will need to build your own equations. There is a single keystroke that informs Excel of your intention. Press the equal key (=). If you can write the equation, Excel can perform the calculation. This module will deal with four simple functions: add, subtract, multiply, and divide.

	A	B	C	D	E	F	G	H	I
1		add		subtract		multiply		divide	
2		6		6		6		6	
3		3		3		3		3	
4									

Step 2 - Writing an addition equation - If you were to state the process for adding the numbers in column B, then it would be "six plus three." The equation could be written exactly like that (=6+3), and Excel would display the expected answer, 9. However, that equation would be useless if the numbers in either B2 or B3 were changed. To avoid this, you should use cell addresses when writing your own equations.

=B2+B3

	A	B	C	D	E
1		add		subtract	m
2		6		6	
3		3		3	
4		=B2+B3			

When writing the equation, clicking in cell B2 displays B2 in the equation. If you have written the equation correctly, then you may accept it by pressing the **Enter/Return** key or by clicking on the green check mark. If you change your mind, click on the red X to cancel the operation.

Step 3. – Writing other simple functions - Symbols for the four basic mathematical functions are:

- addition +
- subtraction -
- multiplication *
- division /

Step 4. – Task - Prepare a worksheet with the data displayed under Step 1. Enter the proper equation under each set of two numbers.

Step 5. – Compare - Compare your results to those shown below:

=B2+B3
B
add
6
3
9

=D2-D3	
D	E
subtract	
6	
3	
3	

=F2*F3	
F	G
multiply	
6	
3	
18	

=H2/H3	
H	I
divide	
6	
3	
2	

Calculating Percent and Using Absolute Cell Reference

Step 1 - Review percent - Before showing how to calculate percent with Excel, let's review how to calculate percent.

A number divided by a second number and multiplied by 100 expresses what percent the first number is of the second number. If you do not multiply by 100, then you have the decimal equivalent of percent.

Step 2 - Writing a percent equation for only two numbers - Solve the following: 2 is what percent of 8?

Now that you are sure you remember the process for calculating percent, use an Excel worksheet to perform the calculations.

= (B1/B2)*100	
B	C
2	
8	
25	

Step 3. - Writing a percent equation for a column of numbers accompanied by a sum - Data from the ice cream survey will be used to illustrate how to calculate percent.

C2	=		
	A	B	C
1	Ice Cream Survey	Students	percent of total
2	Chocolate	6	
3	Strawberry	5	
4	Vanilla	4	
5	Peach	3	
6	Chocolate Ripple	2	
7	Butter Pecan	2	
8	Neapolitan	1	
9	Black Cherry	1	
10	Total	24	

Step 4. - Auto Fill and problems associated with it - You probably remember a discussion of Auto Fill from the previous module. Auto Fill is a convenient way to place information in several cells at the same time. Although Auto Fill may seem like a good way



to fill the equation into cells C3 through C9, it actually will cause errors in your equation, as illustrated below.

C2		=		=(B2/B10)*100	
	A	B	C	D	
1	Ice Cream Survey	Students	percent of total		
2	Chocolate	6	25		
3	Strawberry	5	#DIV/0!		
4	Vanilla	4	#DIV/0!		
5	Peach	3	#DIV/0!		
6	Chocolate Ripple	2	#DIV/0!		
7	Butter Pecan	2	#DIV/0!		
8	Neapolitan	1	#DIV/0!		
9	Black Cherry	1	#DIV/0!		
10	Total	24	#DIV/0!		

Oops! Something is wrong there. The problem was caused by the way the equation was written. The equation B2/B10 says, "Take the first cell in this equation and divide it by the cell eight spaces below." The reason that none of the other equations work is that there is nothing in the cell eight spaces below any of the cells from B3 to B10. You must find a way of telling Excel to use cell B10 to divide by for each of the other eight equations.

Step 5. – Absolute Cell Reference - You tell Excel to use one specific cell and never move to another relative location in the calculations by using "absolute cell reference." To specify the cell, place a dollar sign before the column letter and before the row number. Thus, "\$B\$10" says **always** use cell B10. Go back to the worksheet and rewrite the equation in C2.

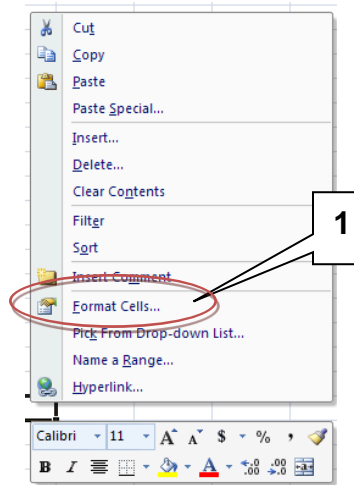
C2		=		=(B2/\$B\$10)*100	
	A	B	C	D	
1	Ice Cream Survey	Students	percent of total		
2	Chocolate	6	25		
3	Strawberry	5			
4	Vanilla	4			
5	Peach	3			
6	Chocolate Ripple	2			
7	Butter Pecan	2			
8	Neapolitan	1			
9	Black Cherry	1			
10	Total	24			

Notice the answer has not changed. If you were writing only this one equation, you wasted time using absolute cell reference. The real benefit of this equation will be seen when you auto-fill down into cells C3 through C10.

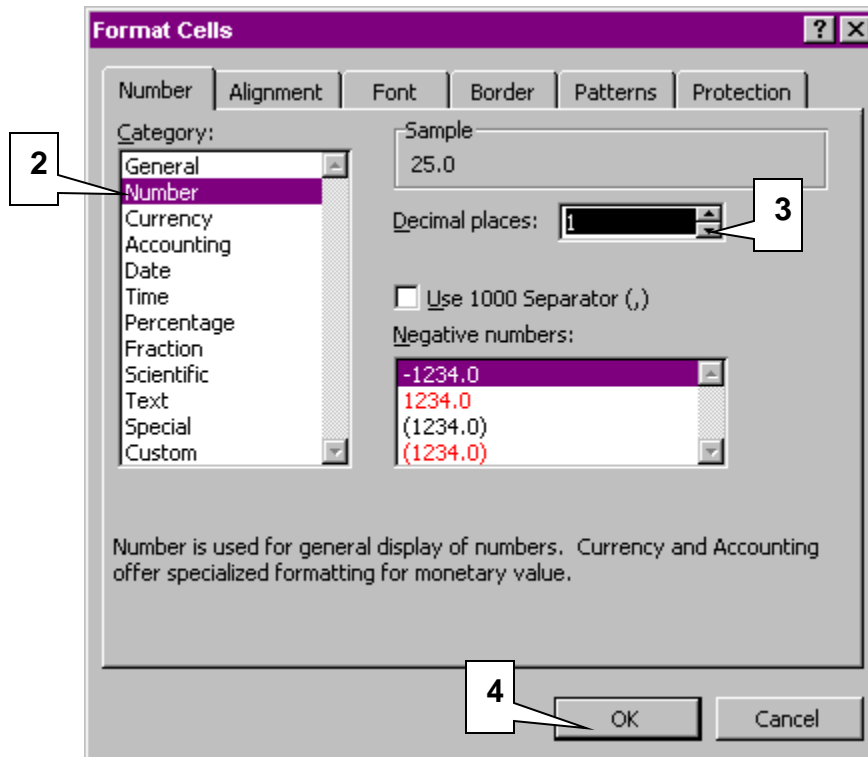
Step 6. – Fill the equation down into the cells below - As soon as you auto-fill this equation with an absolute cell reference down into cells C3 through C10, the percentages are instantly calculated. Only one more task remains.

	A	B	C	D
			$= (B2/\$B\$10)*100$	
1	Ice Cream Survey	Students	percent of total	
2	Chocolate	6	25	
3	Strawberry	5	20.833333	
4	Vanilla	4	16.66667	
5	Peach	3	12.5	
6	Chocolate Ripple	2	8.333333	
7	Butter Pecan	2	8.333333	
8	Neapolitan	1	4.166667	
9	Black Cherry	1	4.166667	
10	Total	24	100	
11				

Step 7. – Format the cells - Unless you need five decimal places, you should format cells C2 through C10, the highlighted range above, so that only one decimal place is displayed.



- 1 Right-click on the highlighted range of cells, and select **Format Cells...**



- 2 In the category list, select **Number**.
- 3 In the Decimal places box, use the down arrow to choose 1.
- 4 Click **OK**. Now your column of data has a nice, uniform appearance.

	A	B	C
			percent of total
1	Ice Cream Survey	Students	
2	Chocolate	6	25.0
3	Strawberry	5	20.8
4	Vanilla	4	16.7
5	Peach	3	12.5
6	Chocolate Ripple	2	8.3
7	Butter Pecan	2	8.3
8	Neapolitan	1	4.2
9	Black Cherry	1	4.2
10	Total	24	100.0

Inserting and Deleting Rows in a Data Set

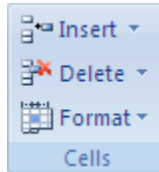
Sometimes it is necessary to insert or delete rows from a set of data. For instance, you might need to insert sales data for Los Angeles into the data below. Assume you have three recent sales for Los Angeles that need to be entered into the data. Begin by selecting three rows at

the location where you would like the data to reside. Since you would like the data to be after Denver and before New York, select rows 7 through 9.

	A	B	C	D	E	F	G	
1	No	City	State	SF	Sale Price	Month Sold	Stories	Be
2	1	Denver	CO	1,800	\$1,400,000	August	2	
3	2	Denver	CO	3,000	\$ 900,000	September	1	
4	3	Denver	CO	2,500	\$ 800,000	August	2	
5	4	Denver	CO	4,200	\$ 400,000	September	1	
6	5	Denver	CO	6,000	\$1,400,000	July	2	
7	6	New York	NY	1,900	\$1,400,000	June	1	
8	7	New York	NY	675	\$ 900,000	February	1	
9	8	New York	NY	3,500	\$1,400,000	July	1	
10	9	New York	NY	2,750	\$2,850,000	June	1	

To insert multiple rows, select the rows above which you want to insert rows. Select the same number of rows as you want to insert. For example, to insert three new rows, you select three rows. (To insert nonadjacent rows, hold down CTRL while you select nonadjacent rows.)

