

# Advanced Microsoft Excel 2013

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## Introduction

Microsoft Excel is a program designed to efficiently manage spreadsheets and analyze data. It contains both basic and advanced features that anyone can learn. Once some basic features are known, learning the advanced tools becomes easy. This lesson is composed of some advanced Excel features. It assumes basic prior knowledge of Excel, and it is expected that the objectives from AT Step's Excel Essentials are known. This lesson will talk about the advanced customization and formatting features that allow for easier data manipulation and organization.

## Objectives

- 1) Learn how to Customize the Interface
- 2) Advanced Formatting: Custom Lists, Cell Groups, and Transposing Tables
- 3) Learn how to Reference Across Sheets
- 4) Advanced Formulas and Using Data Ranges
- 5) Using Data Validation

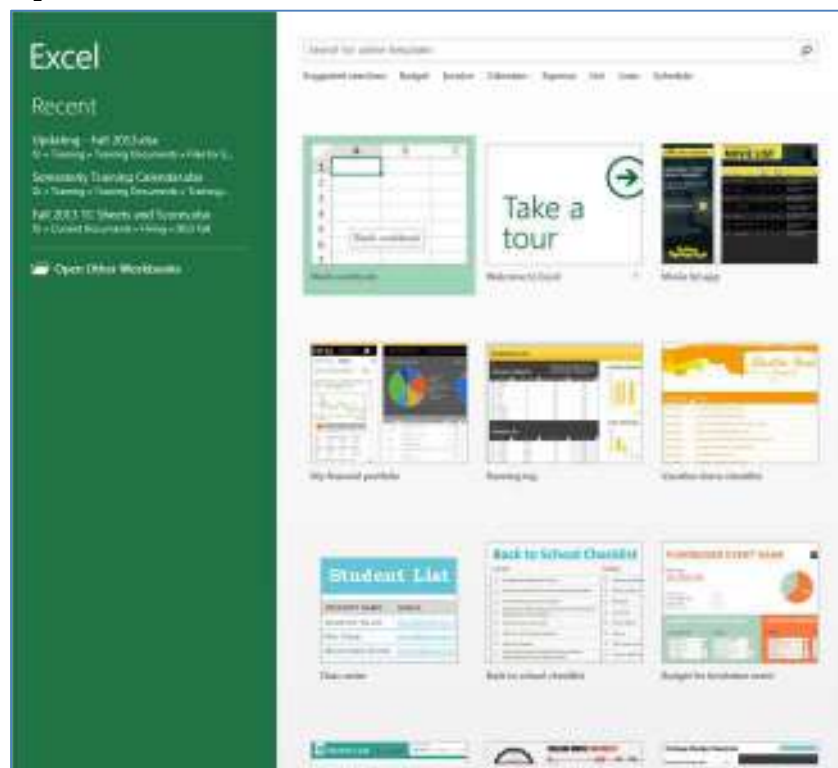
## Interface Customization

Most of Excel's interface can be customized to fit many people's needs. For some, customization makes tools more readily available by placing those tools in a location that is more natural for the user. This section will introduce you to customizing Excel's interface by adding a tab in the ribbon, customizing the status bar at the bottom of the program, opening separate panes, and scrolling through a sheet with a static column or row.

### Adding a Tab in the Ribbon

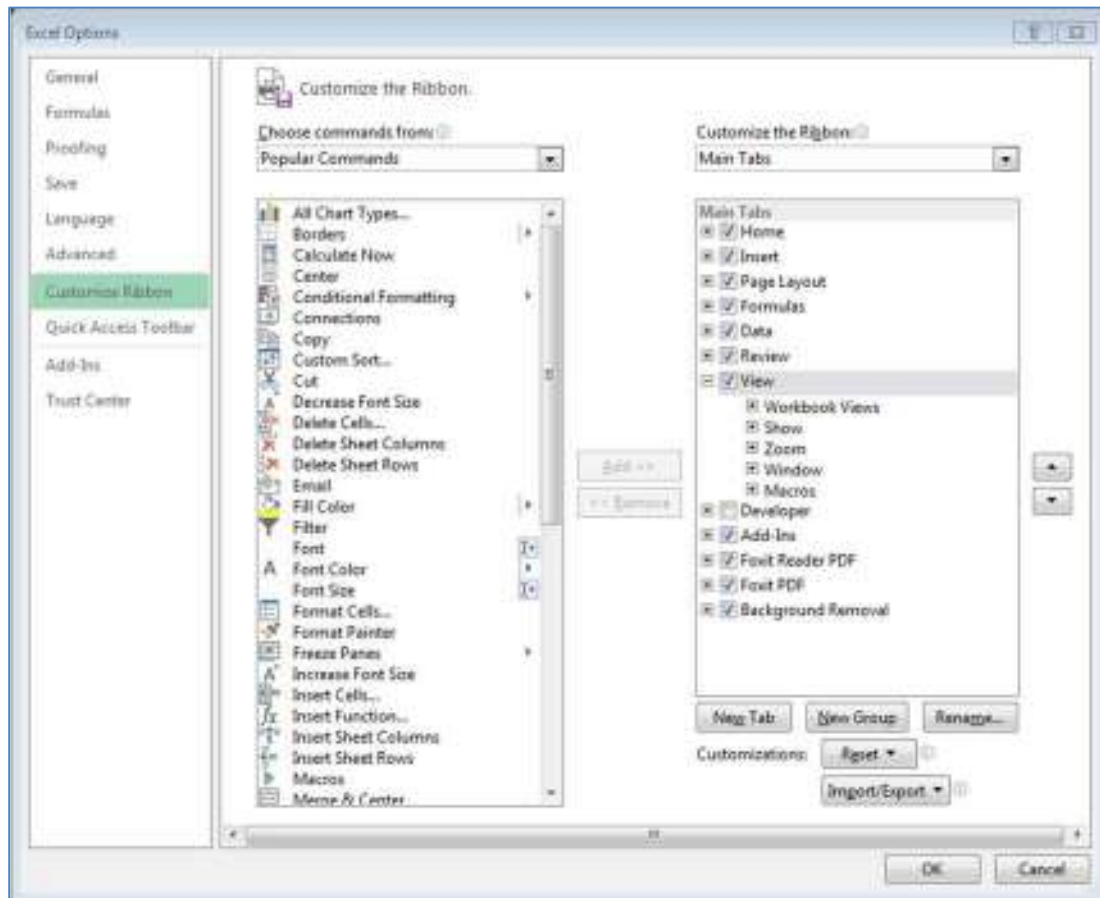
In this subsection, we will explore the tab options in Excel. Tabs in Excel can be added, deleted and even reorganized. This feature is useful if you use a set of tools frequently as it can save time navigating between tabs.

1. Download and unzip the Exercise files from the At Lab's website.
2. Open Excel and choose the blank workbook.



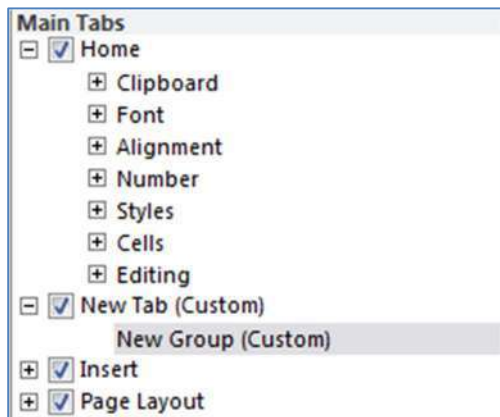
*A recent change in Excel is the startup screen. In the past, Excel defaulted to opening a blank workbook. Now, you have the option of choosing a blank workbook, template, or previously created file.*

3. Open backstage view by clicking on the File Tab and choose 'Options'. This will open the Options dialog box.
4. Select 'Customize Ribbon'. This tab allows you to add tabs as well as move tabs around.



*Notice that this box has two main sections. The first is an area which displays the commands which can be added to tabs. At the top of this section, there is a drop-down menu allowing you to choose the type of command from the list shown below. Select macros from this list. Here there are no commands because we have not created any macros yet. If you use macros, you can add them to your custom tab or group after you create them.*

5. Click Home under the main tabs and click 'New Tab'.



*A new tab labeled "New Tab" along with a new group labeled "New Group" is placed under the Home tab. From here you can re-name the tab and group, add more groups, and add actions in each group.*

6. Rename the tab to "Yourname's Tab" by selecting the tab and choosing 'Rename' at the bottom of the 'Main Tabs' section.

*A dialog box displaying an editable field is displayed. This tool can be used not only to rename your custom tab, but also any tab that is in the worksheet.*

7. Click OK to accept the new name.

8. Rename the new group to "Other Formatting Tools".

*Notice the dialog for renaming a group looks different because it allows you to add symbols to the name.*

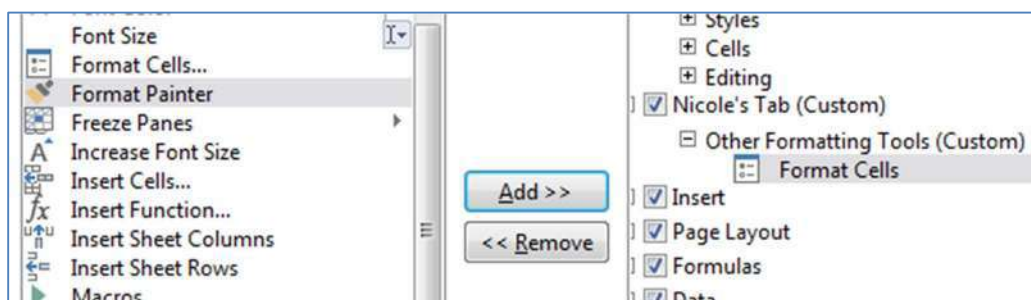


*The field at the bottom of this dialog box is where the name can be edited.*

*For now, we will be adding formatting tools to this group.*

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- Click Ok to accept this name for the group.
- Add the 'Format Cells...' tool to your group by selecting the tool in the command window and clicking 'Add'.

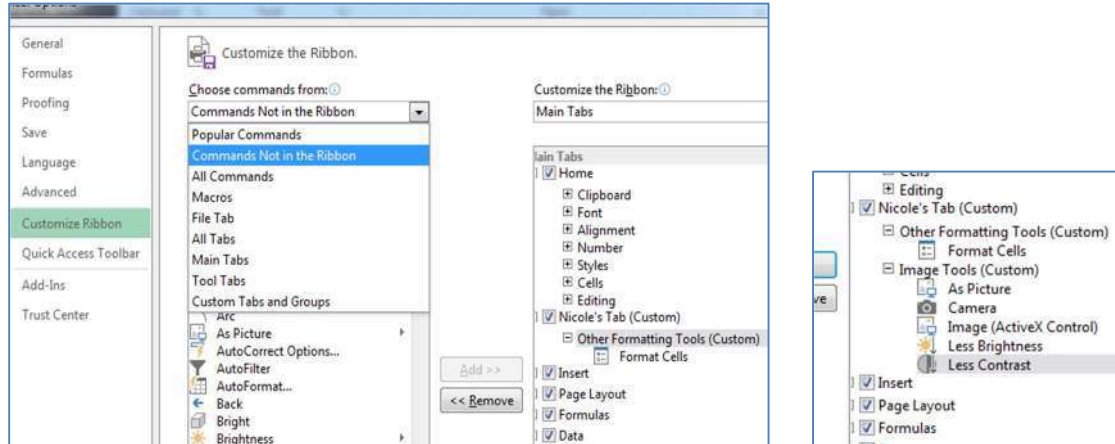


*Notice that when a tool is added to a group, it is removed from the command choices.*

- Click on 'Formatting Tools (custom)' and click 'New Group' to add a new group to your tab.
- Rename this group to "Image Tools".

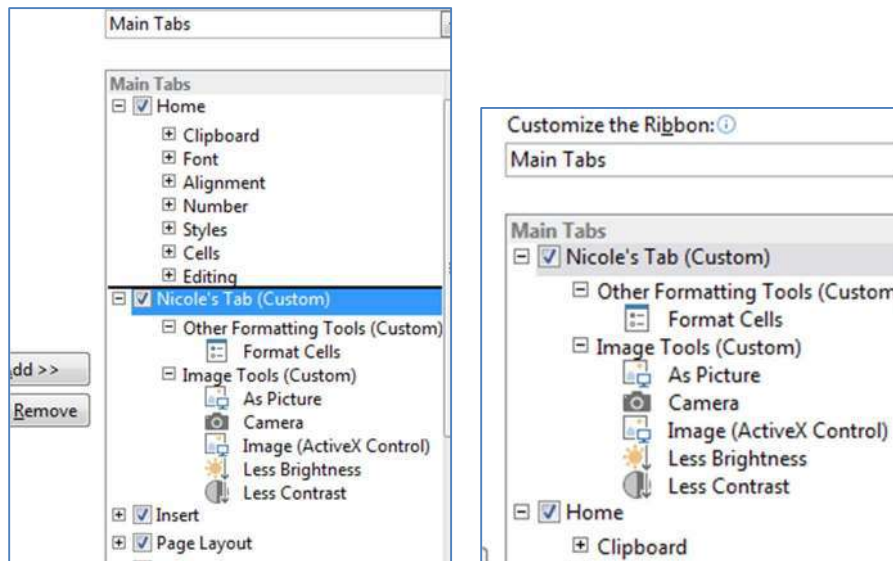
*We will be adding some tools that not already in the ribbon here.*

13. Select 'Commands Not in the Ribbon' from the commands drop down menu and add the 'As Picture', 'Camera', 'Image(ActiveXControl)', 'Less Brightness', and 'Less Contrast' tools into the 'Image Tools' group.



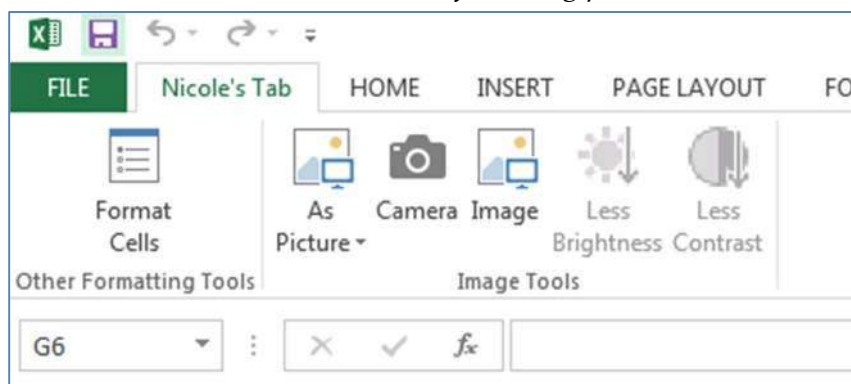
14. Click and drag your tab to before 'Home'.

*In the ribbon, the tabs are displayed in the same order as in the 'Customize Ribbon' dialog box, so this will place your tab as the first tab after the file tab.*



15. Click 'Ok' to exit the 'Customize Ribbon' dialog box and click on your custom tab.

*Your tab should look similar to the following picture.*



Now that you have a customized ribbon, you can quickly get to the tools you need most often. Your options for creating ribbons are nearly limitless. Another part of Excel that can be easily customized is the status bar.

### Status Bar Customization

At the bottom of every Microsoft Office program, there is a status bar. This bar, by default, contains different viewing options as well as the zoom slider. Excel allows you to add and take away features on the status bar such as the ability to display the sum, average, and other calculations for a selected data range.

1. Open a new worksheet and observe the status bar.



*On the right hand side of the toolbar, the view slider, the Page Break preview, Page Layout, and normal View options are displayed. On the left, the word 'Ready' is shown. Ready is part of the cell mode option that indicates a general state. The other modes are enter, indicating content is being entered into the cell, edit, indicating content is being entered into the formula bar for a cell, and point, indicating that a data range is being selected for referencing.*

2. Right click on the status bar to see the different options available.

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*There are different options such as information about the mode, calculations that can be displayed, and viewing tools. We will explore some of these options in the following steps.*

3. Ensure that Average, Count, Minimum, Maximum, Sum, Num Lock are selected. Before any data is typed, the status bar is already displaying Num Lock on the left side to indicate that the Num Lock is on.



4. Enter the numbers 1-12 in A1:A12.

*We will look at some different calculations of these numbers in the status bar.*

5. Select cells A1:A12.

*Notice the status bar now displays all of the calculations that were selected. This can be used whenever it is useful to know the average, sum, etc. but not necessary to display that information in the sheet.*



Once the status bar is customized, we can analyze data quickly without having to put certain formulas into the sheet. We also can add the information about the sheet or even whether a key on the keyboard is active. Another time-saving feature that Excel has is the ability to navigate in panes.



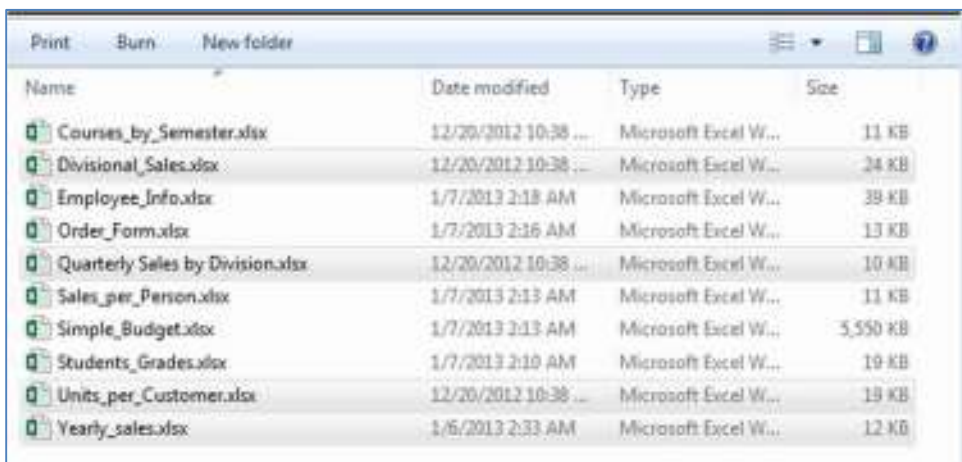
## Navigating in Multiple Windows and Panes

When working with multiple worksheets, navigating through each sheet can be an annoyance as well as cost valuable time. On the other hand using window views allows you to navigate in multiple workbooks at the same time. You can also split one workbook into 4 different views or open the same worksheet multiple times. We will explore these features now.

1. Close Excel.

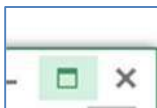
*In the past, Excel was able to run regardless of whether a workbook was open or not. In 2013, Excel started handling each workbook as its own instance of the program.*

2. Navigate to the 'Exercise Files' folder.
3. Open the Divisional\_Sales, Quarterly Sales by Division, Yearly\_sales, and Units\_per\_Customer workbooks.



*We will use different viewing options to display more than one of these sheets neatly on the screen at once. Excel gives a few different ways of doing this, and we will look at a couple of those ways.*

4. Click on the 'Restored Down' button between 'Minimize' and 'Close'.



*Notice that you can see two windows of Excel open, and each Window contains all of the tools and functions in Excel. As mentioned before, each workbook used to be a part of the program, now, the program is open inside each workbook. This is useful when arranging multiple worksheets because different tabs on the ribbon can be opened in each workbook.*

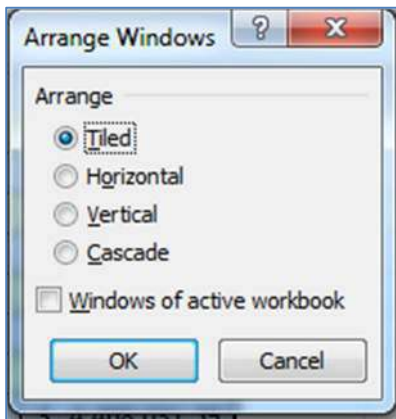
5. Navigate to the Window group in the View tab.



*Here are the tools that we will use to arrange the workbook windows. Later, we will be using the Freeze Panes drop down menu, but for now we will use the New Window, Arrange all, Split, Hide, View Side by Side, Synchronous Scrolling, and Rest Window Position tools.*

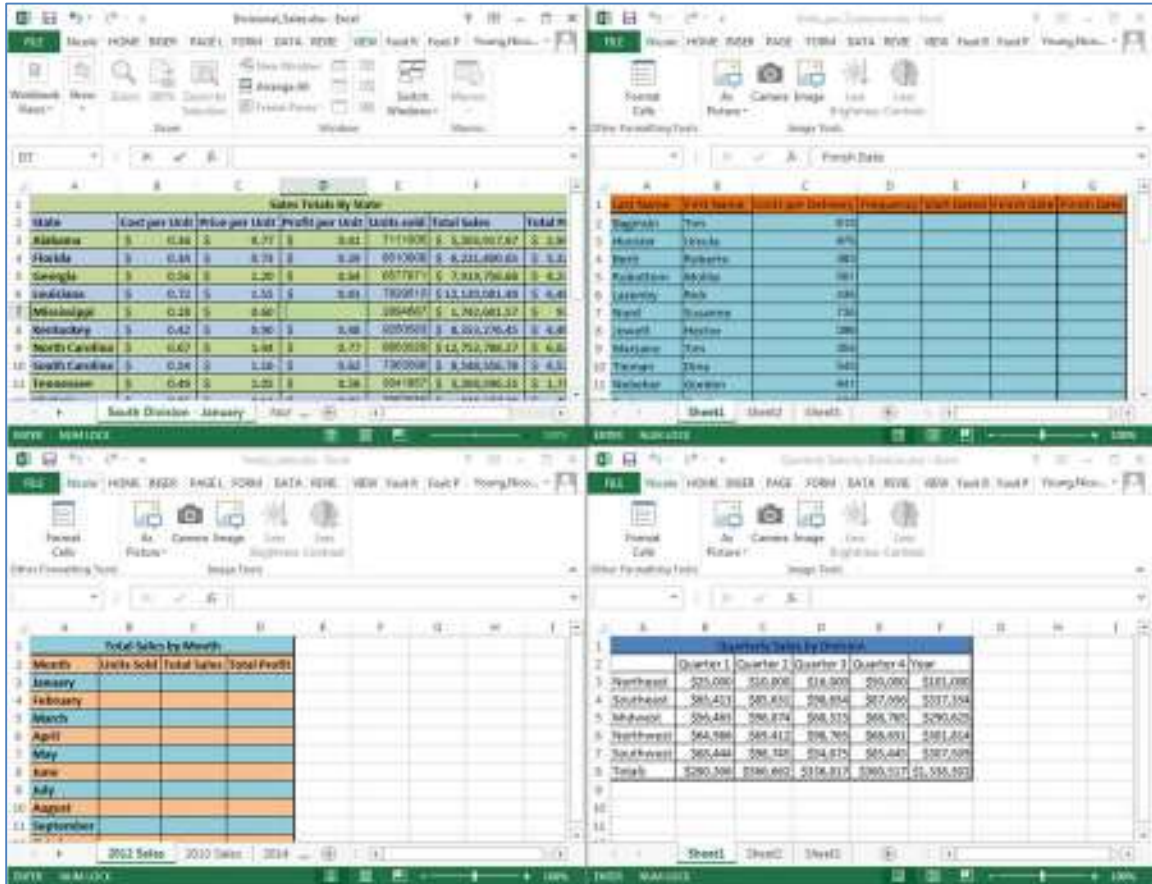
6. Click Arrange all.

*Notice a dialog box is displayed giving a few different displaying options. We will explore each of these options.*



7. Choose Tiled and click OK.

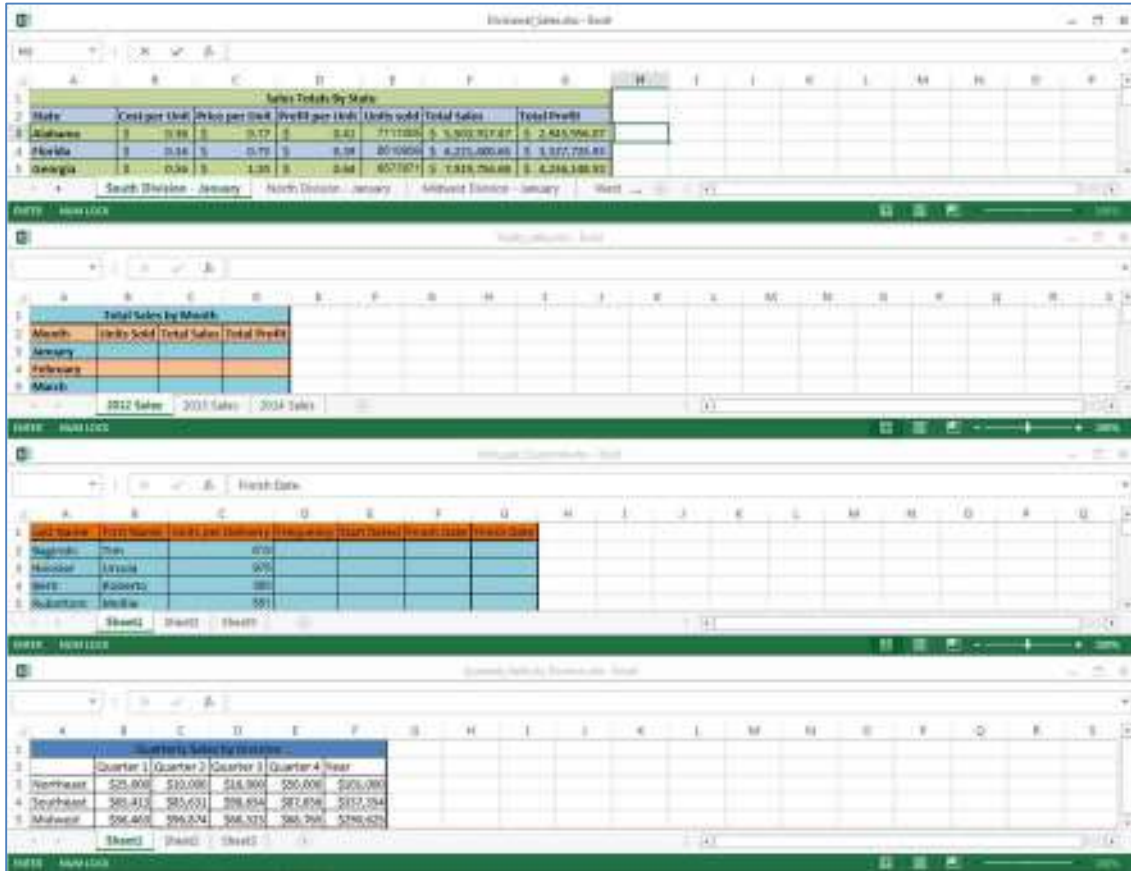
*Tiled shows the workbooks in equally sized squares with one taking two spaces on the left if there are an odd number of windows. This is great for easy comparison of data in different windows.*



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- Click Arrange All and choose Horizontal.

*This aligns the windows one on top of the other with each workbook as wide as the program's window with each having the same height as the rest. This choice is useful if you want to compare rows in different workbooks.*



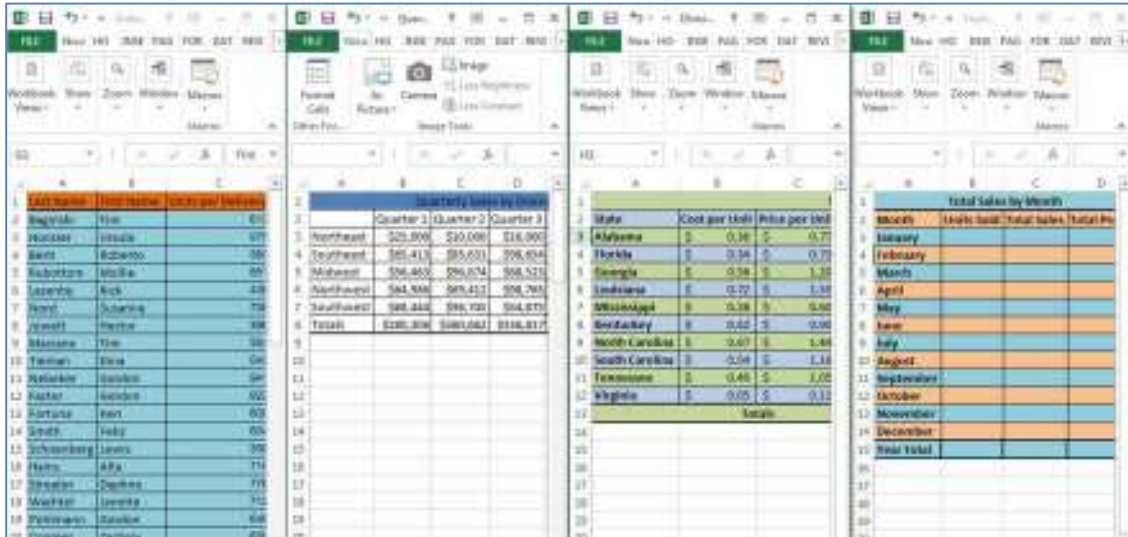
*The ribbon is not shown in any workbook. The ribbon will only be shown if there are less than three workbooks opened.*

- Restore one of the instances to make the ribbon reappear.

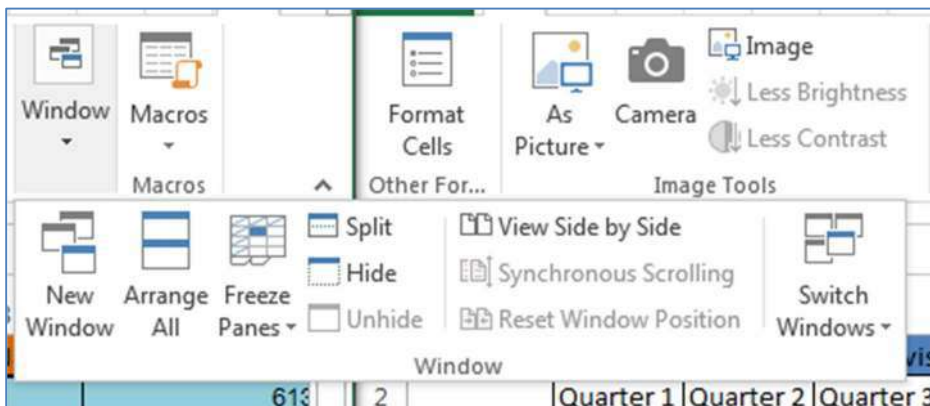
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10. Choose the Vertical option in the Arrange All dialog box.