On the **Home** tab, in the **Cells** group, click the arrow next to **Insert**, and then click **Insert Sheet Rows**.



You can also right-click the selected rows and then click **Insert**.

When you insert rows on your worksheet, all references that are affected by the insertion adjust accordingly, whether they are relative or absolute cell references. The same behavior applies to deleting rows, except when a deleted cell is directly referenced by a formula.

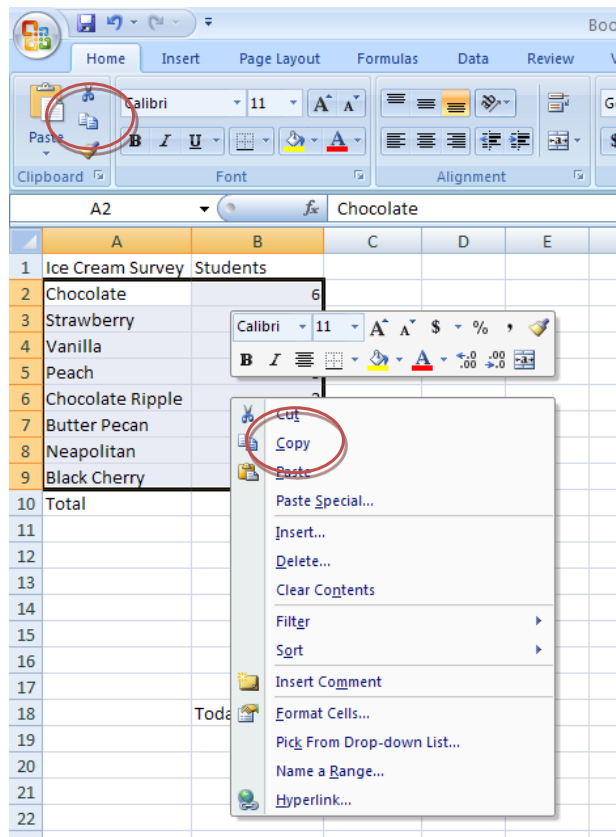
The process for inserting columns is perfectly analogous, except for clicking **Insert Sheet Columns** at the end.



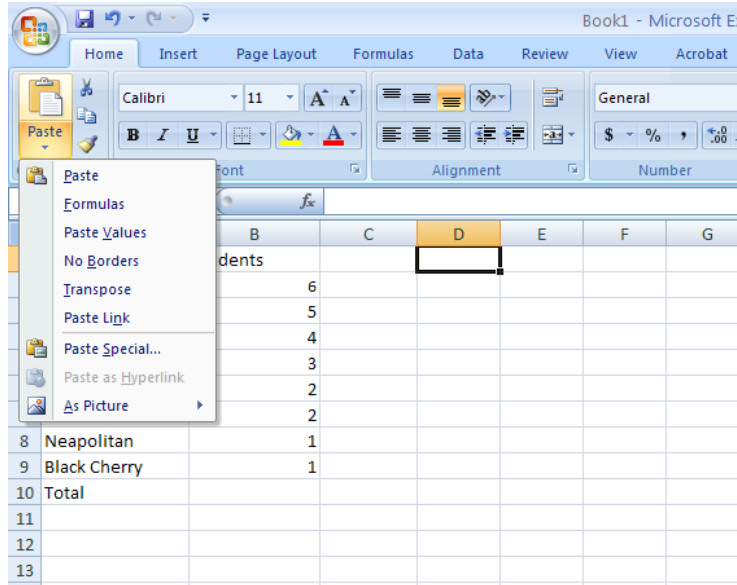
Cutting and Pasting in Excel

Step 1 – Cut and Copy – One of the most common operations you will perform in Excel is cutting and copying data. Cut removes the data and places it in another cell, sheet, or workbook. Copy makes a copy that can be placed somewhere else, leaving the original intact. Several methods are available to accomplish these tasks. For example, once data is selected, it can be copied onto the clipboard by

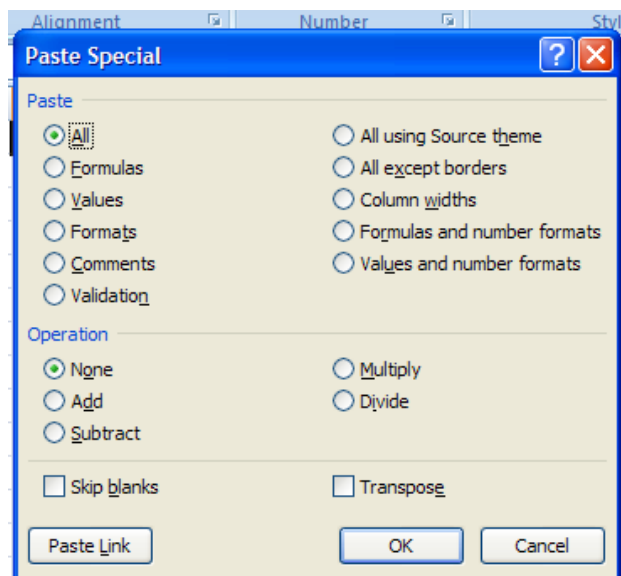
- Selecting the **Copy** button under the **Home** menu
- Right-clicking and selecting **Copy**
- Pushing the **CTRL** and **C** keys simultaneously



Step 2 - Paste data – Data that has been cut or copied must be pasted into a new location. This can be another cell in Excel or in almost every other program, from Word to Lotus Notes. A simple paste brings the data, along with any formatting and formulas associated with the cell.



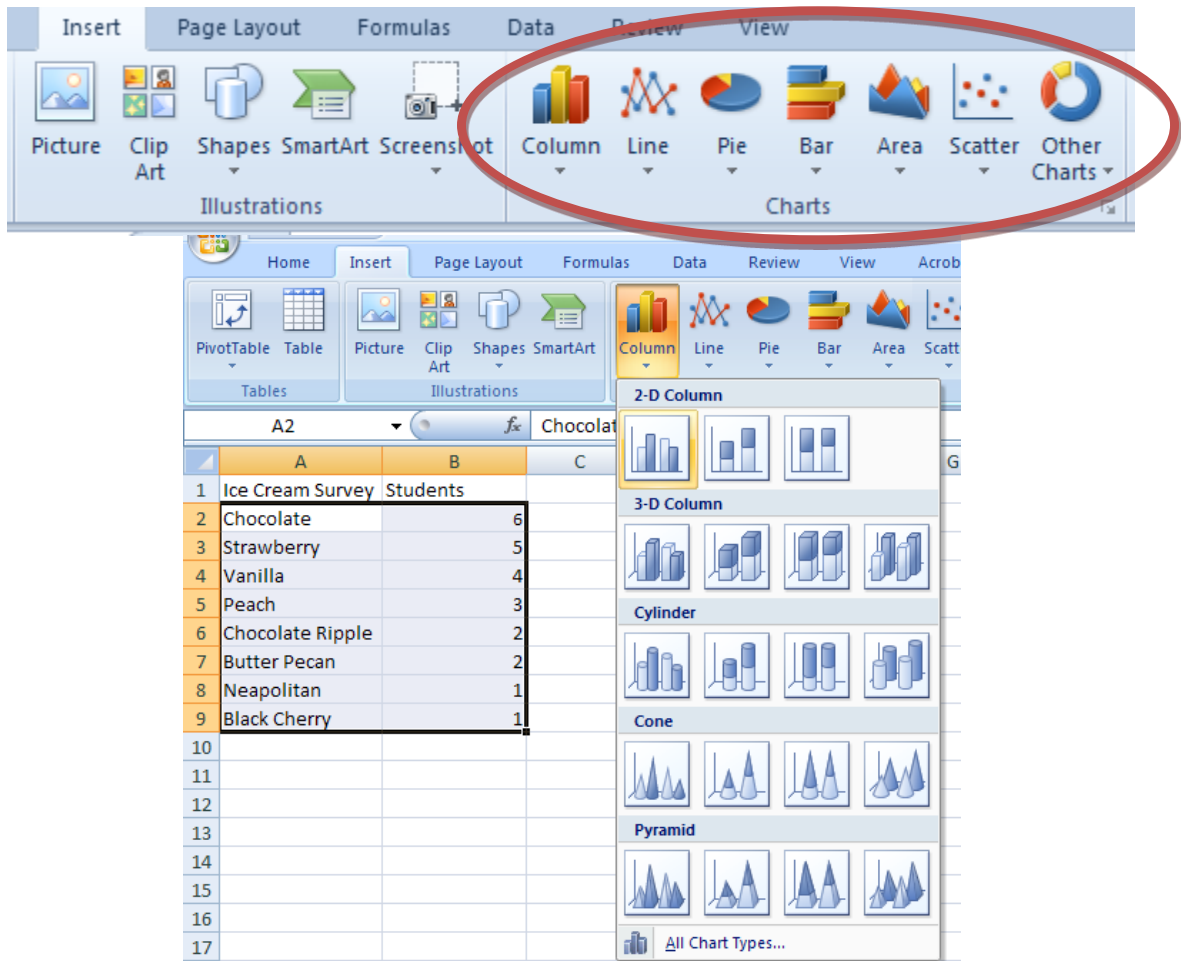
Step 3 – Paste Special – In some cases, pasting everything associated with a cell, chart, or object is not desirable. For example, you may not want data to carry its source formatting or you may want a chart to appear as a bitmap to make it easier to view. In those cases, you would use the **Paste Special** option that can be found by right-clicking into the destination cell or in the **Home** menu under the **Paste** drop-down.