*The workbooks are now aligned next to each other so that they are all as tall as the program and all have the same width. This allows you to compare columns from multiple workbooks easily.*



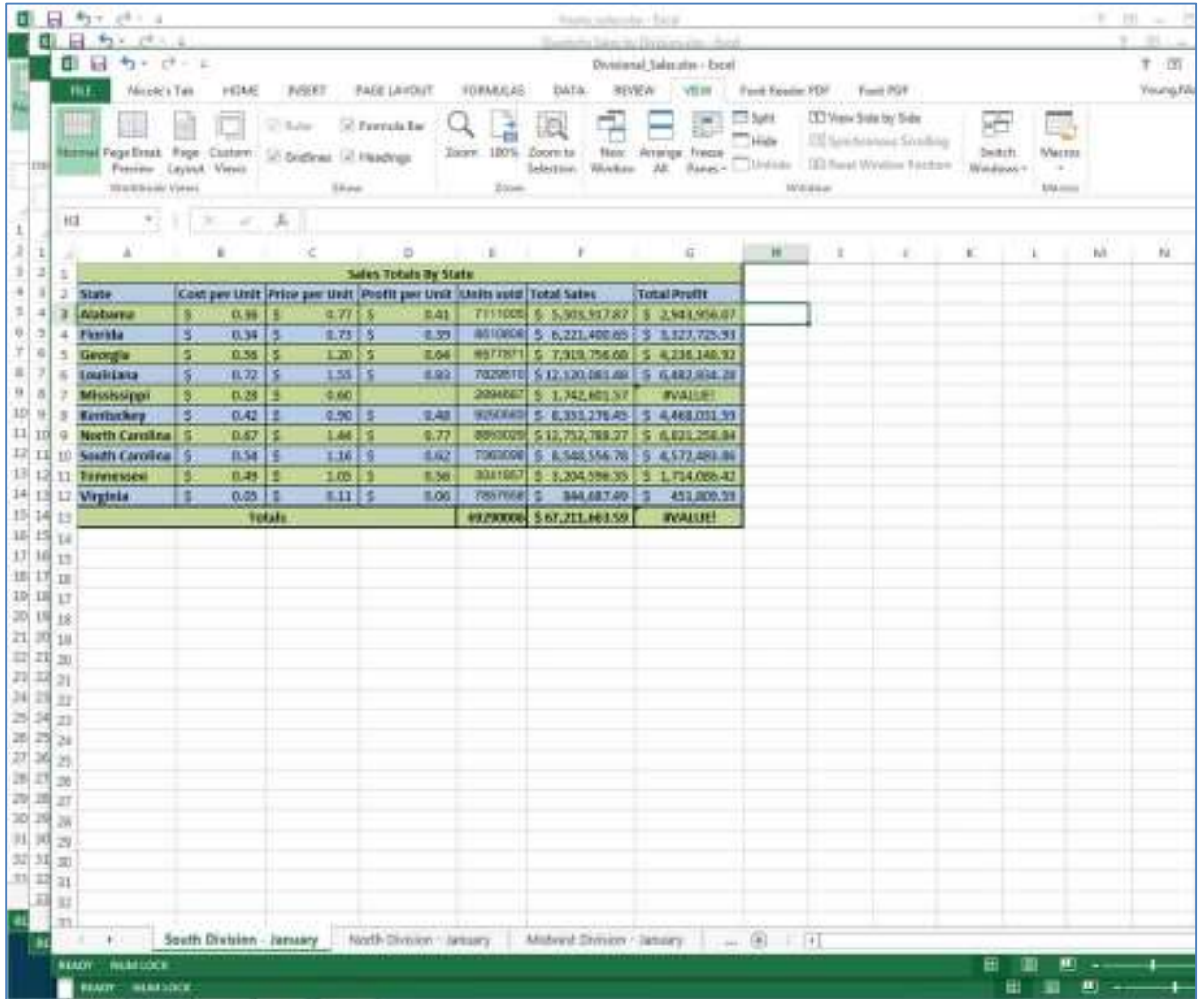
11. Choose the Window drop-down to display the window group.



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12. For a final time, choose Arrange All and select the Cascade option.

*This places the active workbook in the front with the other workbooks cascaded behind it. This allows you to easily move between books one at a time while still given you a large viewing window for each book.*

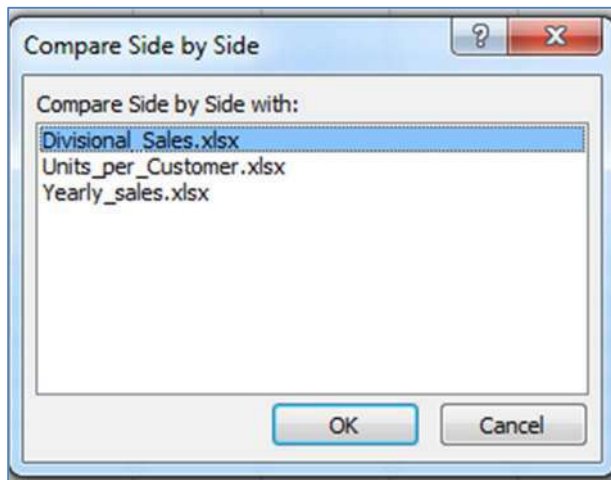


The screenshot shows the Microsoft Excel interface with the 'VIEWS' ribbon selected. The 'Arrange All' button is highlighted, and the 'Cascade' option is selected. The spreadsheet data is as follows:

State	Cost per Unit	Price per Unit	Profit per Unit	Units sold	Total Sales	Total Profit
Alabama	\$ 0.38	\$ 4.77	\$ 4.41	7111005	\$ 5,905,947.82	\$ 2,941,956.67
Florida	\$ 0.34	\$ 8.75	\$ 8.39	8510604	\$ 6,221,400.65	\$ 3,277,725.93
Georgia	\$ 0.58	\$ 1.20	\$ 0.64	8971871	\$ 7,919,756.66	\$ 4,236,146.92
Louisiana	\$ 0.72	\$ 1.55	\$ 0.83	7029518	\$ 12,120,061.68	\$ 6,483,804.28
Mississippi	\$ 0.28	\$ 0.60		2094687	\$ 1,742,601.57	#VALUE!
Kentucky	\$ 0.42	\$ 2.90	\$ 2.48	9050469	\$ 8,331,276.45	\$ 4,468,031.93
North Carolina	\$ 0.67	\$ 1.66	\$ 0.97	8950029	\$ 13,757,788.27	\$ 6,821,258.84
South Carolina	\$ 0.54	\$ 1.16	\$ 0.62	7060090	\$ 8,548,556.78	\$ 4,572,481.86
Tennessee	\$ 0.49	\$ 1.05	\$ 0.56	3081667	\$ 3,204,598.35	\$ 1,714,086.42
Virginia	\$ 0.65	\$ 8.11	\$ 7.46	7857666	\$ 844,687.49	\$ 451,809.28
Totals				89290006	\$ 67,211,661.59	#VALUE!

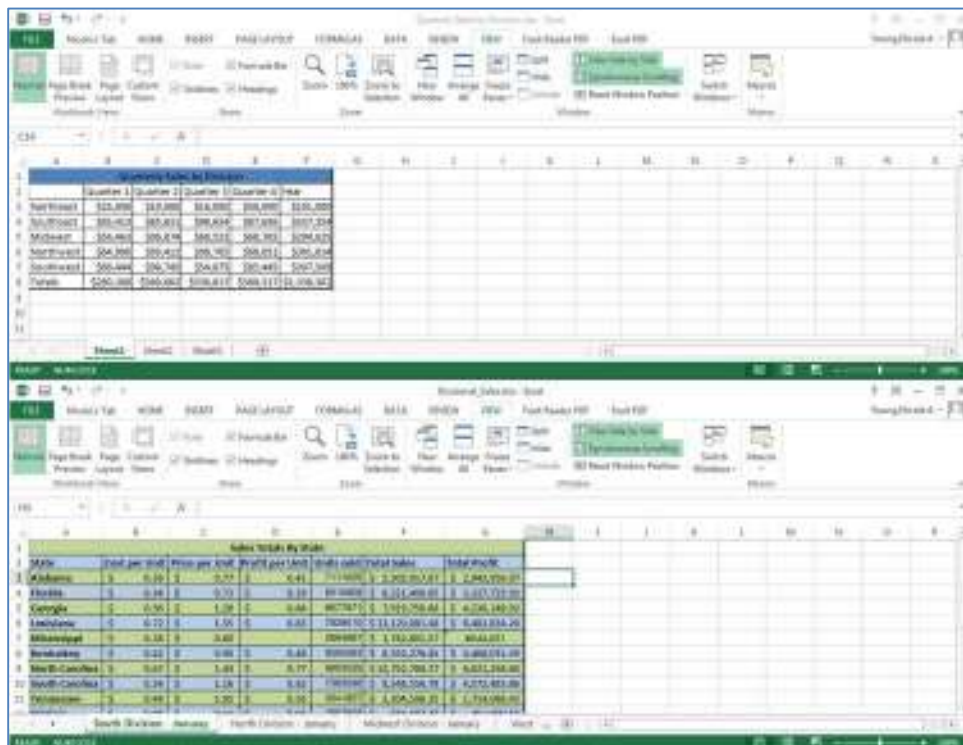
- Click the Quarterly Sales by Division workbook and then, click View Side by Side.

A dialog box asking you to choose another workbook is displayed. This tool only allows viewing of two workbooks at once and by default is similar to the Horizontal Arrange All tool. If multiple windows were arranged just before this tool was used, the tool will sometimes try to match the other windows arrangement.




- Choose the Divisional\_Sales workbook.

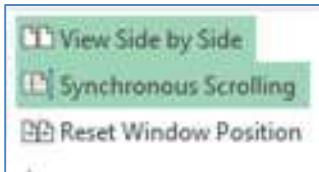
Your window should look like the following image.



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*If the window does not look like this, choosing  Reset Window Position will position the windows correctly.*

15. Observe that Synchronous Scrolling is highlighted and scroll down a worksheet.



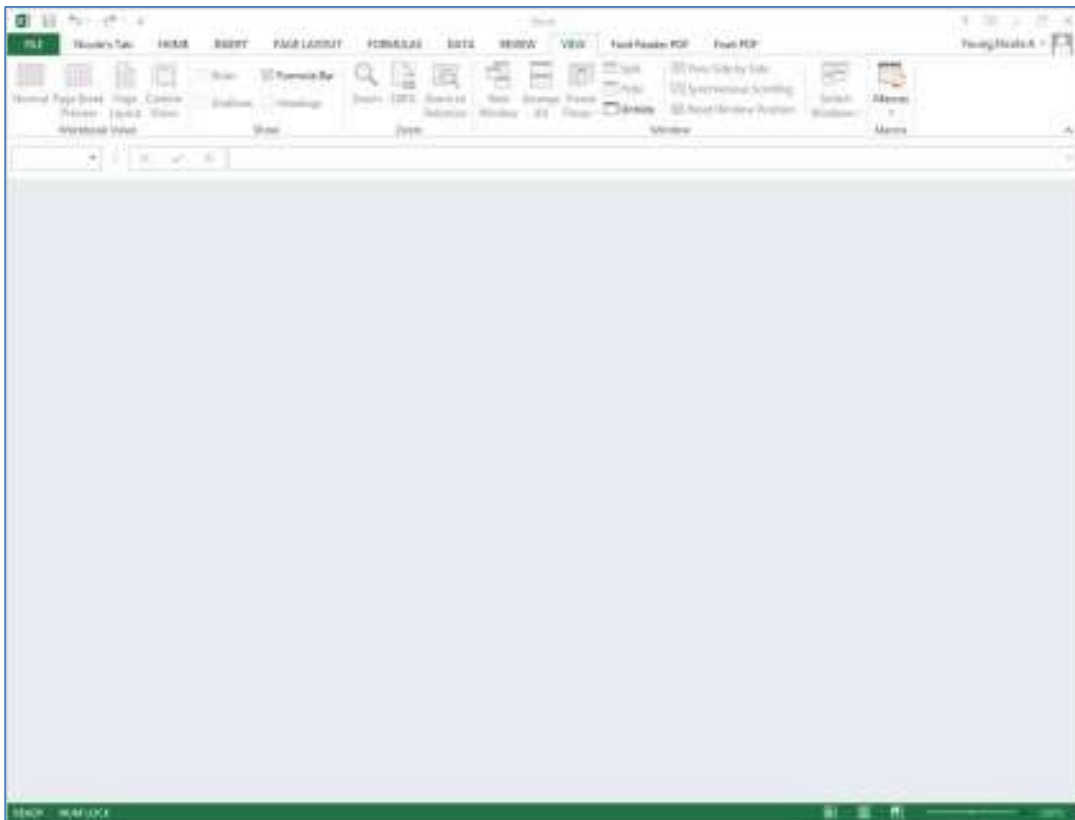
*When it is useful to be able to scroll through the two workbooks simultaneously, this tool allows that ability. If the button is not highlighted, the sheets will not scroll together.*

16. Click Hide.

*This hides the active window. If pressed multiple times, it will continue hiding windows until all the windows are hidden.*

17. Click hide again until there are no worksheets displayed.

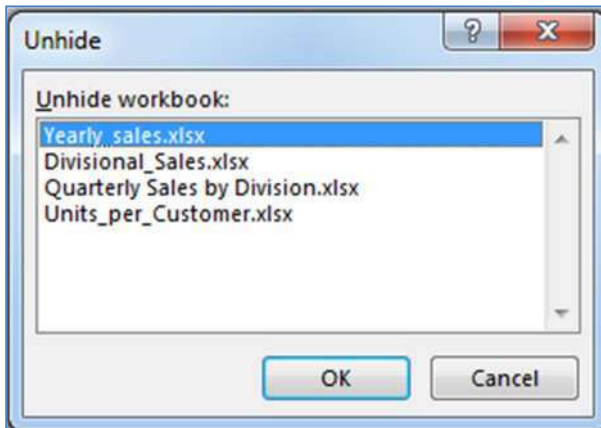
*Notice only the program is running, and no worksheet is showing.*





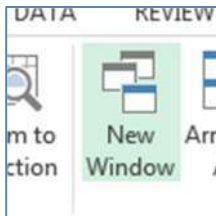
18. Click Unhide.