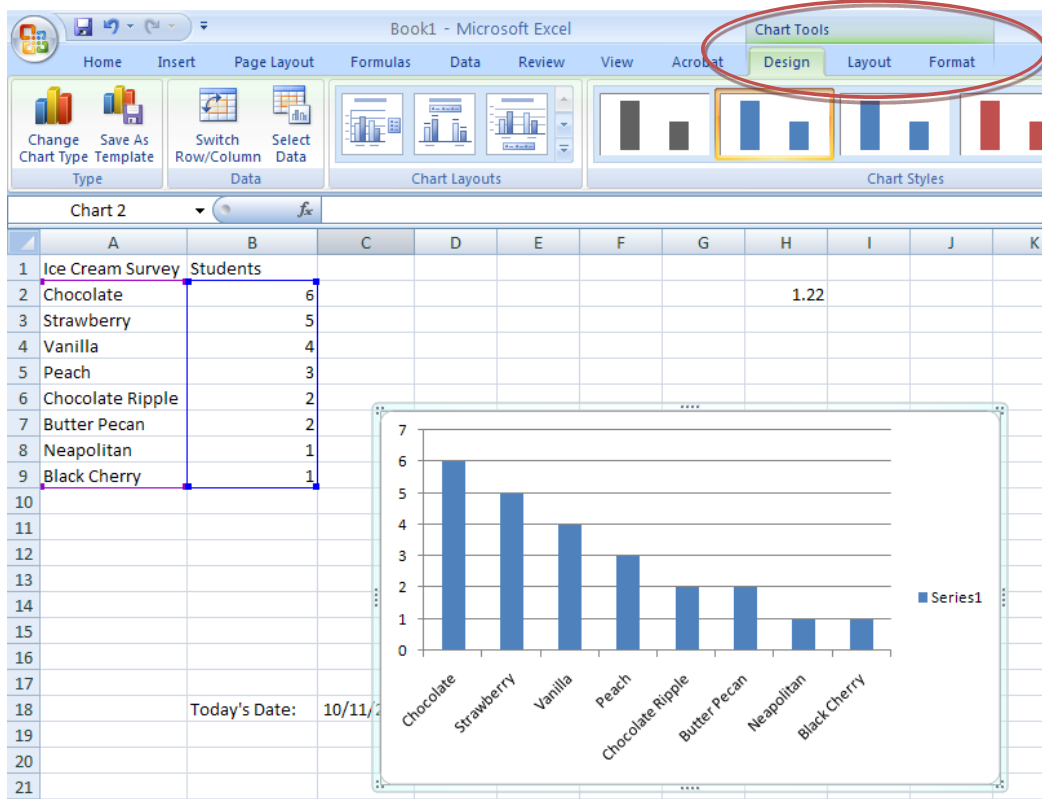
Creating Static Charts in Excel

Step 1 – Selecting Data and Chart Type – Besides computation, one of the most common uses of Excel is to create static charts to help analyze a set of data. The first step in this process is always selecting what data you want to analyze and what type of chart to use. Selecting the type of chart is as much art as science, and some trial and error may be necessary before you find one you like.

The most common types are shown under the **Insert** tab in the **Chart** area. For each type, there are numerous sub-types, each with a slightly different look.

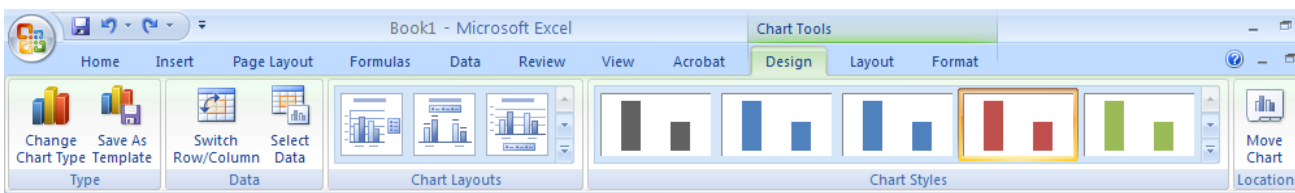


Step 2 – Basic Chart – Once a chart type is chosen, Excel will display the chart and the three **Chart Tools** menus

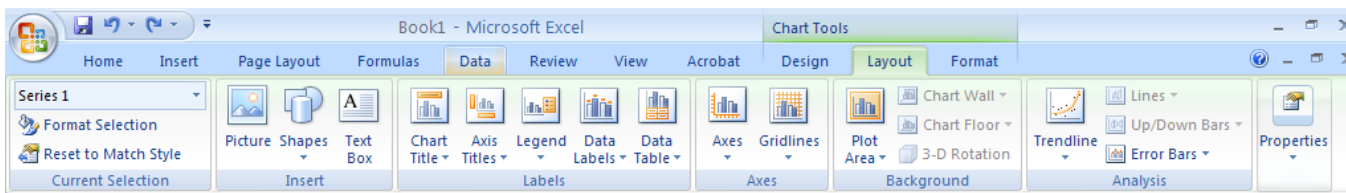


Step 3 – Menu Options – The primary method for customizing and modifying charts in Excel 2007/10 is through the three chart menus.

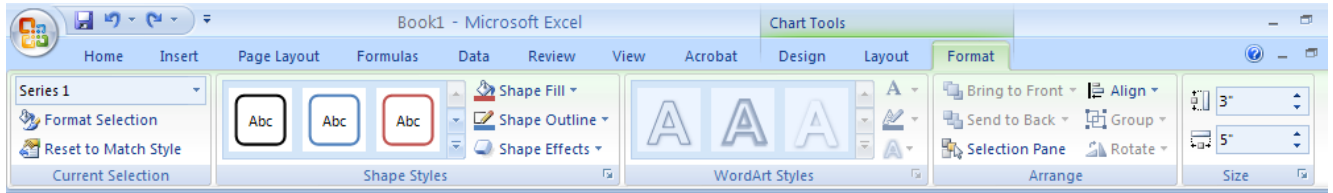
- **Design** – Allows you to quickly swap chart types (e.g., column to pie), edit the data source, choose among popular layout styles, and change the chart colors.



- **Layout** – Allows you to add extras like text boxes and pictures, add and edit the various chart elements (title, axis, gridlines, plot area)

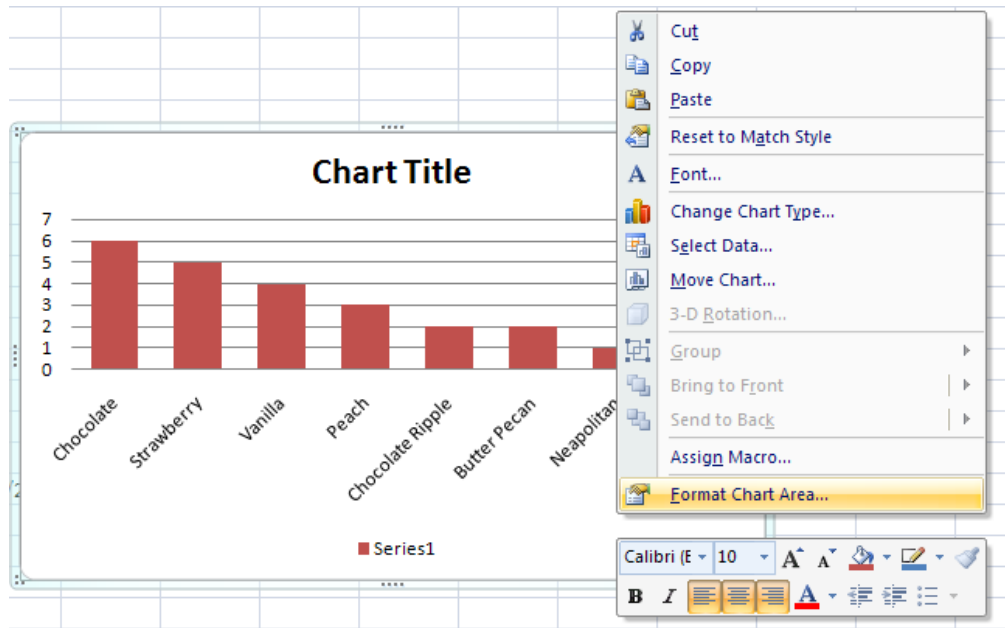


- **Format** – The primary way to edit the look of the chart, including the color scheme, text effects, chart area size, and alignment.

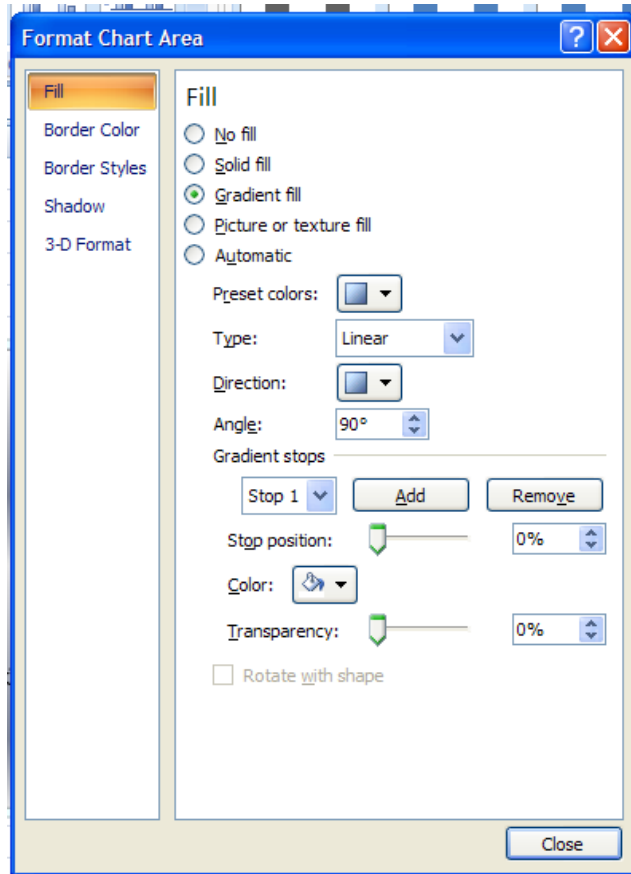


Step 4 – Manual Formatting – By right clicking on the various parts of the chart, you can also modify and customize in a more manual fashion, as was possible in earlier versions of Excel.