*A dialog box showing the hidden workbooks is displayed.*



19. Choose the Divisional\_Sales.xlsx workbook and click 'OK'.

20. Click New Window.



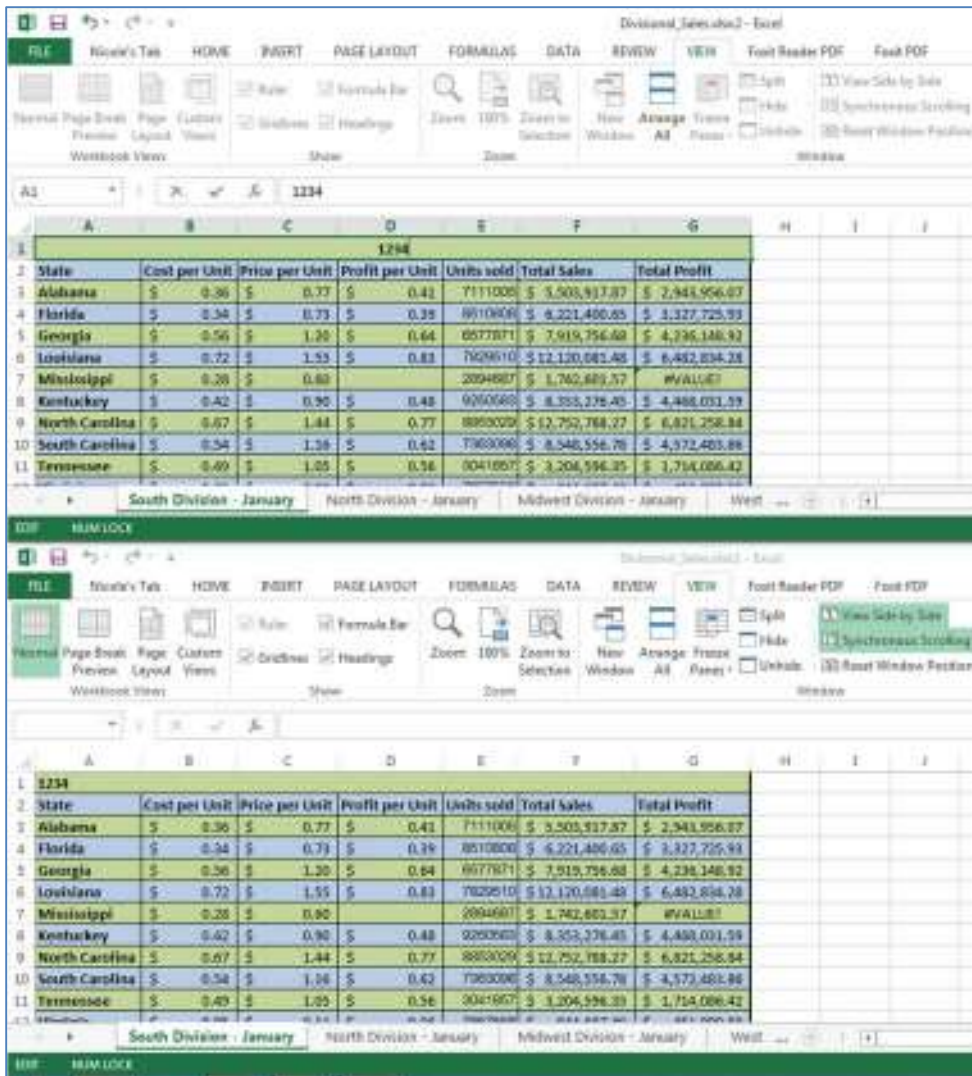
*A new window display a copy of the active workbook is displayed. The New window button can be used multiple times to add multiple windows of the same workbook. Each window is titled with the workbooks name followed by a colon and a number.*

State	Cost per Unit	Price per Unit	Profit per Unit	Units sold	Total Sales	Total Profit
Alabama	\$ 0.26	\$ 0.73	\$ 0.47	7111008	\$ 5,509,917.87	\$ 2,942,996.67
Florida	\$ 0.24	\$ 0.73	\$ 0.39	8510684	\$ 6,221,400.65	\$ 3,327,725.93
Georgia	\$ 0.56	\$ 1.20	\$ 0.64	8577871	\$ 7,915,756.68	\$ 4,256,148.52
Illinois	\$ 0.72	\$ 1.55	\$ 0.83	7829910	\$ 12,130,881.48	\$ 6,482,836.28
Mississippi	\$ 0.28	\$ 0.60	\$ 0.32	2894887	\$ 1,747,831.37	#VALUE!
Kentucky	\$ 0.42	\$ 0.90	\$ 0.48	8200883	\$ 8,505,776.45	\$ 4,468,931.99
North Carolina	\$ 0.67	\$ 1.44	\$ 0.77	8899029	\$ 12,752,788.27	\$ 6,823,298.84
South Carolina	\$ 0.54	\$ 1.18	\$ 0.64	7993006	\$ 8,548,556.78	\$ 4,572,483.86
Tennessee	\$ 0.49	\$ 1.05	\$ 0.56	8041867	\$ 7,204,396.35	\$ 3,714,086.42
Virginia	\$ 0.85	\$ 0.33	\$ 0.86	7957266	\$ 968,887.49	\$ 451,809.53
<b>Totals</b>				<b>89290006</b>	<b>\$ 67,211,883.58</b>	<b>#VALUE!</b>

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21. Arrange the windows side-by-side.
22. Type "1234" into cell A1 of Divisional\_Sales.xlsx:2

*When something is done to one window of a worksheet, the changes are displayed in all of the windows of the worksheet.*



23. In the top window, click into the North Division – January sheet.

*These two sheets can now be compared without switching between sheets in the same window.*

We have just looked at how to view multiple workbooks and sheets simultaneously in Excel. With this information, using multiple workbooks or sheets at the same time becomes less of a task. Excel also allows the ability to split one window into multiple sections called panes which we will look at in the next section.

## Using a Static Column or Row

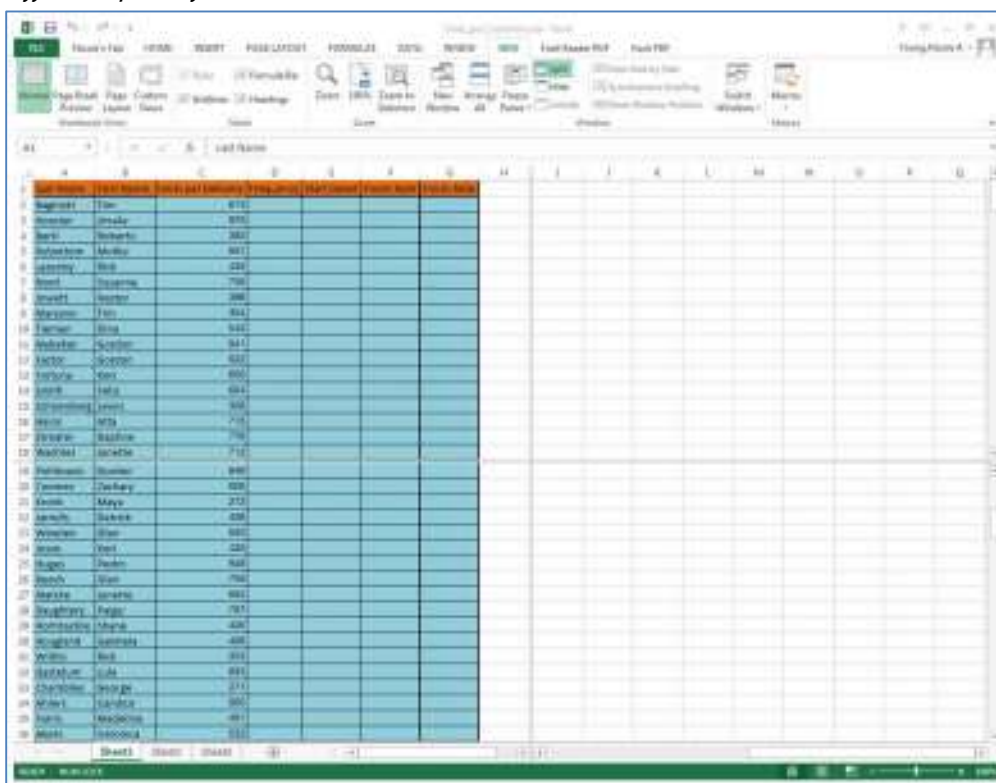
Static columns and rows involve the use of panes. A pane is a divided section of a worksheet in the same window. When a window is divided into panes, scrolling comparing parts of the same worksheet becomes easier. We will look at different ways to display panes.

1. Close all but the 'Units\_per\_Customer.xlsx' workbook and maximize the workbook.

*This workbook contains information that is spread over many columns and rows. To view different parts of this sheet, will use the split tool.*

2. Click Split in the Window group on the View tab.

*Excel splits this worksheet into 4 panes with a gray border between each pane. Each pane is equally sized, but you can adjust the borders if needed. By default, each pane shows a different part of the worksheet.*



3. Scroll up and down in the top half of the screen.

*The top panes both scroll vertically together and the bottom panes scroll vertically together.*

4. Scroll left and right in the right half of the screen.

*Similar to vertical scrolling, the left and right halves of the screen scroll horizontally together.*

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5. Click into any other sheet.

*Notice that only the first sheet is split into panes. Each sheet can be split into panes at any time by navigating to the sheet and clicking Split.*

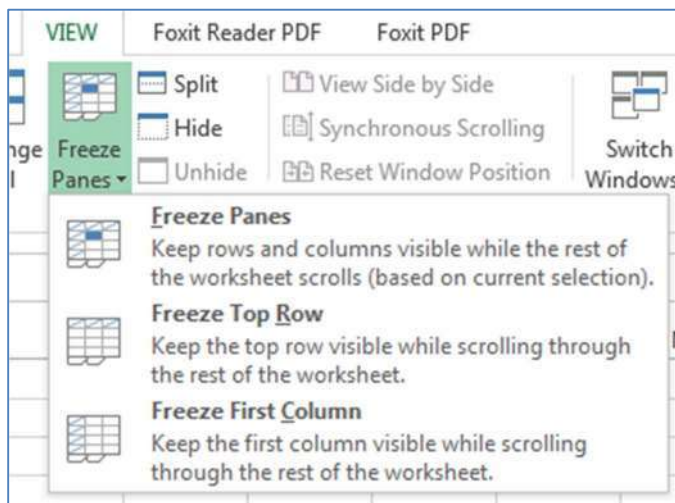
6. Navigate back into sheet 1 and click Split a second time.

*This brings the window back to the original view. A sheet will remain in the split view until Split is clicked a second time. Another way of using panes is by freezing the panes.*

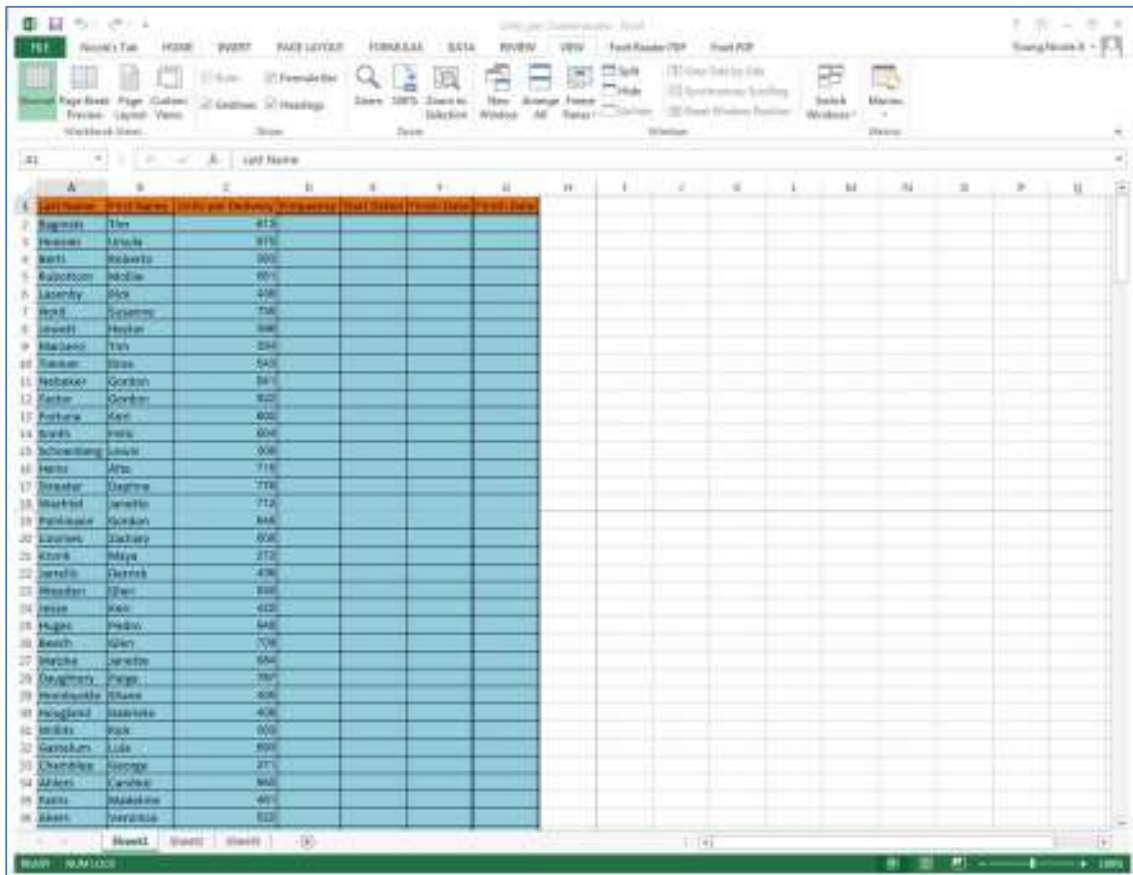
7. Click into cell A1.

8. Click Freeze Panes.

*A menu giving three options is shown. Each of these options creates a set of panes and freezes one of the panes to allow for easy viewing of data from one part of the sheet with the frozen pane.*



9. Choose the first option, 'Freeze Panes'.



*This option adds in panes that are split with a thin black line. Here, the top-left pane is locked from scrolling, the bottom panes only scroll up and down, and the right panes only scroll left and right. This allows you freeze the set of data that is shown first sheet while scrolling left, right, u, and down through the rest of the sheet. Freeze Top Row keeps the top row static while scrolling vertically through the sheet, and Freeze First Column keeps the first row static while scrolling left and right through the sheet.*

10. Click Freeze panes and choose 'Unfreeze Panes'.

*Anytime you have panes frozen, this option will unfreeze the panes and restore the sheet to the default view. You can also adjust where you want the top pane placed.*



13. Unfreeze the panes, select column C, and refreeze the panes.

*Here, columns A and B are static while the selected column is just out of the range. We will briefly look at freezing just the top row or left column.*

	A	B	C
1	Last Name	First Name	Units per Delivery
2	Baginski	Tim	613
3	Hoosier	Ursula	975
4	Berti	Roberto	383
5	Rubottom	Mollie	551
6	Lazenby	Rick	435
7	Nord	Susanne	735
8	Jowett	Hector	396
9	Marzano	Tim	354
10	Tieman	Dina	543
11	Nebeker	Gordon	941

14. Unfreeze the panes and choose 'Freeze Top Row' in the freeze panes menu.

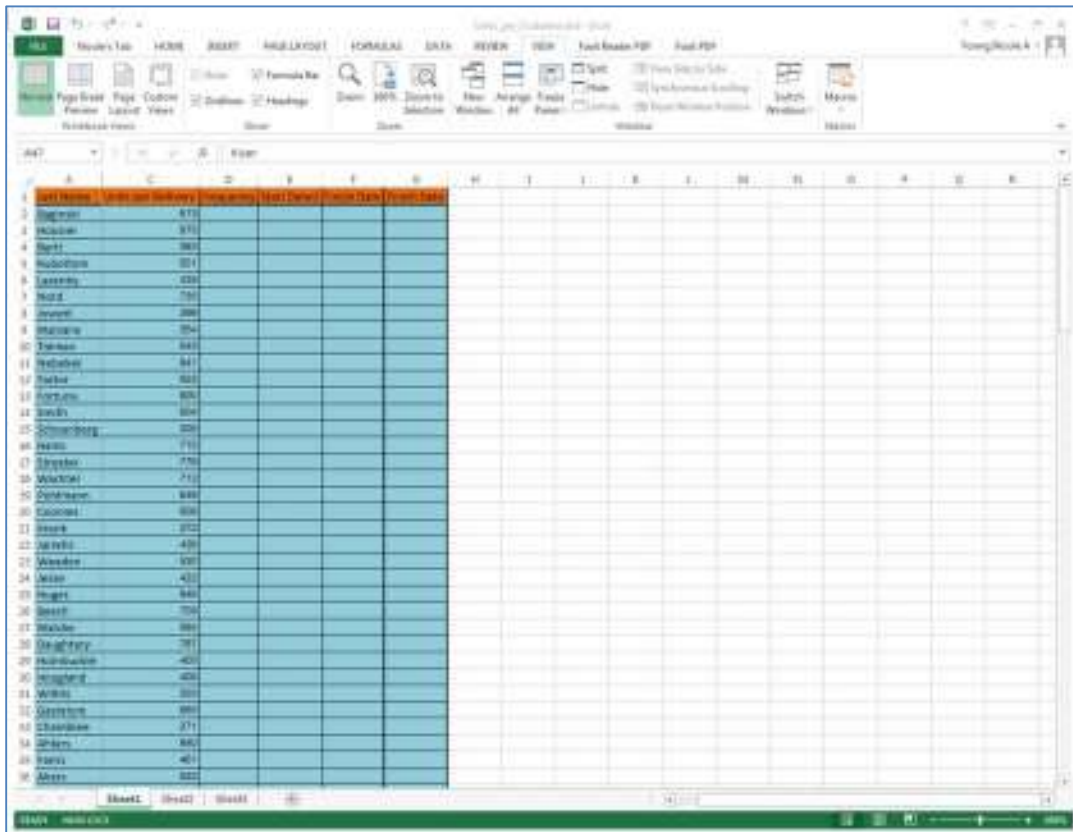
15. Scroll down the page.

*Here the top pane is static. This allows easier data entry in the table. It also allows information on specific people to be accessed easier.*

	A	B	C	D	E	F	G	H	I	J
1	Last Name	First Name	Units per Delivery	Frequency	Start Date	Finish Date	Finish Date			
47	Kizer	Willie	677							
48	Mayes	Judith	354							
49	Shrader	Miniam	870							
50	Treadway	Donald	726							
51	Sierra	Alan	532							
52	Longo	Glenn	990							
53	Eberly	Allison	562							
54	Garland	Russell	492							
55	Brody	Monica	399							
56	Rochelle	Timothy	251							
57	Knighton	Sheila	482							
58	Helm	Karla	820							
59	Whitcomb	Phyllis	534							
60	Sand	Alan	287							
61	Shivers	Nicholas	228							

16. Now choose Freeze 'First Column'.

*This time, the first column is the only static pane.*



17. Unfreeze the panes and close this workbook.

When it is necessary to navigate within large worksheets, workbooks, or multiple worksheets and workbooks, using windows can save time from switching between sheets and books as well as from scrolling back and forth from one part of the sheet to another. In the next section, we will see how referencing across sheets can also save time.



## Referencing Across Sheets

Anytime a cell is used in another part of a workbook or worksheet, the cell is said to be referenced to that part. An example is when a formula references a range of cells. In AT Steps Excel Essentials lesson, referencing is introduced within one worksheet. Here, referencing will be explored across multiple worksheets in a workbook and even across multiple workbooks.

1. Open the Divisional\_Sales.xlsx worksheet.

*This worksheet contains divisional sales for a fictitious company. The first four sheets have information on the sales in each state. We will be entering formulas for Excel to place the totals inside one sheet.*

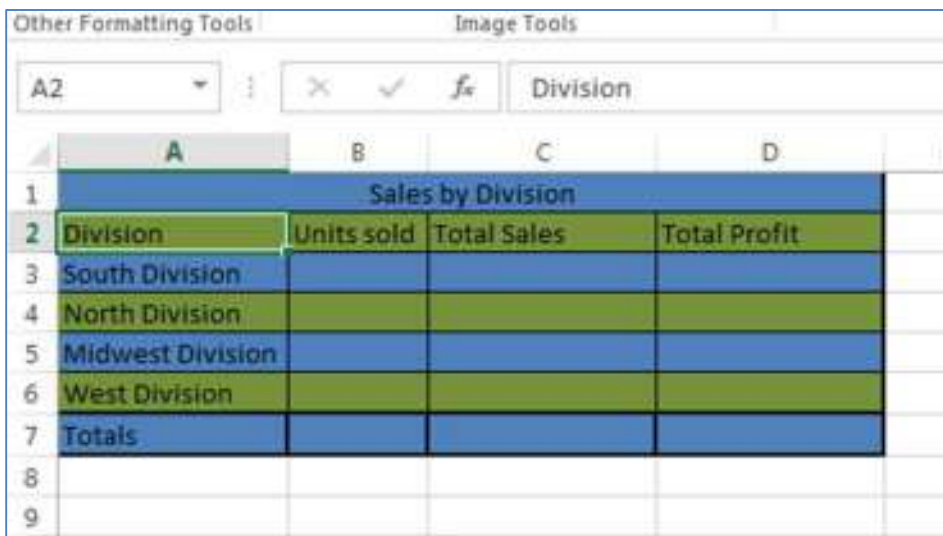
The screenshot shows an Excel spreadsheet with the following data:

Sales Totals By State							
State	Cost per Unit	Price per Unit	Profit per Unit	Units sold	Total Sales	Total Profit	
Alabama	\$ 0.36	\$ 0.77	\$ 0.41	7111006	\$ 5,503,917.87	\$ 2,943,956.07	
Florida	\$ 0.34	\$ 0.73	\$ 0.39	8510808	\$ 6,221,400.65	\$ 3,327,725.93	
Georgia	\$ 0.56	\$ 1.20	\$ 0.64	6577871	\$ 7,919,756.68	\$ 4,236,148.92	
Louisiana	\$ 0.72	\$ 1.55	\$ 0.83	7829510	\$ 12,120,081.48	\$ 6,482,834.28	
Mississippi	\$ 0.28	\$ 0.60	\$ 0.32	2894687	\$ 1,742,601.57	\$ 932,089.21	
Kentucky	\$ 0.42	\$ 0.90	\$ 0.48	9250583	\$ 8,353,276.45	\$ 4,468,031.59	
North Carolina	\$ 0.67	\$ 1.44	\$ 0.77	8853029	\$ 12,752,788.27	\$ 6,821,258.84	
South Carolina	\$ 0.54	\$ 1.16	\$ 0.62	7363098	\$ 8,548,556.78	\$ 4,572,483.86	
Tennessee	\$ 0.49	\$ 1.05	\$ 0.56	3041857	\$ 3,204,596.35	\$ 1,714,086.42	
Virginia	\$ 0.05	\$ 0.11	\$ 0.06	7857558	\$ 844,687.49	\$ 451,809.59	
Totals				69290006	\$ 67,211,663.59	\$ 35,950,424.71	

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2. Navigate to the January Totals worksheet.

*This sheet is formatted to display the divisional total sales and then overall totals at the bottom of the sheet.*

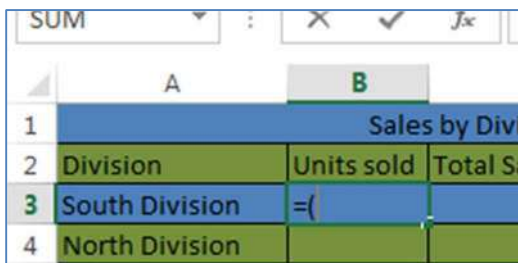


Sales by Division			
Division	Units sold	Total Sales	Total Profit
South Division			
North Division			
Midwest Division			
West Division			
Totals			

3. Click into cell B3.

*Here we want to display the total units sold from the 'South Division – January' worksheet. This could be done by copying that data directly to the totals sheet, but if the data is changed in the original sheet, the changes would not be reflected in the totals sheet. The solution to this problem would be to relatively reference cell A13 from the original worksheet.*

4. Type “=(“.



Sales by Divi			
Division	Units sold	Total S	
South Division	=(		
North Division			

*This tells Excel that you will be referencing another cell. At this point we could type “'South Division – January'!E13” to designate the cell, but it would be faster to go directly to the 'South Division – January' worksheet.*

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- Navigate to the worksheet labeled 'South Division – January' and choose cell E13.

*Notice the formula bar now displays "=( 'South Division – January'!E13" This is how Excel labels cells from other worksheets in the same workbook.*

The screenshot shows the Excel interface with the formula bar containing the formula `=( 'South Division – January'!E13`. Below the formula bar is a table titled "Sales Totals By State".

State	Cost per Unit	Price per Unit	Profit per Unit	Units sold	Total Sales	Total
Alabama	\$ 0.36	\$ 0.77	\$ 0.41	7111005	\$ 5,503,917.87	\$ 2
Florida	\$ 0.34	\$ 0.73	\$ 0.39	8510808	\$ 6,221,400.65	\$ 3
Georgia	\$ 0.56	\$ 1.20	\$ 0.64	6577871	\$ 7,919,756.68	\$ 4
Louisiana	\$ 0.72	\$ 1.55	\$ 0.83	7829510	\$12,120,081.48	\$ 6
Mississippi	\$ 0.28	\$ 0.60	\$ 0.32	2894687	\$ 1,742,601.57	\$
Kentucky	\$ 0.42	\$ 0.90	\$ 0.48	9250583	\$ 8,353,276.45	\$ 4
North Carolina	\$ 0.67	\$ 1.44	\$ 0.77	8853029	\$12,752,788.27	\$ 6
South Carolina	\$ 0.54	\$ 1.16	\$ 0.62	7363098	\$ 8,548,556.78	\$ 4
Tennessee	\$ 0.49	\$ 1.05	\$ 0.56	3041857	\$ 3,204,596.35	\$ 1
Virginia	\$ 0.05	\$ 0.11	\$ 0.06	7857558	\$ 844,687.49	\$
<b>Totals</b>				<b>69290006</b>	<b>\$ 67,211,663.59</b>	<b>\$ 35</b>

- Type ')' and press enter.  
*'January Totals' is now the active worksheet, and the data displayed in cell B3 is identical to the data in cell E13 on the South Division – January worksheet.*
- Change the data in cell E13 on the South Division – January worksheet and refer back to the January Totals sheet.  
*Here, the data has changed to match what is displayed in the worksheet you are referencing.*
- Press Undo to undo the change of data in cell E13 on the 'South Division – January' worksheet.

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- Repeat steps 3-6 for cells B4:B6 in the Totals sheet using the data from the rest of the sheets respectively.

*At the end of this step, your sheet should look like the following picture:*

Sales by Division			
Division	Units sold	Total Sales	Total Profit
South Division	69290006	\$ 67,211,663.59	\$ 35,950,424.71
North Division	57606686	\$ 82,324,713.14	\$ 44,034,148.89
Midwest Division	52138717	\$ 47,041,778.21	\$ 25,161,881.37
West Division	59938438	\$ 61,248,751.36	\$ 32,760,960.03
<b>Totals</b>			

*We now want to total the units sold from all of the divisions which could be done using '=sum(B3:B6)' in the January Totals sheet; however to see how to use a formula from multiple worksheets, we will sum the data from cell E13 in each worksheet.*

- Type "=sum(" into cell B7 in the Totals sheet.

*We will use this formula to sum the totals in E13 from each sheet.*

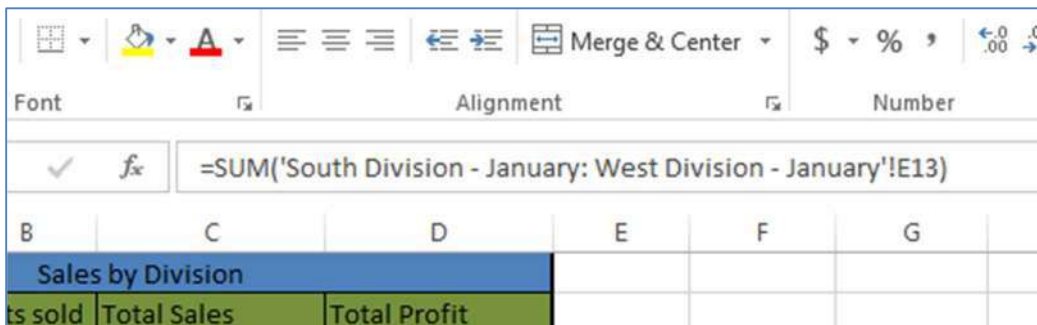
Sales by Division			
Division	Units sold	Total Sales	Total Profit
South Division	69290006	\$ 67,211,663.59	\$ 35,950,424.71
North Division	57606686	\$ 82,324,713.14	\$ 44,034,148.89
Midwest Division	52138717	\$ 47,041,778.21	\$ 25,161,881.37
West Division	59938438	\$ 61,248,751.36	\$ 32,760,960.03
<b>Totals</b>	=sum(		

SUM(number1, [number2], ...)

- Click into the first worksheet and click cell E13.

12. Now hold 'shift' and click on the worksheet just before the totals sheet.

Notice the status bar now displays "`=SUM('South Division - January: West Division - January'!E13)`". This can be broken into two parts. The first part is "'South Division - January: West Division - January'!" which tells Excel that we are referencing cells from all of the sheets between 'South Division - January' and 'West Division - January' should sheets be moved so that there are more sheets between these sheets, excel will update the formula to include the additional sheets. The second part, "E13", tells Excel which specific cells are referenced inside the range of worksheets.



13. Type ')' and press enter.

'January Totals' is again the active sheet, and now cell B7 now contains the total from E13 in the other sheets.

The screenshot shows the Excel interface with the formula bar containing the formula `=SUM('South Division - January: West Division - January'!E13)`. Below the formula bar, a table is visible with columns B, C, D, E, and F. The table has a header row 'Sales by Division' and a data row with columns 'Units sold', 'Total Sales', and 'Total Profit'. The value 238973847 is shown in cell B7.

Sales by Division			E	F
Units sold	Total Sales	Total Profit		
Division	69290006	\$ 67,211,663.59	\$ 35,950,424.71	
Division	57606686	\$ 82,324,713.14	\$ 44,034,148.89	
Division	52138717	\$ 47,041,778.21	\$ 25,161,881.37	
Division	59938438	\$ 61,248,751.36	\$ 32,760,960.03	
	238973847			

14. Continue referencing the appropriate cells for the rest of this table.

To practice referencing multiple sheets in a specific cell, use cells F13 and G13 in the other sheets for cells C7 and D7 in the 'January Totals' worksheet respectively. Your 'January Totals' worksheet should now look like the following picture.

Sales by Division			
	Units sold	Total Sales	Total Profit
Division	69290006	\$ 67,211,663.59	\$ 35,950,424.71
Division	57606686	\$ 82,324,713.14	\$ 44,034,148.89
Division	52138717	\$ 47,041,778.21	\$ 25,161,881.37
Division	59938438	\$ 61,248,751.36	\$ 32,760,960.03
	238973847	\$ 257,826,906.30	\$ 137,907,415.00

15. Open the Yearly\_sales.xlsx workbook and display the two workbooks side-by-side.

This sheet contains the yearly totals based on the month. We want to reference the totals in the 'Divisional\_Sales' workbook.