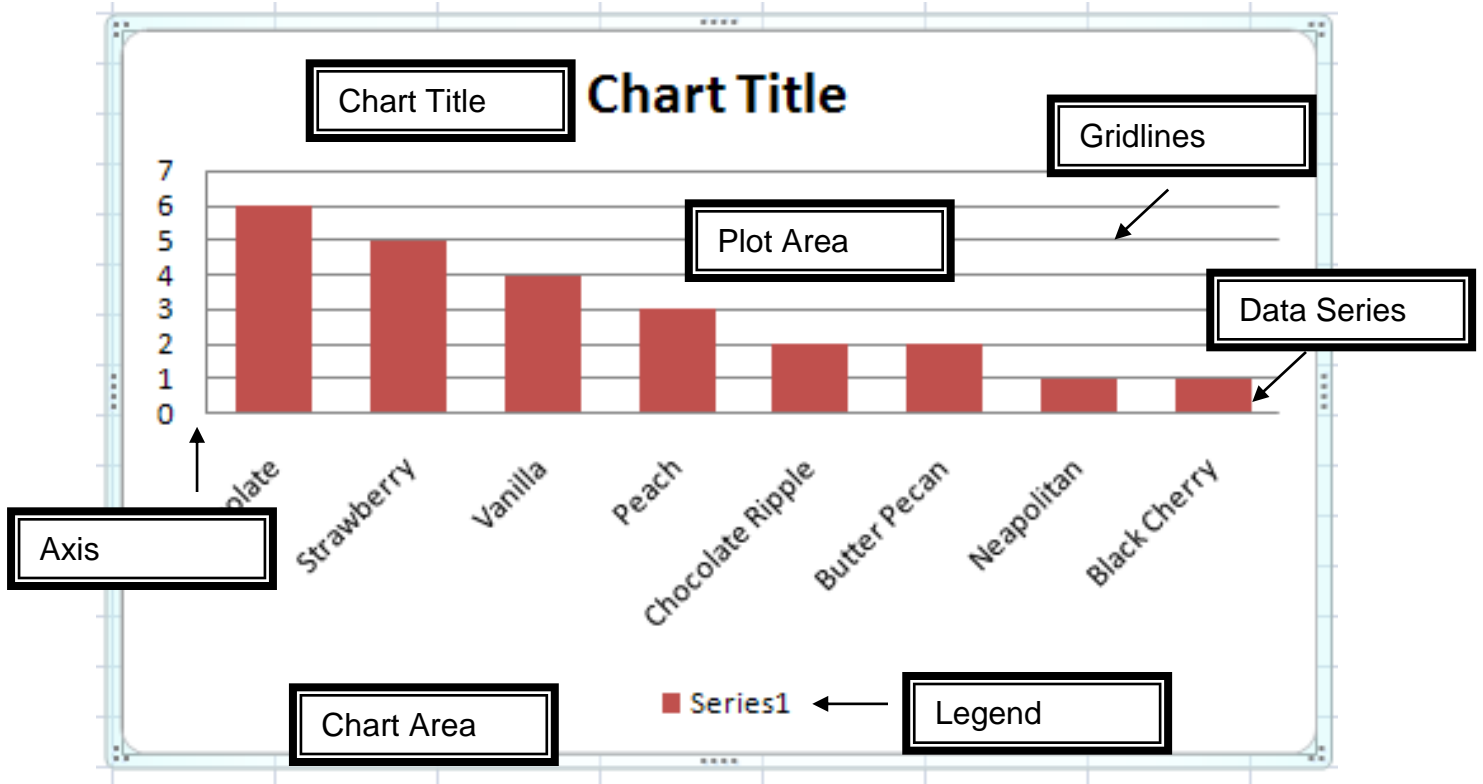
By clicking on the chart area (the space around the plot area), you can access many features, such as changing chart types and reselecting data, as well as open the mini format toolbar and **Format Chart Area** menu.



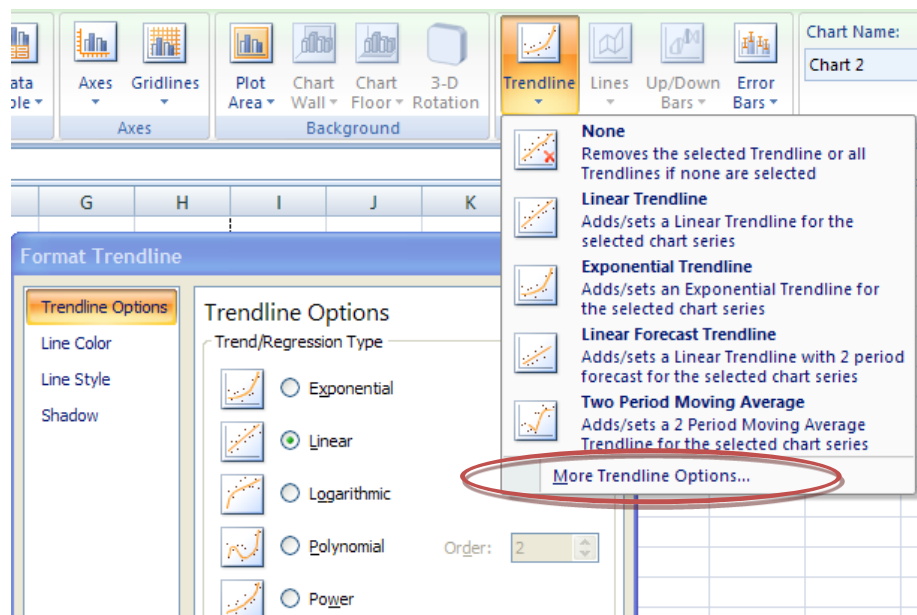
The **Format Chart Area** menu allows you to modify all of the formatting of the chart area, including fill style, border, and shadowing of the chart area. If this menu is open, you can open related menus for formatting the other elements for a chart (data series, gridlines, axis) simply by clicking on one of those elements.



Additionally, right-clicking within the Plot Area, Gridlines, Title, Legend, Axis, or Data Series opens similar sets of options, including opening the format menu specifically tailored to each element.



Analytical features, such as trend lines and error bars, can also be formatted in this manner if necessary, or they can be formatted using the applicable Format menu.





MICROSOFT EXCEL: SORTING, FILTERING, AND PIVOT TABLES

Introduction to Sorting

The records that make up a data set can be rearranged by changing the field by which the data set is filtered. For example, the data set below is sorted in ascending order by the **Asset Description** field.

	Location	Description	Park	Park Name	Region	Occupan	Asset Code	Status	API	FCI
14	106134	Electrical System	LYJO	Lyndon B Johnson National Historic Park		NPS	5400	OPERATING	80	0.000
15	109015	Fleet Vehicles	LYJO	Lyndon B Johnson National Historic Park		NPS	0000	REMOVED		0.000
16	116250	Helicopter Shelter	LYJO	Lyndon B Johnson National Historic Park		NPS	4100	PLANNED	83	0.000
17	116932	Radio Antenna on Water tower	LYJO	Lyndon B Johnson National Historic Park		NPS	5500	OPERATING	61	0.000
18	14582	Johnson City District	LYJO	Lyndon B Johnson National Historic Park		NPS	0000	OPERATING		0.000
19	14584	Boyhood Home Area GJ-001	LYJO	Lyndon B Johnson National Historic Park		IMR	0000	OPERATING		0.000
20	14585	LBJ Boyhood Home HB-001 LCS 000876	LYJO	Lyndon B Johnson National Historic Park		IMR	NPS 4100	OPERATING	80	0.073
21	14586	LBJ Boyhood Home Barn HB-002 LCS 005708	LYJO	Lyndon B Johnson National Historic Park		IMR	NPS 4100	OPERATING	36	0.000
22	14593	Back 40 Area GJ-004	LYJO	Lyndon B Johnson National Historic Park		IMR	NPS 0000	OPERATING		0.000
23	14607	Johnson Settlement Area GJ-003	LYJO	Lyndon B Johnson National Historic Park		IMR	NPS 0000	OPERATING		0.000
24	14609	John Bruckner Barn HB-010 LCS 000878	LYJO	Lyndon B Johnson National Historic Park		IMR	NPS 4100	OPERATING	57	0.028
25	14612	Exhibit Center B-108	LYJO	Lyndon B Johnson National Historic Park		IMR	NPS 4100	OPERATING	38	0.014
26	14613	Settlement Polk Barn HB-011 LCS 005716	LYJO	Lyndon B Johnson National Historic Park		IMR	NPS 4100	OPERATING	50	0.001
27	14616	Sam E Johnson Log Cabin HB-007 LCS 00571	LYJO	Lyndon B Johnson National Historic Park		IMR	NPS 4100	OPERATING	80	0.050
28										

Step 1. – Getting Started

- 1** Select any cell within the data table.
- 2** From the **Data** menu, select **Sort**. Excel will automatically determine the data to be sorted, which should be highlighted, and a **Sort** dialog box will appear. Verify that the entire data set you would like to sort is highlighted.
- 3** In the open dialog box, select the field to sort by, the type of sort and the sort order, and press OK.