16. Type '=' into cell B3 on the '2012 Sales' worksheet.

17. Now click into cell B7 on the 'January Totals'.

Total Sales by Month		
Units Sold	Total Sales	Total Profit
=('([Divisional_Sales.xlsx]January Totals'!\$B\$7		

This worksheet is in the 'Divisional\_Sales' workbook. The formula bar now reads "=('([Divisional\_Sales.xlsx]January Totals'!\$B\$7" indicating that it is using absolute referencing from cell B7. Notice that Excel now also references the file name including the .xlsx. It is important to keep the files being referenced in the same folder as the file doing the referencing. Excel automatically creates this as an absolute reference whenever a cell is referenced from another workbook, but you can change that referencing to be relative.

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18. Type ')' and press enter to return to the original workbook.

*We want to drag this reference through the rest of the row, but we want to change the reference from an absolute reference to a relative reference.*

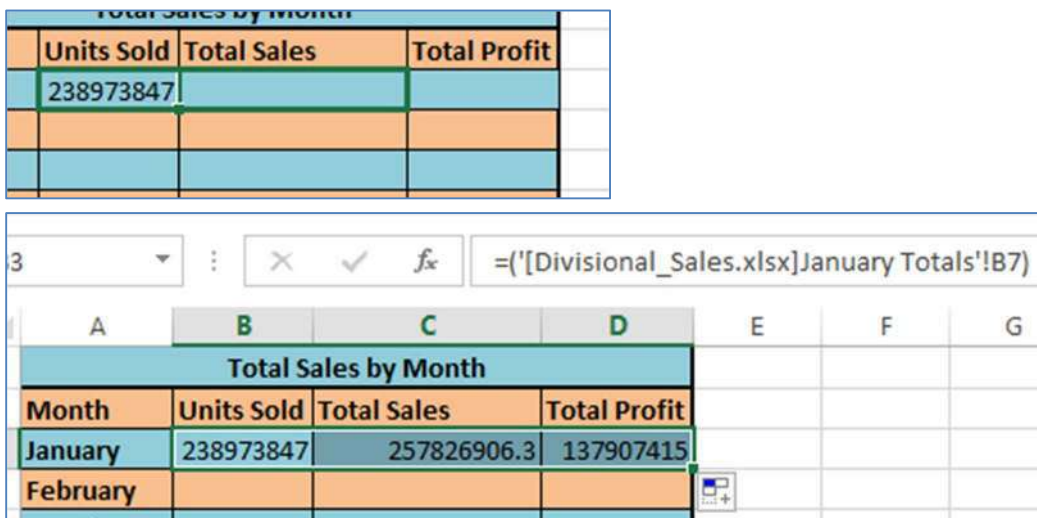
19. Click into cell B3 and then into the formula bar.

20. Remove the '\$' from “=('[Divisional\_Sales.xlsx]January Totals'!\$B\$7)”.

*Now that we have a relative reference, we can drag this through the rest of the row which will fill in the rest of the information with respect to the 'January Totals' sheet.*

21. Drag the reference through the row.

*The values in cells C3 and D3 now correspond to cells C7 and B7 in the 'January Totals' sheet.*



The image shows two screenshots of an Excel spreadsheet. The top screenshot shows a small table with the following data:

Units Sold	Total Sales	Total Profit
238973847		

The bottom screenshot shows the Excel formula bar and a larger spreadsheet grid. The formula bar contains the formula: `=('[Divisional_Sales.xlsx]January Totals'!B7)`. The spreadsheet grid shows a table with the following data:

Total Sales by Month			
Month	Units Sold	Total Sales	Total Profit
January	238973847	257826906.3	137907415
February			

In this section, we explored relative referencing across sheets and workbooks. We also saw that one cell can reference more than one sheet. In the next section we will see some formatting features that also involved multiple sheets.

## Advanced Formatting

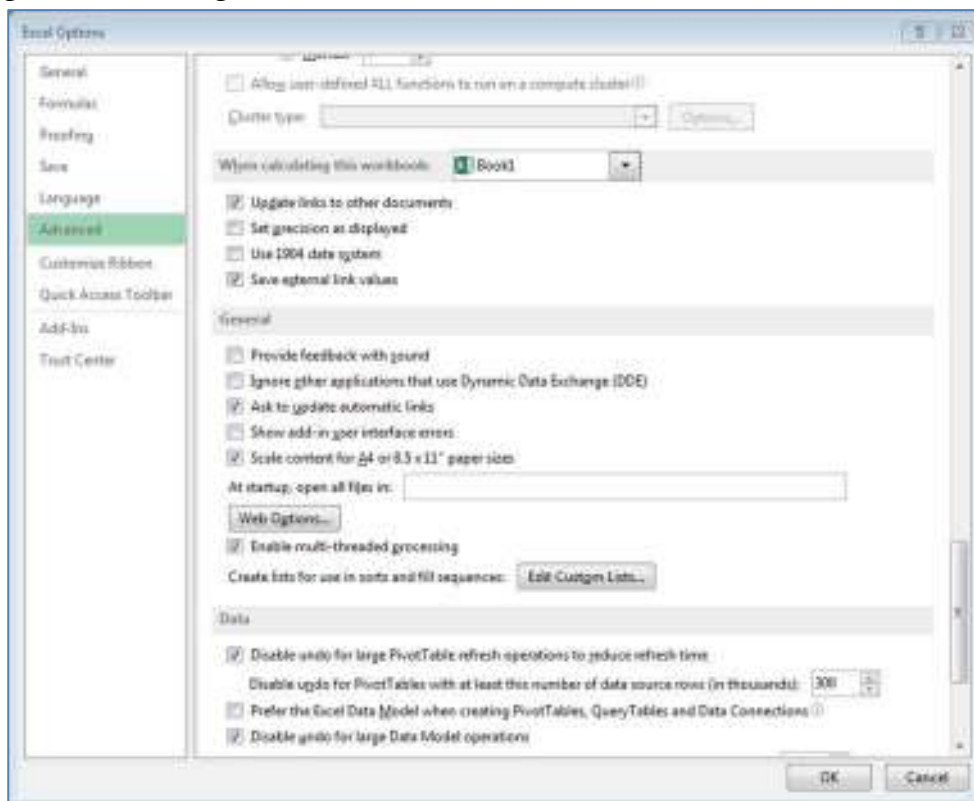
Excel has many quick and basic formatting features, but sometimes more customization is needed. We will use features that format things in the program itself to be used in multiple workbooks as well as worksheets in specific workbooks. In this section, we will explore some advanced formatting features such as creating a custom list and formatting across groups of worksheets.

### Custom Lists

We will start by adding a custom list. Custom lists allow you to work with lists that are either lengthy, used frequently, or both. Once created, a custom list stays in the program which allows the use of the list in multiple workbooks. Using this feature, you will only have to enter the list once. When you want to use the list later, Excel can populate the list for you.

1. Open a new worksheet.
2. Open the 'Options' dialog box.
3. Navigate to the general section of the 'Advanced' tab.

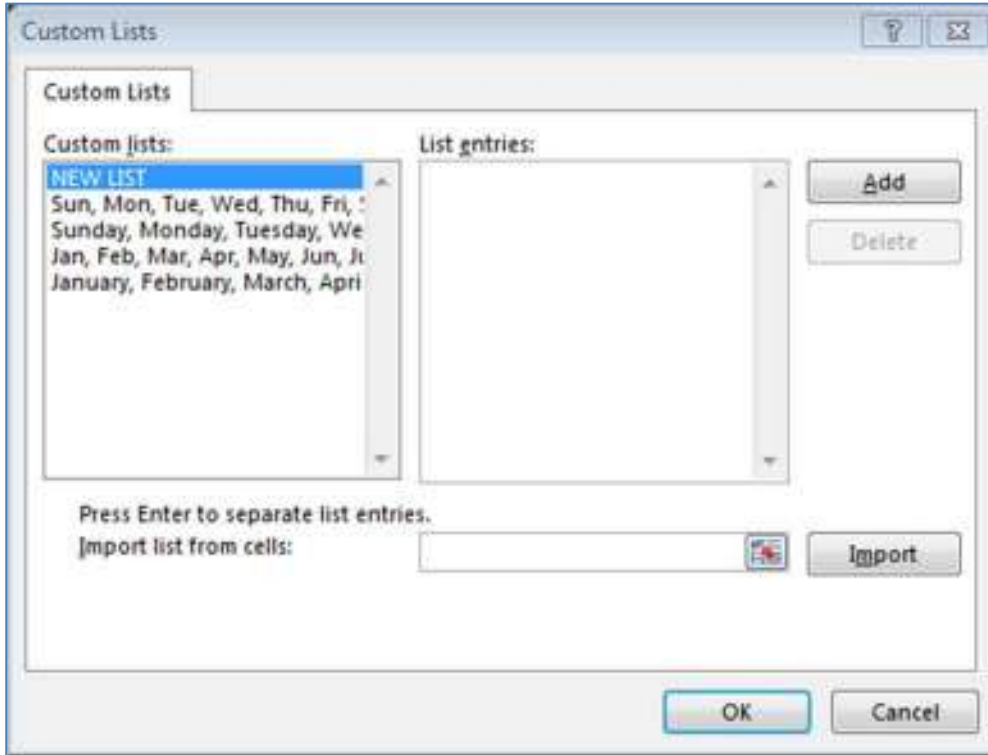
*Choose Advanced on the left of the 'Options' screen and scroll to the section labeled general on the right.*



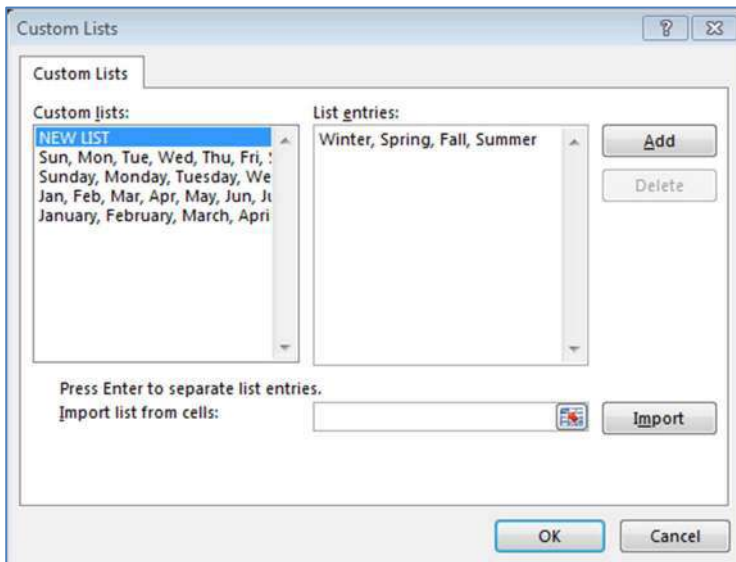


4. Navigate to the 'Custom Lists' dialog box.

*Click the button labeled 'Edit Custom Lists...'. The Custom Lists dialog box is now displayed. Here, you can enter your list in two different ways. You can add it using the 'New List' option, or you can select a data range where your list is already populated.*



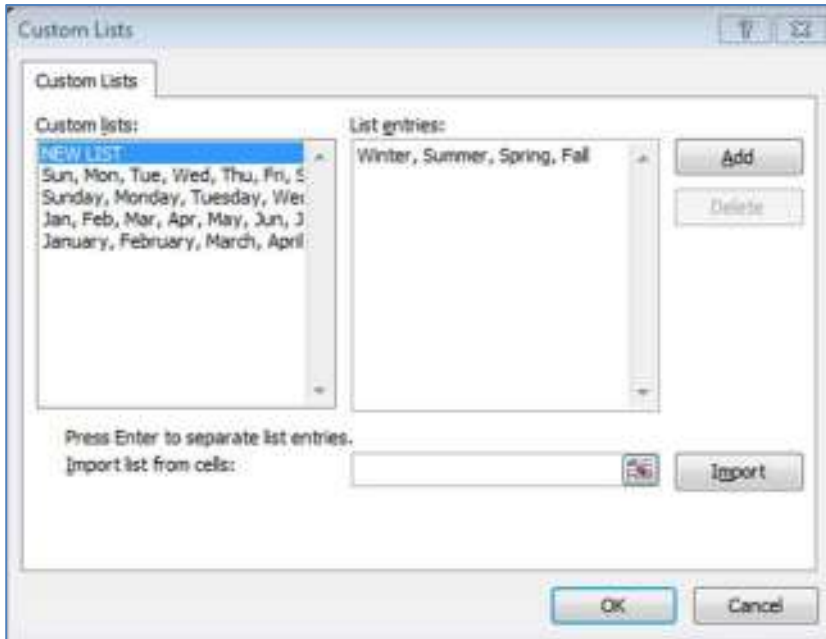
5. Click 'New List'.
6. Create a new list representing the seasons using fall as opposed to autumn:



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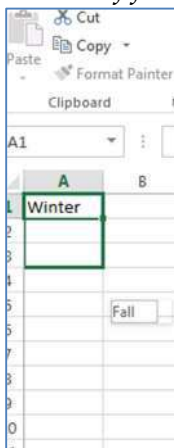
With 'New List' highlighted, click into the 'List entries:' text area and type the names of the seasons.

7. Type "Winter, Summer, Spring, Fall".



8. Click 'Add' to add the list.
9. Click 'Ok' to exit the Custom Lists dialog box and 'Ok' again to exit the 'Options' dialog box.
10. Populate the list into cells A1:A4

Type 'winter' or any other part of the list in cell A1. Move your cursor to the bottom right hand corner of the cell until it changes to a small bold +. Hold and drag the cursor until you see the entire list in the column. Now that the list is populated, you can organize using Excel's sorting features. For now, we will edit the list to ensure that autumn, instead of fall, is in the list.







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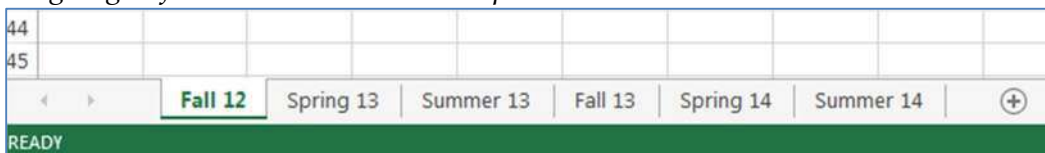
Now that you know how to work with custom lists, you can easily enter lists without typing each entry multiple times. These lists are not saved with the file, so if use multiple computers, the list will have to be created on each computer, but since you can create a list from a data range, you can simply create the list in one file and recreate the list on each computer you use.

### Using Groups to Format Multiple Worksheets

Another advanced formatting feature Excel 2010 has is formatting over a group of worksheets. This is useful if you have many different sheets that you want to be identically formatted. The formatting can be done over as few as two sheets in a workbook to as many as are in the workbook. Using this feature, you can format cells in basic ways such as shading, manually creating a table, or inserting formulas. Unfortunately, you do not have the option of using conditional formatting or formatting the cells as a table.