Advanced Facility Management Practices: Microsoft Excel Session

The screenshot shows the Microsoft Excel interface with the 'Sort & Filter' ribbon tab selected. A 'Sort' dialog box is open, showing the 'Sort by' dropdown set to 'Asset Code' and the 'Order' dropdown set to 'Smallest to Largest'. The background data table contains columns for Asset #, Asset Description, Park, Occupant, Asset Code, Status, API, FCI, CRV, DCost, Qty, and UM. A callout box with the number '2' points to the 'Sort & Filter' ribbon, and another callout box with the number '3' points to the 'Sort by' dropdown in the dialog box.

Step 2. – Sorting Data based on a Single Field

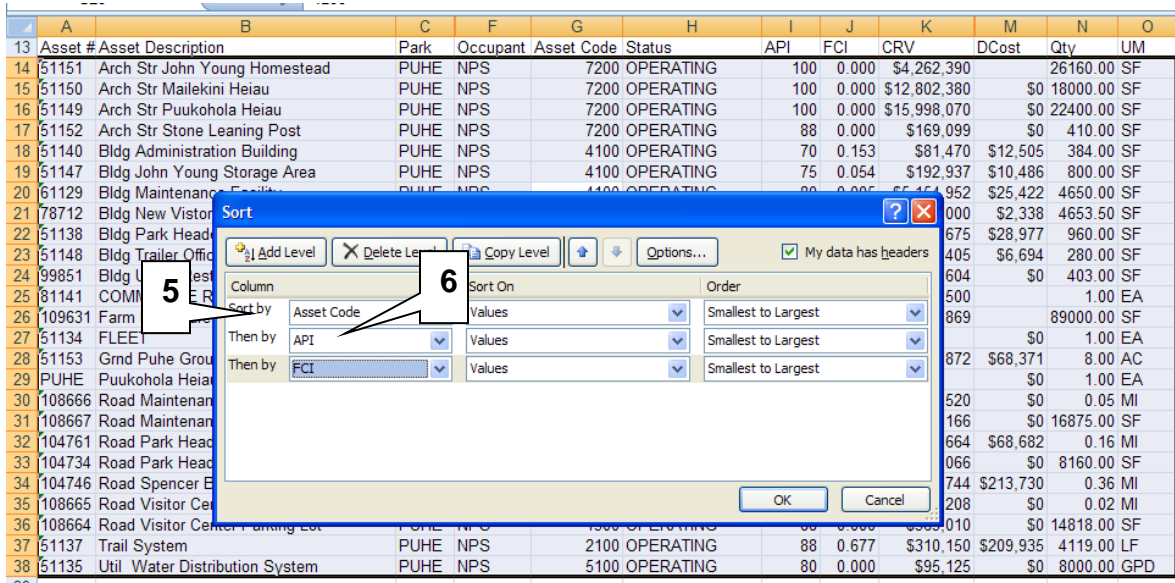
The Sort dialog box allows data to be sorted by as many fields as you have data columns—each of which may be sorted in ascending or descending order. The result of sorting the Asset Code field in ascending order is shown below.

	A	B	C	F	G	H	I	J	K	M	N	O
1	Asset #	Asset Description	Park	Occupant	Asset Code	Status	API	FCI	CRV	DCost	Qty	UM
2	PUHE	Puukohola Heiau National Historic Site	PUHE	NPS	0	NOTAPPLICABLE		0.000		\$0		1.00 EA
3	108666	Road Maintenance Facility Access	PUHE	NPS	1100	OPERATING	80	0.000	\$220,520	\$0		0.05 MI
4	104761	Road Park Headquarters Entrance	PUHE	NPS	1100	OPERATING	80	0.097	\$705,664	\$68,682		0.16 MI
5	104746	Road Spencer Beach Park	PUHE	SHARED	1100	OPERATING	88	0.135	\$1,587,744	\$213,730		0.36 MI
6	108665	Road Visitor Center Exit	PUHE	NPS	1100	OPERATING	88	0.000	\$88,208	\$0		0.02 MI
7	108667	Road Maintenance Facility Parking Area	PUHE	NPS	1300	OPERATING	80	0.000	\$641,166	\$0		16875.00 SF
8	104734	Road Park Headquarters Parking Lot	PUHE	NPS	1300	OPERATING	80	0.000	\$91,066	\$0		8160.00 SF
9	108664	Road Visitor Center Parking Lot	PUHE	NPS	1300	OPERATING	88	0.000	\$563,010	\$0		14818.00 SF
10	51137	Trail System	PUHE	NPS	2100	OPERATING	88	0.677	\$310,150	\$209,935		4119.00 LF
11	51153	Grnd Puhe Grounds	PUHE	NPS	3100	OPERATING	100	0.048	\$1,418,872	\$68,371		8.00 AC
12	51140	Bldg Administration Building	PUHE	NPS	4100	OPERATING	70	0.153	\$81,470	\$12,505		384.00 SF
13	51147	Bldg John Young Storage Area	PUHE	NPS	4100	OPERATING	75	0.054	\$192,937	\$10,486		800.00 SF
14	61129	Bldg Maintenance Facility	PUHE	NPS	4100	OPERATING	80	0.005	\$5,154,952	\$25,422		4650.00 SF
15	78712	Bldg New Visitor Center	PUHE	NPS	4100	OPERATING	100	0.000	\$7,450,000	\$2,338		4653.50 SF
16	51138	Bldg Park Headquarters	PUHE	NPS	4100	OPERATING	70	0.142	\$203,675	\$28,977		960.00 SF
17	51148	Bldg Trailer Office	PUHE	NPS	4100	OPERATING	70	0.113	\$59,405	\$6,694		280.00 SF
18	99851	Bldg Upper Restroom	PUHE	NPS	4100	OPERATING	80	0.000	\$463,604	\$0		403.00 SF
19	51135	Util Water Distribution System	PUHE	NPS	5100	OPERATING	80	0.000	\$95,125	\$0		8000.00 GPD
20	81141	COMM-PUHE Radio System	PUHE	NPS	5500	OPERATING	71	0.000	\$74,500			1.00 EA
21	51151	Arch Str John Young Homestead	PUHE	NPS	7200	OPERATING	100	0.000	\$4,262,390			26160.00 SF
22	51150	Arch Str Mailekini Heiau	PUHE	NPS	7200	OPERATING	100	0.000	\$12,802,380	\$0		18000.00 SF
23	51149	Arch Str Puukohola Heiau	PUHE	NPS	7200	OPERATING	100	0.000	\$15,998,070	\$0		22400.00 SF
24	51152	Arch Str Stone Leaning Post	PUHE	NPS	7200	OPERATING	88	0.000	\$169,099	\$0		410.00 SF
25	109631	Farm Enclosure	PUHE	PARTNER	7200	INACTIVE	85	0.000	\$4,362,869			89000.00 SF
26	51134	FLEET	PUHE	NPS	8999	NOTAPPLICABLE		0.000		\$0		1.00 EA



Step 3. – Sorting Data based on Multiple Fields

A similar approach is used when sorting data using multiple fields.



- 5 In this example, the **Asset Code** field is sorted in ascending order.
- 6 Then the **API** field is sorted in ascending order.

The result of this sort is shown below. Note that the sorting of the **Asset Code** field took precedence over the sorting of the **API** field. As a result, the records are first grouped together by their **Asset Code**, and then, within each of these groups, the records are sorted in descending order by **API**.

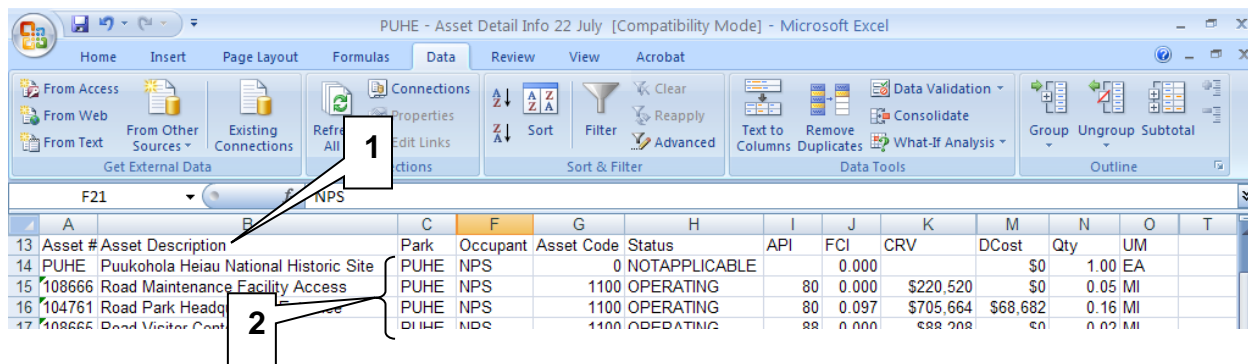
A	B	C	F	G	H	I	J	K	M	N	O	T
Asset #	Asset Description	Park	Occupant	Asset Code	Status	API	FCI	CRV	DCost	Qty	UM	
13	PUHE	Puukohola Heiau National Historic Site	PUHE	NPS	0	NOTAPPLICABLE		0.000		\$0	1.00	EA
14	108666	Road Maintenance Facility Access	PUHE	NPS	1100	OPERATING	80	0.000	\$220,520	\$0	0.05	MI
15	104761	Road Park Headquarters Entrance	PUHE	NPS	1100	OPERATING	80	0.097	\$705,664	\$68,682	0.16	MI
16	108665	Road Visitor Center Exit	PUHE	NPS	1100	OPERATING	88	0.000	\$88,208	\$0	0.02	MI
17	104746	Road Spencer Beach Park	PUHE	NPS	1100	OPERATING	88	0.135	\$1,587,744	\$213,730	0.36	MI
18	108667	Road Maintenance Facility Parking Area	PUHE	NPS	1300	OPERATING	80	0.000	\$641,166	\$0	16875.00	SF
19	104734	Road Park Headquarters Parking Lot	PUHE	NPS	1300	OPERATING	80	0.000	\$91,066	\$0	8160.00	SF
20	108664	Road Visitor Center Parking Lot	PUHE	NPS	1300	OPERATING	88	0.000	\$563,010	\$0	14818.00	SF
21	51137	Trail System	PUHE	NPS	2100	OPERATING	88	0.677	\$310,150	\$209,935	4119.00	LF
22	51153	Grnd Puhe Grounds	PUHE	NPS	3100	OPERATING	100	0.048	\$1,418,872	\$68,371	8.00	AC
23	51148	Bldg Trailer Office	PUHE	NPS	4100	OPERATING	70	0.113	\$59,405	\$6,694	280.00	SF
24	51138	Bldg Park Headquarters	PUHE	NPS	4100	OPERATING	70	0.142	\$203,675	\$28,977	960.00	SF
25	51140	Bldg Administration Building	PUHE	NPS	4100	OPERATING	70	0.153	\$81,470	\$12,505	384.00	SF
26	51147	Bldg John Young Storage Area	PUHE	NPS	4100	OPERATING	75	0.054	\$192,937	\$10,486	800.00	SF
27	99851	Bldg Upper Restroom	PUHE	NPS	4100	OPERATING	80	0.000	\$463,604	\$0	403.00	SF
28	61129	Bldg Maintenance Facility	PUHE	NPS	4100	OPERATING	80	0.005	\$5,154,952	\$25,422	4650.00	SF
29	78712	Bldg New Visitor Center	PUHE	NPS	4100	OPERATING	100	0.000	\$7,450,000	\$2,338	4653.50	SF
30	51135	Util Water Distribution System	PUHE	NPS	5100	OPERATING	80	0.000	\$95,125	\$0	8000.00	GPD
31	81141	COMM-PUHE Radio System	PUHE	NPS	5500	OPERATING	71	0.000	\$74,500		1.00	EA
32	109631	Farm Enclosure	PUHE	NPS	7200	INACTIVE	85	0.000	\$4,362,869		89000.00	SF
33	51152	Arch Str Stone Leaning Post	PUHE	NPS	7200	OPERATING	88	0.000	\$169,099	\$0	410.00	SF
34	51151	Arch Str John Young Homestead	PUHE	NPS	7200	OPERATING	100	0.000	\$4,262,390		26160.00	SF
35	51150	Arch Str Mailekini Heiau	PUHE	NPS	7200	OPERATING	100	0.000	\$12,802,380	\$0	18000.00	SF
36	51149	Arch Str Puukohola Heiau	PUHE	NPS	7200	OPERATING	100	0.000	\$15,998,070	\$0	22400.00	SF
37	51134	FLEET	PUHE	NPS	8999	NOTAPPLICABLE		0.000		\$0	1.00	EA