1. Open the Courses\_by\_Semester.xlsx worksheet.

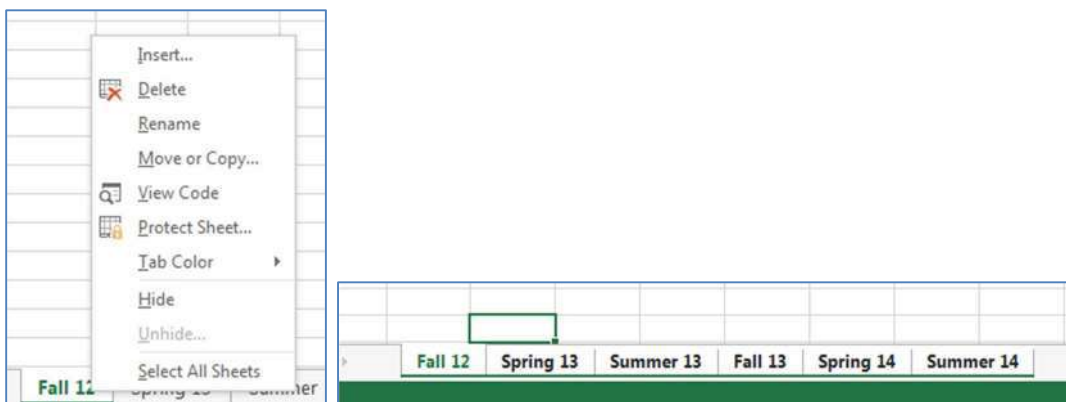
*Notice that this workbook is composed of worksheets that are labeled by the semester. We are going to format this sheet as a sample class schedule.*



2. Select all of the Worksheets.

*Select the sheet labeled 'Fall 12', press shift, and click on the sheet labeled 'Summer 14'.*

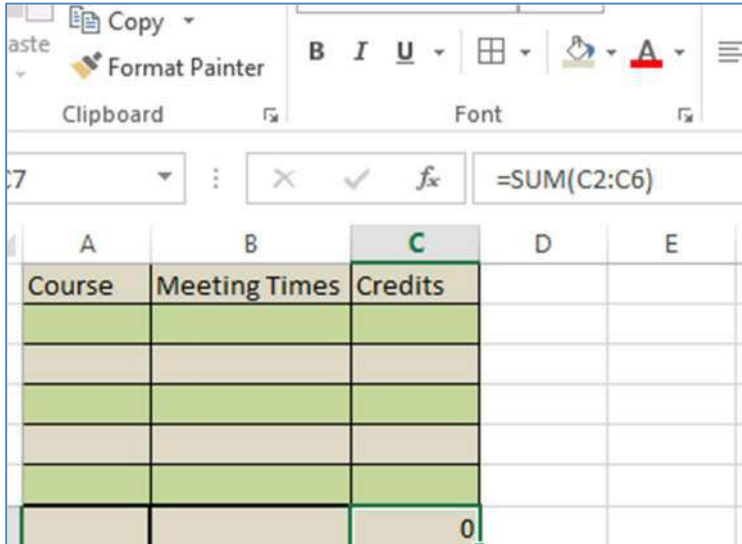
*The sheets are now a group of worksheets. You can also do this by right clicking any sheet and selecting 'Select All Sheets'.*



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3. Format a table in cells A1:C7 similar the one in the picture below.

*Type Course, Meeting Times, and Credits in the top row of the first sheet as in the following picture. Apply all borders to the table, and enter a formula to sum cells C2:C6 in C7. Resize all of the columns to fit so that all of the information is displayed.*



A	B	C	D	E
Course	Meeting Times	Credits		
		0		

4. Click into another worksheets.

*You will notice that each worksheet is formatted in exactly the same way. When formatting over multiple sheets, you want to be careful because if you delete or edit data in cell C1 in one worksheet, it will be deleted or edited in all of the worksheets. We will see an example of this now.*

5. Reselect all sheets.
6. Type "January" into A10 and navigate to another sheet.

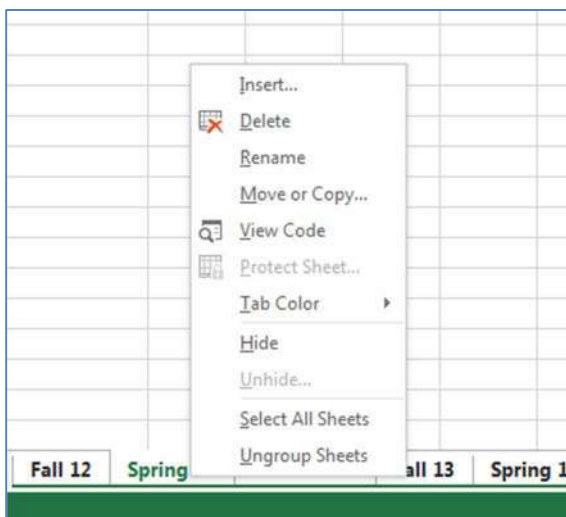
*The word January is no displayed in A10 in all of the sheets.*

7. Reselect all sheets.
8. Select cell A10 in this sheet and press delete on your keyboard.
9. Navigate back to the sheet labeled 'Summer 13'.

*Care should be taken when deleting information while all sheets are selected because the information will be deleted from all of the sheets*

10. Ungroup the worksheets.

*This can be done by clicking any worksheet's name besides the active worksheet. You can also right-click the name of any grouped sheet and choose 'Ungroup Sheets'.*



*As you can tell, grouping worksheets can save time by formatting multiple worksheets in the same way, but it also can delete data in multiple sheets.*

## Transposing Table

If you have a table, you can have Excel transpose it for you. What this means is that Excel will take the Rows and Columns of a table and flip them. This can be done using a pivot table; however, if you simply want to display the original table and the transposed table on the same sheet, this method can be faster. This method only works on tables which have not been formatted as a table, but any formatting can be removed so that the transposing can be done.

1. Open the Sales\_per\_Person.xlsx worksheet.

*This sheet contains a table, which displays a fictitious "Quarterly Sale per Person" report. We will be transposing the table so that it displays the divisional sales per person. There is some formatting on the table, so we need to clear this before we move on.*

Employee	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
Bob	1500	1300	2000	5000	9800
Sally	6546	1565	2184	6841	17136
Will	6546	5456	5845	6846	24693
Derek	7564	5486	5876	8651	27577
Totals	22156	13807	15905	27338	79206

2. Select the Table and navigate to the Design tab.

Employee	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
Bob	1500	1300	2000	5000	9800
Sally	6546	1565	2184	6841	17136
Will	6546	5456	5845	6846	24693
Derek	7564	5486	5876	8651	27577
Totals	22156	13807	15905	27338	79206

3. Select 'Convert to Range' in the tools group.

*The table should now only have basic formatting.*

Employee	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
Bob	1500	1300	2000	5000	9800
Sally	6546	1565	2184	6841	17136
Will	6546	5456	5845	6846	24693
Derek	7564	5486	5876	8651	27577
Totals	22156	13807	15905	27338	79206



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4. Select and copy the entire table.
5. Click into Cell A13 and paste the table using 'ctrl+v'.

*This will paste an identical table to the one already in the sheet. We will be using paste options to transpose the new table here.*

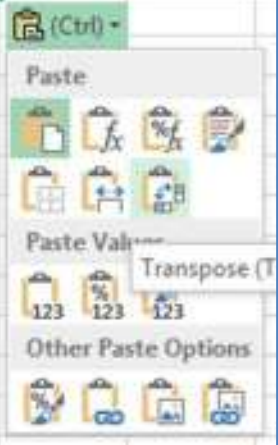
6. Click the "Paste Options" drop-down menu at the bottom right-hand corner of the new table.

*This menu allows you to choose different types of pasting. We will see some more of these features later in the Advanced Formulas section. A list of options for special pasting is displayed by images depicting what each option does.*

Employee	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
Bob	1500	1300	2000	5000	9800
Sally	6546	1565	2184	6841	17136
Will	6546	5456	5845	6846	24693
Derek	7564	5486	5876	8651	27577
Totals	22156	13807	15905	27338	79206


Employee	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
Bob	1500	1300	2000	5000	9800
Sally	6546	1565	2184	6841	17136
Will	6546	5456	5845	6846	24693
Derek	7564	5486	5876	8651	27577
Totals	22156	13807	15905	27338	79206



The image shows a screenshot of an Excel spreadsheet with two identical tables. The second table is highlighted in green. A 'Paste Options' menu is open at the bottom right of the second table, showing various options for pasting data. The menu includes 'Paste', 'Paste Values', 'Paste Formulas', and 'Other Paste Options'. The 'Transpose (T)' option is highlighted, indicating that the data will be pasted in a transposed format.

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7. Choose the Transpose option.

This option is signified by the  button. You should now have two tables showing the same information in different ways.

A	B	C	D	E	F	G
<b>Employee</b>	<b>Quarter 1</b>	<b>Quarter 2</b>	<b>Quarter 3</b>	<b>Quarter 4</b>	<b>Totals</b>	
Bob	1500	1300	2000	5000	9800	
Sally	6546	1565	2184	6841	17136	
Will	6546	5456	5845	6846	24693	
Derek	7564	5486	5876	8651	27577	
<b>Totals</b>	<b>22156</b>	<b>13807</b>	<b>15905</b>	<b>27338</b>	<b>79206</b>	
<b>Employee</b>	Bob	Sally	Will	Derek	Totals	
Quarter 1	1500	6546	6546	7564	22156	
Quarter 2	1300	1565	5456	5486	13807	
Quarter 3	2000	2184	5845	5876	15905	
Quarter 4	5000	6841	6846	8651	27338	
<b>Totals</b>	<b>9800</b>	<b>17136</b>	<b>24693</b>	<b>27577</b>	<b>79206</b>	

Though basic formatting features are useful, advanced formatting in Excel can save a lot of time when things need formatted in similar ways. Another feature in Excel that has more advanced aspects is formulas and functions.

## Advanced Formulas and Features

In this section, we will be discussing the advanced tools, features, and formulas that Excel has to offer. Though some of the following features are not formulas or functions themselves, they are still useful, and can save time, when working with functions. We will first be exploring some techniques that allow you to easily work with formulas that were previously created, then we will see how range names help functions, and last, we will apply this knowledge in some advanced formulas that are contained in Excel.

### Formula Tools

When working with formulas in Excel, it's useful to know when a cell is used in a formula and what formula it is being used in. There are some keyboard shortcuts that can help us do this. In addition, you can format formulas so that others looking at the sheet can tell which cells contain information from a formula. There is also a trick to quickly populate a formula down a column.

1. Open the Simple\_Budget.xlsx worksheet.

*In this worksheet, there are some calculations that have not been labeled. Every cell in this sheet is either an output from a function or used in a function.*

2. Click into B2 and press ctrl +] on the keyboard.

*This will show us what cells contain functions that reference this cell. In this case, there are only two which are both in the screen, but if not, we can use enter to navigate to the other functions.*

Power	\$ 155	\$ 225
TV	\$ 35	\$ 35
Internet	\$ 15	\$ 15
Food	\$ 200	\$ 150
Gas	\$ 27	\$ 17
Car Payment	\$ 157	\$ 157
Monthly Total	\$ 1,339	\$ 1,347
	\$ 9,000	
	\$ 3,952	\$ 329
	\$ 3,054	\$ 255
	\$ 262	\$ 22

3. Press enter to move to the second formula that uses this cell.
4. Click into cell C13 and press ctrl + [ on the keyboard.

*The active cell is now a cell that is used in the function which is located in C13. Pressing enter will also move between cells here similar to step 4.*

\$ 15	\$ 15	\$ 15	\$ 15	\$ 15	\$ 15	\$ 15	\$ 15	\$ 15	\$ 15	\$ 15	\$ 15	\$ 15	\$ 15
\$ 200	\$ 150	\$ 300	\$ 225	\$ 362	\$ 123	\$ 542	\$ 100	\$ 75	\$ 425	\$ 200	\$ 352		
\$ 27	\$ 17	\$ 28	\$ 23	\$ 30	\$ 5	\$ 13	\$ 30	\$ 31	\$ 20	\$ 24	\$ 14		

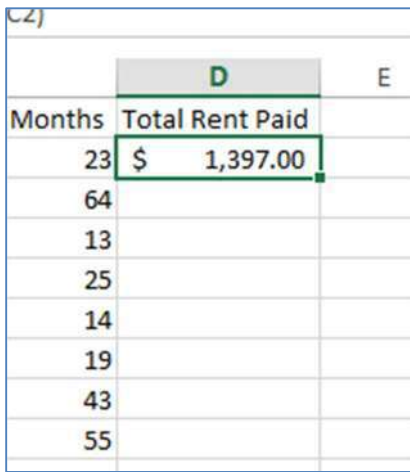
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- Find what the data in B11:B15 and C12:C15 is referencing and label them using the closest empty cell.

*Cell B11 contains the total rent, so you could put "Total Rent" in cell A11. When labeling, notice that all of the data in C12:C15 are averages.*

- Navigate to sheet 2.

*In this sheet there are a list of tenants and some data about their rent. In D2, there is a formula for that tenant's total rent, but we want this formula to be in the whole table. We could drag the formula through the table, but Excel has a quicker method.*



	D	E
Months	Total Rent Paid	
23	\$ 1,397.00	
64		
13		
25		
14		
19		
43		
55		

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- Select D2 and double click the small box in the bottom right hand corner of the cell.

*Notice the formula is now in column D for each row.*

*We know want to add the entire column into G1. We could navigate to the bottom of the column and enter the range that has data, but if any tenants are adding to this list, their rent would not be included.*

=SUM(B2:C2)

C	D
Number of Months	Total Rent Paid
23	\$ 1,397.00
64	\$ 1,343.00
13	\$ 767.00
25	\$ 1,182.00
14	\$ 662.00
19	\$ 382.00
43	\$ 1,250.00
55	\$ 616.00
30	\$ 504.00
14	\$ 881.00
58	\$ 1,197.00
51	\$ 979.00
28	\$ 732.00
66	\$ 584.00
18	\$ 1,464.00
46	\$ 444.00
31	\$ 1,322.00
33	\$ 1,519.00
52	\$ 1,382.00
31	\$ 1,384.00
38	\$ 423.00
60	\$ 1,136.00
17	\$ 553.00
52	\$ 579.00
52	\$ 725.00
31	\$ 867.00
30	\$ 1,255.00
12	\$ 1,123.00
31	\$ 869.00
22	\$ 420.00
13	\$ 1,159.00
40	\$ 652.00
28	\$ 1,297.00
29	\$ 1,320.00
20	\$ 614.00
25	\$ 1,230.00
13	\$ 816.00
16	\$ 756.00
34	\$ 1,105.00
65	\$ 973.00
37	\$ 1,369.00
25	\$ 655.00
54	\$ 1,469.00
31	\$ 1,100.00

- Enter “=Sum(D:D)” into G1.