Introduction to Filtering

Filtering is a quick and easy way to find and work with a subset¹ of a data set. A filtered data set displays only the rows (records) that meet the criteria² you specify for a column. Excel provides two commands for filtering ranges: **AutoFilter** and **Advanced Filter**. Only the **AutoFilter** command is covered in this document.

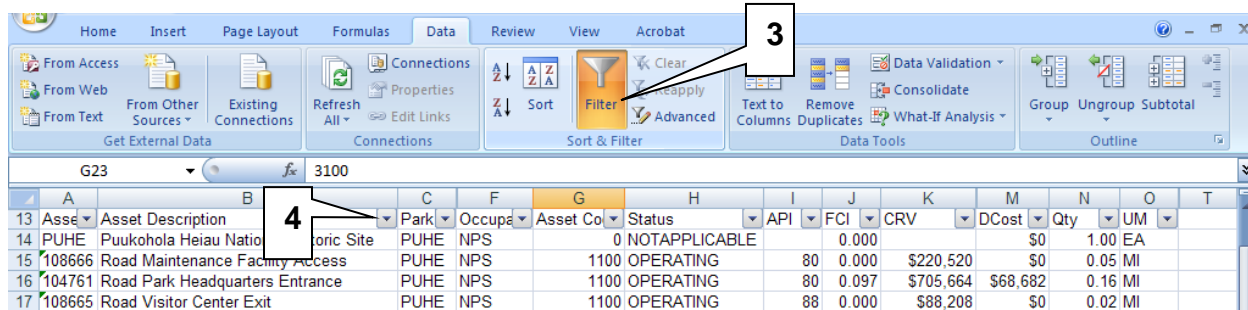
Unlike sorting, filtering does not necessarily reorganize a data set, although the filter can be used to sort data. In most cases, filtering temporarily hides rows you do not want displayed. When Excel filters rows you can edit, format, chart, and print the subset of data without reorganizing or moving it.

Step 1. – Format the Data Set



- 1 The first row of the data set should contain headings.
- 2 Subsequent rows should contain data, and there should be no blank rows within the data set (individual blank cells are acceptable but blank rows are not). There should also be a blank row at the end of the data set and a blank column at the right.

Step 2. – Turn on the AutoFilter



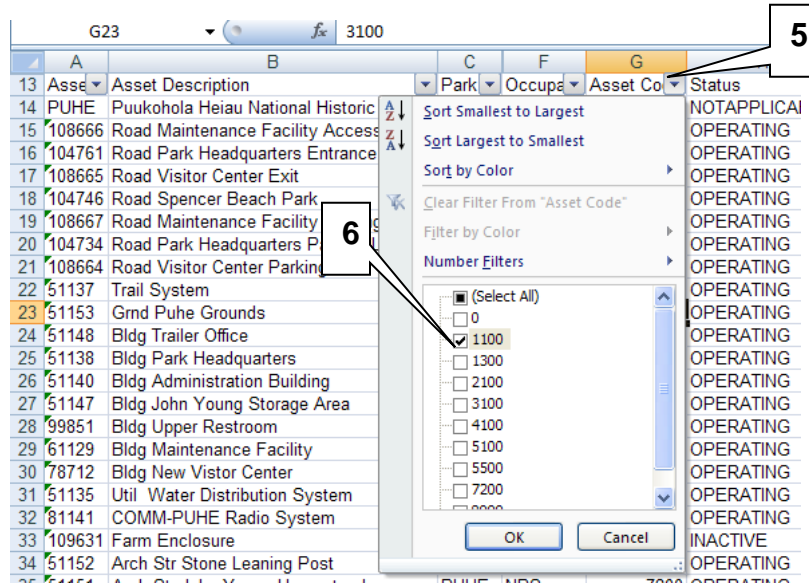
- 3 After selecting any cell in the table, go to the **Data** menu and choose **Filter**.

¹ Subset: A group of data that is part of a larger data set.

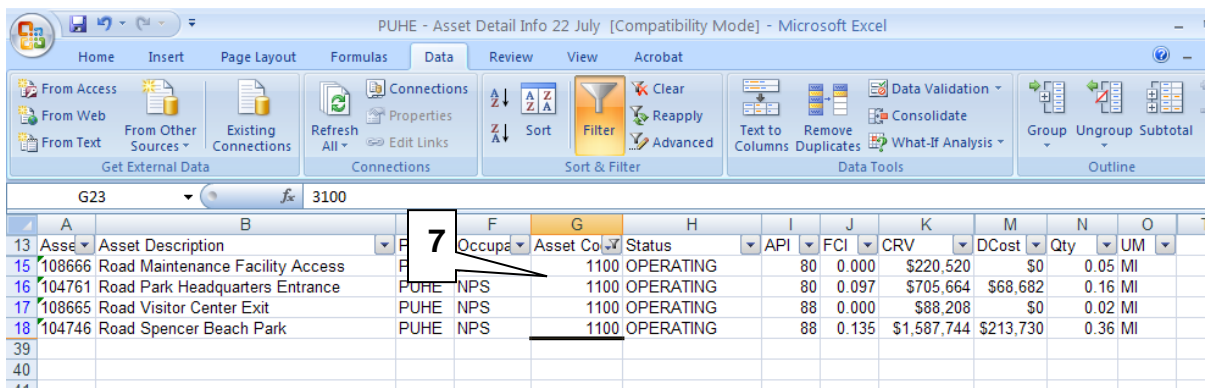
² Criteria: Conditions you specify to limit which records are included in the result set of a query or filter.

- 4 A dropdown arrow ▼ appears to the right of each column heading, indicating that each column heading is now a label in the filtered range.

Step 3. – Filtering the Data based on a Single Field



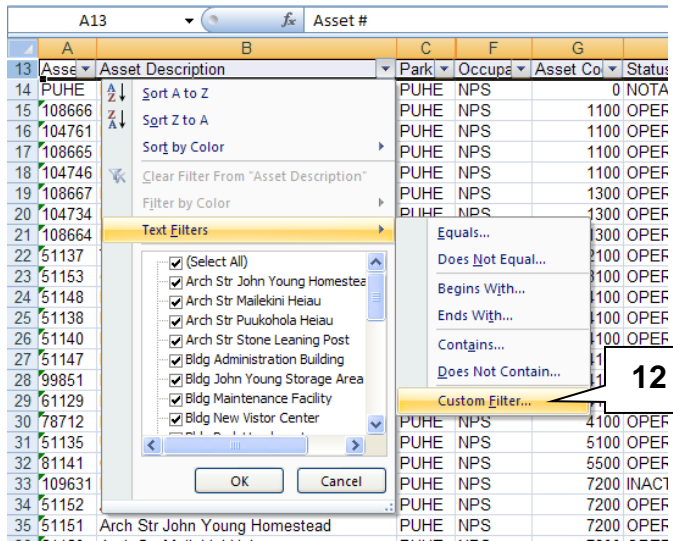
- 5 To filter the list, select the dropdown arrow for the field that you would like to filter and choose an item from the list.
- 6 For example, if you were only interested in the 1100 assets, you would select 1100 from the **Asset Code** dropdown list.



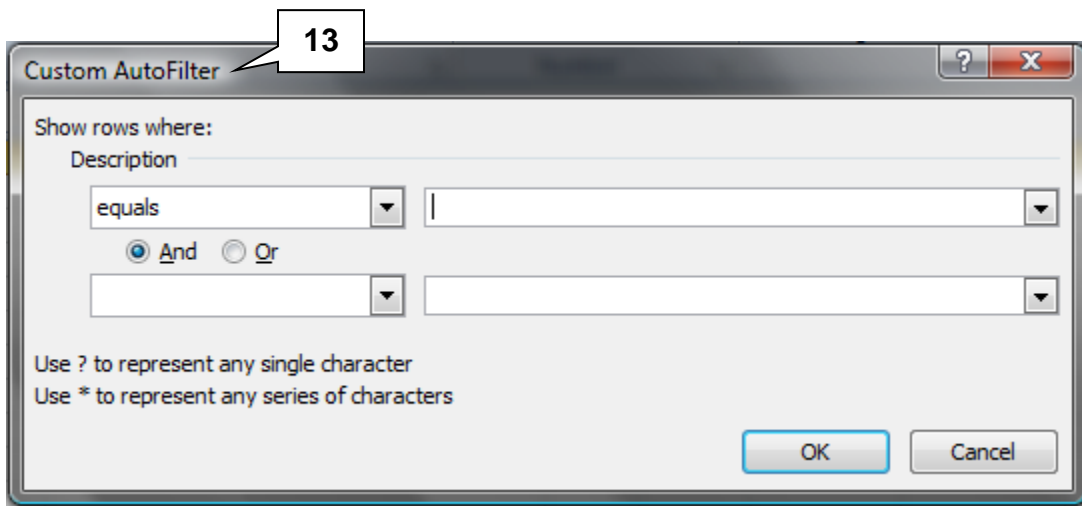
- 7 Once you select 1100 from the list, the dropdown list disappears, and the table only reflects the data for 1100. Rows that do not meet the criteria are hidden.

Step 4. – Filtering the Data based on Custom Criteria

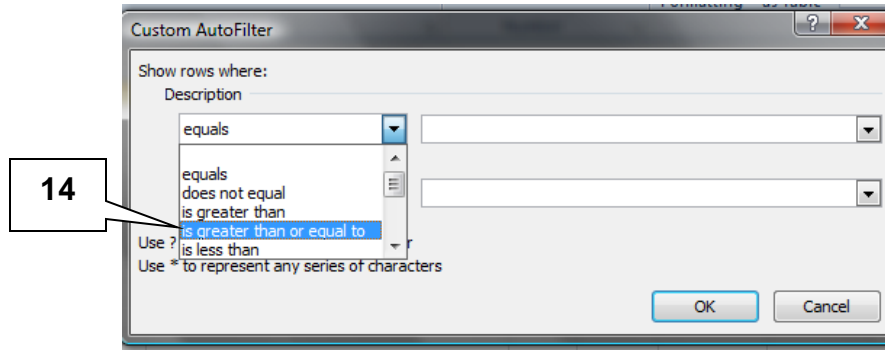
By default, when you select an item from the dropdown list, the list is filtered for rows that are *equal to* the item that you chose.



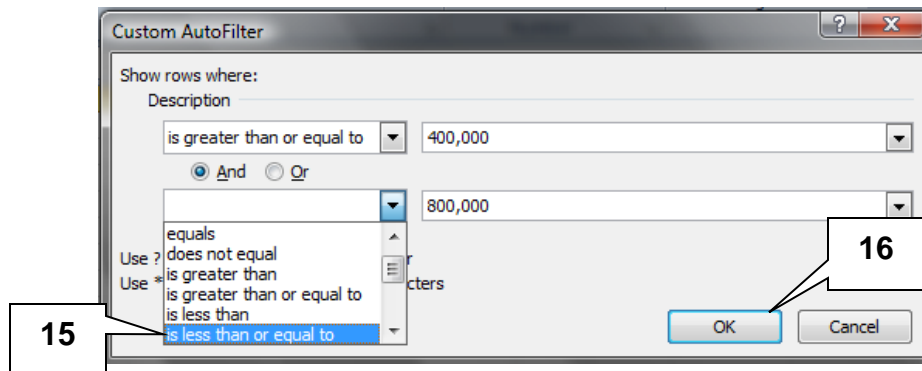
12 If you need more options when filtering, choose **Custom Filter** from the dropdown list.



13 The **Custom AutoFilter** dialog box will appear. This **Custom AutoFilter** dialog box can be used to filter the list based on multiple conditions.



- 14** If you wanted to see CRVs between \$400,000 and \$800,000, you would select **is greater than or equal to** from the **Show rows where** dropdown list and enter \$400,000 (or select \$400,000 from the dropdown list).

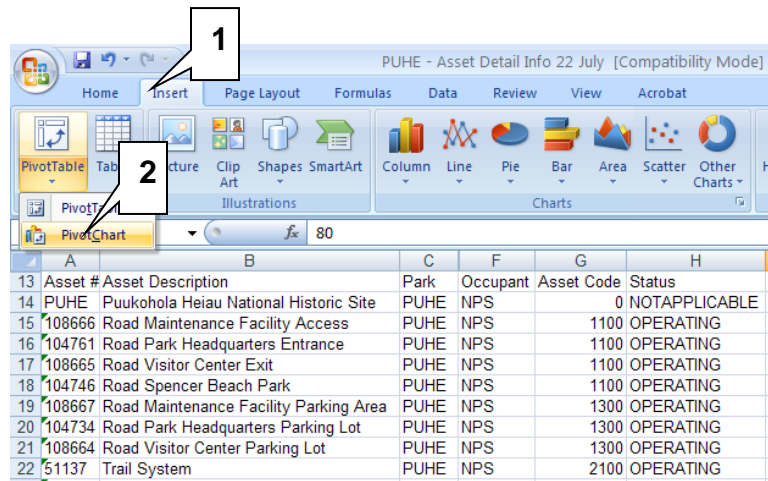


- 15** You would then select **is less than or equal to** and enter \$800,000 (or select \$800,000 from the dropdown list).
- 16** Once you have completed all the information in the dialog box, select **OK**.

Introduction to Pivot Charts & Tables

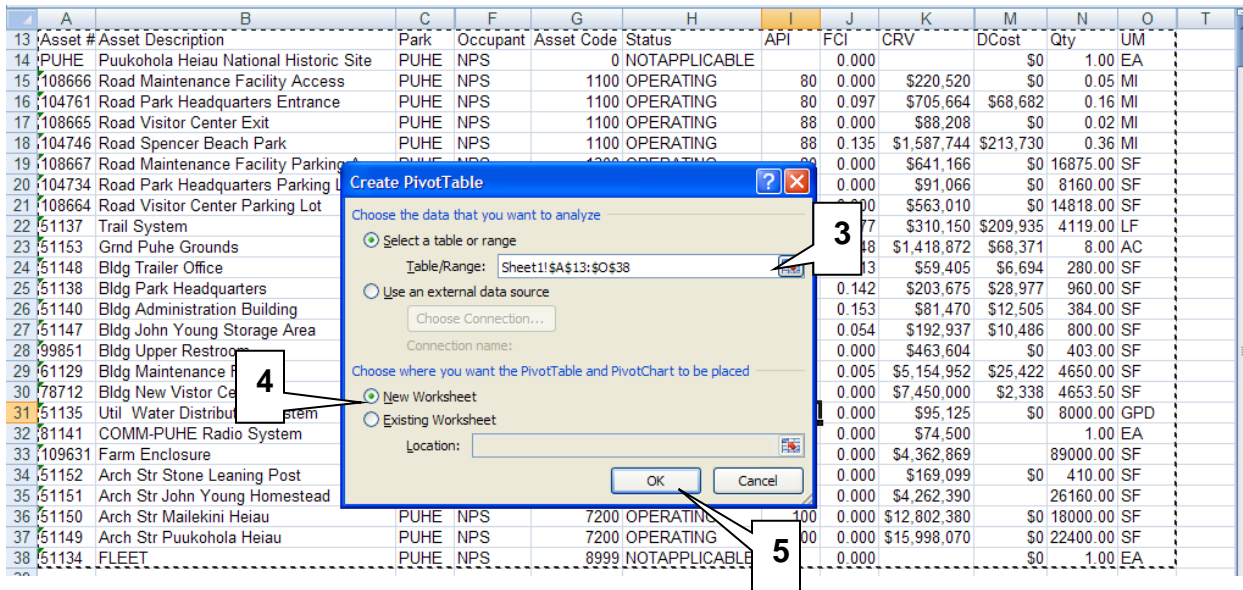
A pivot chart is a type of worksheet that, using data from one sheet, transposes only selected data to a table on a new worksheet for easier viewing. This section will demonstrate how to transform a large data set into a summary table.

Step 1. – Getting Started



- 1 Click on the **Insert** menu.
- 2 Select **PivotTable** and **PivotChart**.

A **PivotTable and PivotChart Wizard** dialog box will appear.

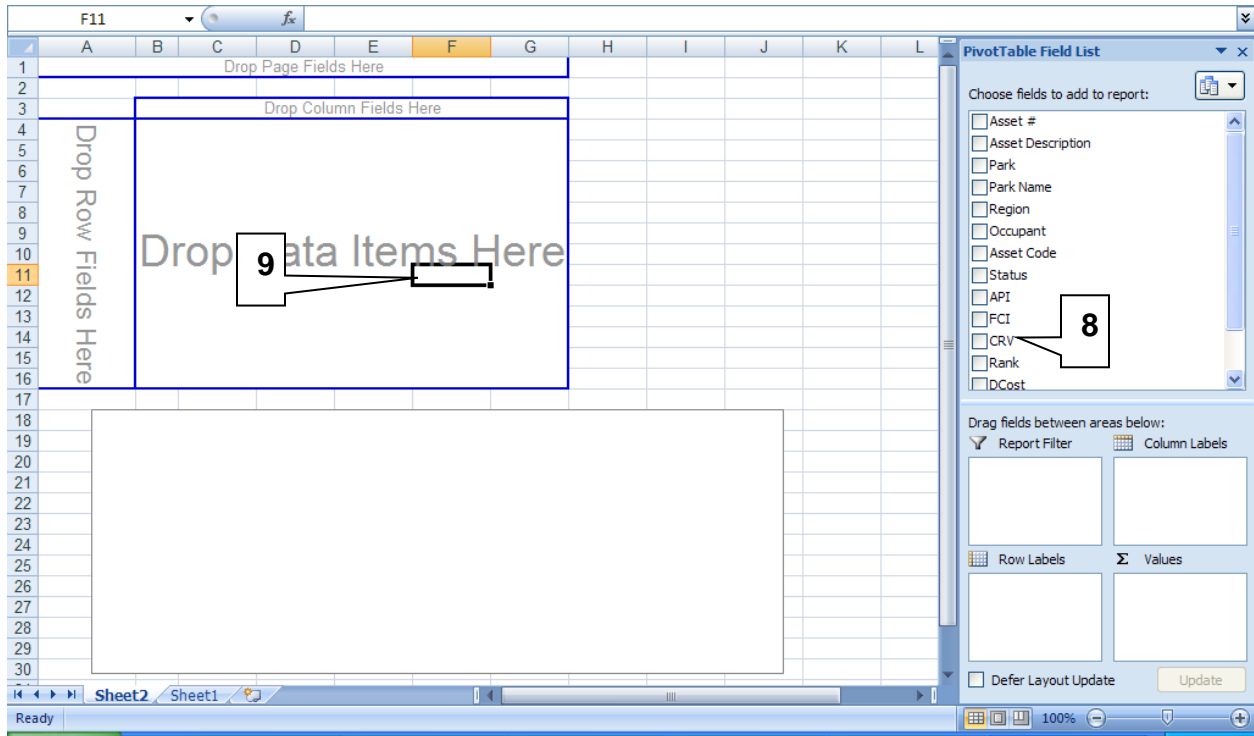


- 3 Select the **Range** of data that you would like to summarize using the PivotTable. The **Range** may automatically populate. In this case, verify that Excel auto-populated the correct range of data. The selected data range will be outlined with a dashed line.
- 4 For the final step of the wizard, select where you would like to put the PivotTable report. The default is to put the report on a **New Worksheet**.
- 5 Select **OK**.



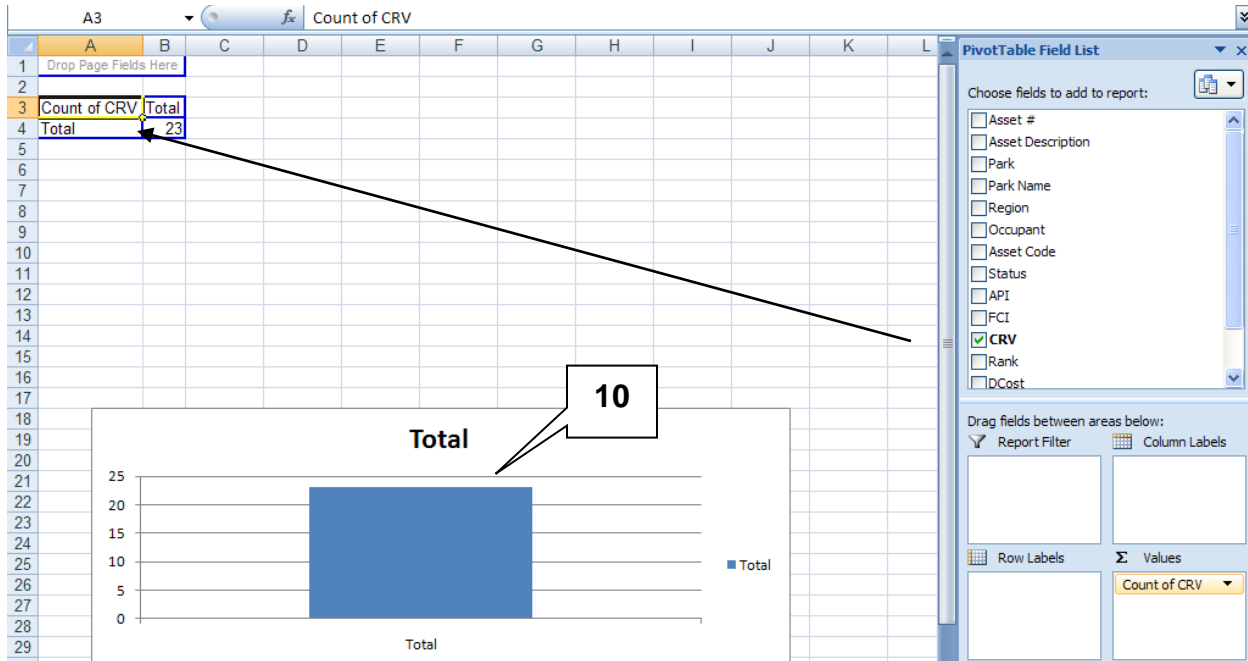
Step 2. – Setting up a PivotTable Chart

Once the wizard is complete, a worksheet is created with a blank PivotTable and PivotChart. A **PivotTable Field List** will also be displayed, as shown below. The items in the **PivotTable Field List** represent each column of data from the data set. These fields can be placed in the row, column, data, or page fields of the blank PivotTable.

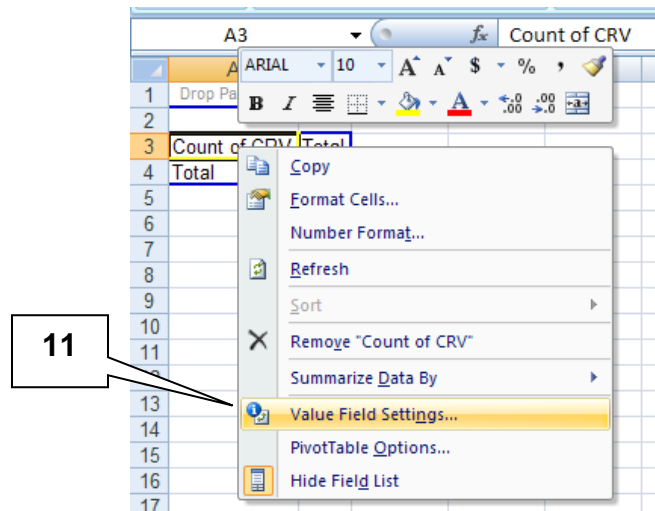


- 8** If you want to see the sum of the CRV for all assets, you would select the **CRV** field from the **PivotTable Field List**.
- 9** Hold the left mouse button down and drag the field into the **Data Field** of the PivotTable. The PivotTable will refresh to reflect the count of all the CRV, which is the typical default.

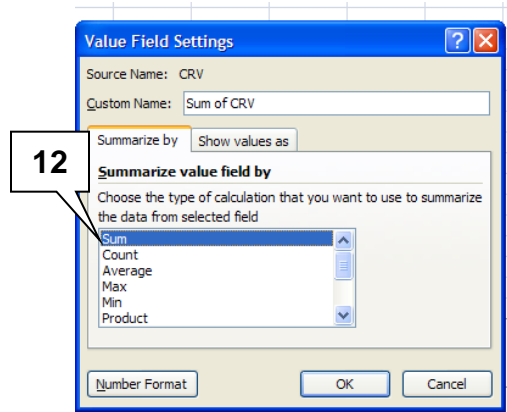
- 10** Excel will automatically create a chart of the data. In this case, it is simply charting the total number of CRV values, but the chart will change as changes are made to the Pivot Table.



- 11** You can change the way that the data is summarized by right-clicking the data field. Select **Value Field Settings** from the menu and a **PivotTable Field** dialog box will appear. This allows you to change how the data is summarized.



12 To see the sum of all CRV for this data set, you can select **Sum** from the **Summarize** by dropdown list.



13 To see the CRV by Asset Code, drag the **Asset Code** field from the **PivotTable Field List** to the **Row Labels Field**.

Asset Code	Total
0	0
1100	2602136
1300	1295241.91
2100	310150.4
3100	1418872
4100	13606042.37
5100	95124.79
5500	74500
7200	37594807.6
8999	8999
Grand Total	56996875.07

14 To see the CRV for only NPS assets, drag the **Occupant** field from the **PivotTable Field List** to the **Report Filter**. Click on the down-drop next to the name in Pivot Table and select NPS. This filters out any records other than those with an NPS in the Occupant field.

The screenshot displays an Excel PivotTable and its corresponding PivotChart. The PivotTable is structured as follows:

Occupant	Sum of CRV
(All)	Total
0	0
1100	2602136
1300	1295241.91
2100	310150.4
3100	1418872
4100	13606042.37
5100	95124.79
5500	74500
7200	37594807.6
8999	
Grand Total	56996875.07

The PivotChart, titled 'Total', is a bar chart with the Y-axis representing the Sum of CRV (ranging from 0 to 4,000,000) and the X-axis representing Asset Codes (0, 1100, 1300, 2100, 3100, 4100, 5100, 5500, 7200, 8999). The bars show the CRV for each asset code, with 7200 having the highest value.

The PivotTable Field List on the right shows the following configuration:

- Choose fields to add to report:**
 - Asset Description
 - Park
 - Park Name
 - Region
 - Occupant**
 - Asset Code**
 - Status
 - API
 - FCI
 - CRV**
 - Rank
 - DCost
 - Qty
- Drag fields between areas below:**
 - Report Filter:** Occupant
 - Column Labels:**
 - Row Labels:** Asset Code
 - Values:** Sum of CRV

This close-up shows the dropdown menu for the 'Occupant' field in the PivotTable. The options listed are:

- (All)
- NPS
- Shared
- State

The 'NPS' option is highlighted with a red circle, indicating the selection step described in the text.