*This formula reads “sum the entire D column”. Using this notation, if any addition tenants are added to the list, they will be included in the formula.*

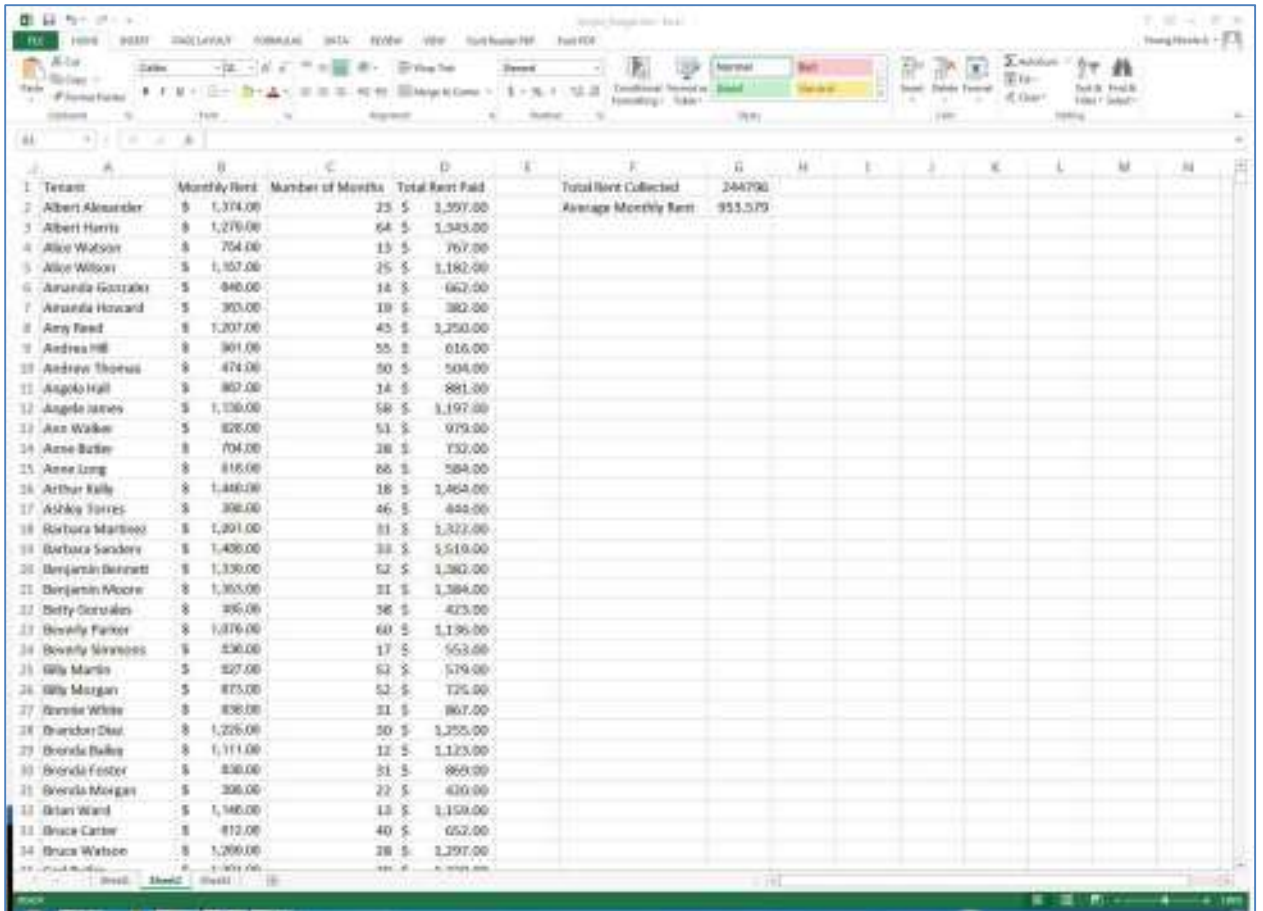
B	C	D	E	F	G	H
Monthly Rent	Number of Months	Total Rent Paid		Total Rent Collected	=sum(D:D)	
\$ 1,374.00	23	\$ 1,397.00		Average Monthly Rent	SUM(number1, [num	
\$ 1,279.00	64	\$ 1,343.00				
\$ 754.00	13	\$ 767.00				
\$ 1,157.00	25	\$ 1,182.00				

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9. Type "=average(" into G2, select column B and press enter.

*Selecting the column is another way to specify that the values in the entire column will be used.*

*Now that we have some formulas in this sheet, we will look at a few easy ways to display those formulas. Your sheet should look like the following picture:*



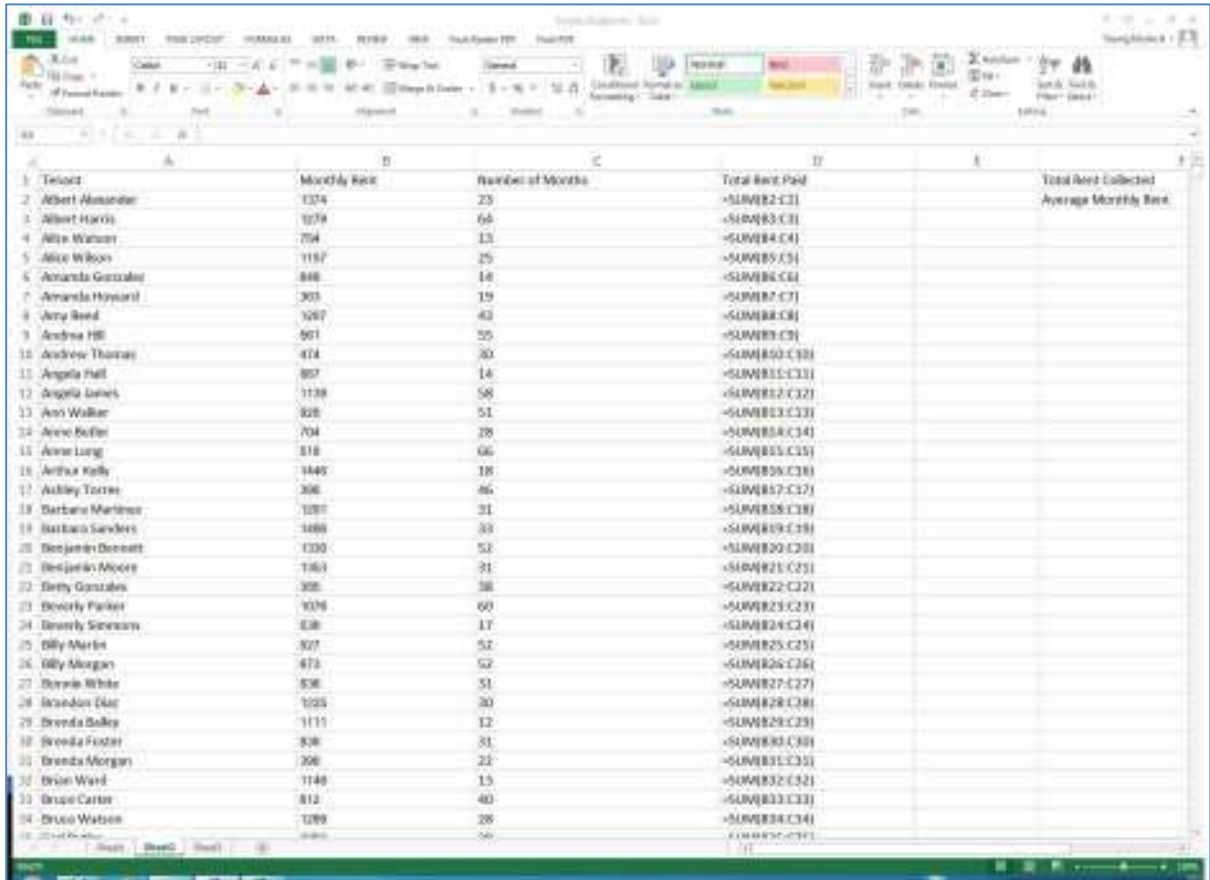
The screenshot shows an Excel spreadsheet with the following data:

Tenant	Monthly Rent	Number of Months	Total Rent Paid	Total Rent Collected	Average Monthly Rent
Albert Alexander	\$ 1,204.00	23	\$ 1,297.00		
Albert Harris	\$ 1,270.00	64	\$ 1,343.00		
Alice Watson	\$ 704.00	13	\$ 767.00		
Alice Wilson	\$ 1,157.00	25	\$ 1,182.00		
Amanda Gotzabel	\$ 940.00	14	\$ 662.00		
Amanda Howard	\$ 303.00	19	\$ 382.00		
Amy Reed	\$ 1,207.00	43	\$ 1,250.00		
Andrea Hill	\$ 301.00	55	\$ 616.00		
Andrew Thomas	\$ 474.00	50	\$ 504.00		
Angelo Hall	\$ 807.00	14	\$ 881.00		
Angela James	\$ 1,136.00	58	\$ 1,197.00		
Ann Walker	\$ 808.00	51	\$ 979.00		
Anne Butler	\$ 704.00	38	\$ 732.00		
Anne Long	\$ 816.00	86	\$ 584.00		
Arthur Kelly	\$ 1,446.00	18	\$ 1,464.00		
Ashley Torres	\$ 398.00	46	\$ 444.00		
Barbara Martini	\$ 1,201.00	31	\$ 1,322.00		
Barbara Sanders	\$ 1,498.00	33	\$ 1,510.00		
Benjamin Belmont	\$ 1,336.00	52	\$ 1,382.00		
Benjamin Moore	\$ 1,365.00	31	\$ 1,384.00		
Betty Gonzalez	\$ 396.00	58	\$ 423.00		
Beverly Parker	\$ 1,076.00	60	\$ 1,186.00		
Beverly Minness	\$ 236.00	17	\$ 553.00		
Billy Martin	\$ 327.00	62	\$ 579.00		
Billy Morgan	\$ 873.00	52	\$ 726.00		
Bonnie White	\$ 838.00	31	\$ 867.00		
Bonnie Diaz	\$ 1,226.00	50	\$ 1,255.00		
Bonnie Baker	\$ 1,111.00	12	\$ 1,123.00		
Bonnie Foster	\$ 230.00	51	\$ 869.00		
Bonnie Morgan	\$ 308.00	22	\$ 430.00		
Brian Ward	\$ 1,140.00	13	\$ 1,159.00		
Bruce Carter	\$ 812.00	40	\$ 652.00		
Bruce Watson	\$ 1,200.00	38	\$ 1,297.00		

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10. On the keyboard press ctrl + `.

*This shows all of the calculated formulas as functions.*

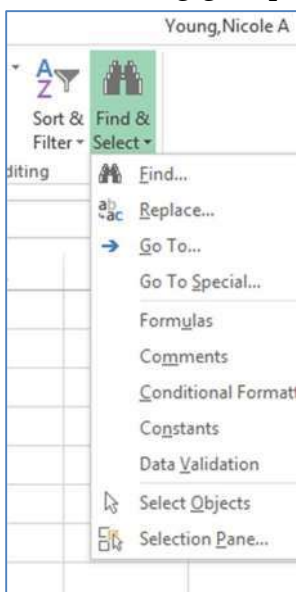


The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F
1	Telozt	Monthly Rent	Number of Months	Total Rent Paid		Total Rent Collected
2	Albert Alexander	1204	23	=SUM(B2:C2)		Average Monthly Rent
3	Albert Harris	1079	66	=SUM(B3:C3)		
4	Allye Watson	794	13	=SUM(B4:C4)		
5	Alice Wilson	1157	25	=SUM(B5:C5)		
6	Amanda Gonzalez	848	18	=SUM(B6:C6)		
7	Amanda Howard	303	19	=SUM(B7:C7)		
8	Amy Reed	1087	43	=SUM(B8:C8)		
9	Andrea Hill	501	55	=SUM(B9:C9)		
10	Andrew Thomas	474	30	=SUM(B10:C10)		
11	Angela Hall	887	14	=SUM(B11:C11)		
12	Angella James	1138	58	=SUM(B12:C12)		
13	Ann Walker	828	51	=SUM(B13:C13)		
14	Anne Butler	704	28	=SUM(B14:C14)		
15	Anne Long	818	66	=SUM(B15:C15)		
16	Arthur Kelly	1445	18	=SUM(B16:C16)		
17	Audley Torres	306	46	=SUM(B17:C17)		
18	Barbara Martinez	1081	31	=SUM(B18:C18)		
19	Barbara Sanders	1888	33	=SUM(B19:C19)		
20	Benjamin Bennett	1300	53	=SUM(B20:C20)		
21	Benjamin Moore	1163	31	=SUM(B21:C21)		
22	Beth Gonzalez	308	38	=SUM(B22:C22)		
23	Beverly Parker	1076	60	=SUM(B23:C23)		
24	Beverly Simmons	838	17	=SUM(B24:C24)		
25	Billy Martin	307	52	=SUM(B25:C25)		
26	Billy Morgan	873	52	=SUM(B26:C26)		
27	Bonnie White	536	51	=SUM(B27:C27)		
28	Brandon Diaz	1025	30	=SUM(B28:C28)		
29	Brenda Bailey	1111	12	=SUM(B29:C29)		
30	Brenda Foster	838	31	=SUM(B30:C30)		
31	Brenda Morgan	306	22	=SUM(B31:C31)		
32	Brian Ward	1148	15	=SUM(B32:C32)		
33	Bruce Carter	812	40	=SUM(B33:C33)		
34	Bruce Watson	1289	28	=SUM(B34:C34)		
35						
36						
37						
38						
39						
40						
41						
42						
43						
44						
45						
46						
47						
48						
49						
50						

11. Press ctrl + ` again to return the values.

12. In the editing group on the Home tab choose Find and Select.



13. Choose formulas from the menu.

*For easier viewing, one could format the formulas with shading. All of the cells containing formulas are now selected.*

	A	B	C	D	E	F	G	H	I
1	Tenant	Monthly Rent	Number of Months	Total Rent Paid		Total Rent Collected	244796		
2	Albert Alexander	\$ 1,374.00	23	\$ 1,397.00		Average Monthly Rent	953.579		
3	Albert Harris	\$ 1,278.00	64	\$ 1,343.00					
4	Alice Watson	\$ 754.00	13	\$ 767.00					
5	Alice Wilson	\$ 1,157.00	25	\$ 1,182.00					
6	Amanda Gonzalez	\$ 648.00	14	\$ 662.00					
7	Amanda Howard	\$ 363.00	19	\$ 382.00					
8	Amy Reed	\$ 1,207.00	43	\$ 1,250.00					
9	Andrea Hill	\$ 561.00	55	\$ 616.00					
10	Andrew Thomas	\$ 474.00	30	\$ 504.00					
11	Angela Hall	\$ 867.00	14	\$ 881.00					
12	Angela James	\$ 1,139.00	58	\$ 1,197.00					
13	Ann Walker	\$ 928.00	51	\$ 979.00					
14	Anne Butler	\$ 704.00	28	\$ 732.00					
15	Anne Long	\$ 518.00	66	\$ 584.00					
16	Arthur Kelly	\$ 1,446.00	18	\$ 1,464.00					
17	Ashley Torres	\$ 398.00	46	\$ 444.00					
18	Barbara Martinez	\$ 1,291.00	31	\$ 1,322.00					
19	Barbara Sanders	\$ 1,486.00	33	\$ 1,519.00					
20	Benjamin Bennett	\$ 1,330.00	52	\$ 1,382.00					
21	Benjamin Moore	\$ 1,353.00	31	\$ 1,384.00					
22	Betty Gonzales	\$ 385.00	38	\$ 423.00					
23	Beverly Parker	\$ 1,078.00	60	\$ 1,136.00					
24	Beverly Simmons	\$ 536.00	17	\$ 553.00					
25	Billy Martin	\$ 627.00	52	\$ 579.00					
26	Billy Morgan	\$ 673.00	52	\$ 725.00					
27	Bonnie White	\$ 836.00	31	\$ 867.00					
28	Brandon Diaz	\$ 1,225.00	30	\$ 1,255.00					
29	Brenda Bailey	\$ 1,111.00	12	\$ 1,123.00					
30	Brenda Foster	\$ 838.00	31	\$ 869.00					
31	Brenda Morgan	\$ 398.00	22	\$ 420.00					
32	Brian Ward	\$ 1,146.00	13	\$ 1,159.00					
33	Bruce Carter	\$ 612.00	40	\$ 652.00					
34	Bruce Watson	\$ 1,268.00	28	\$ 1,297.00					

14. Shade all of the formulas with a color.

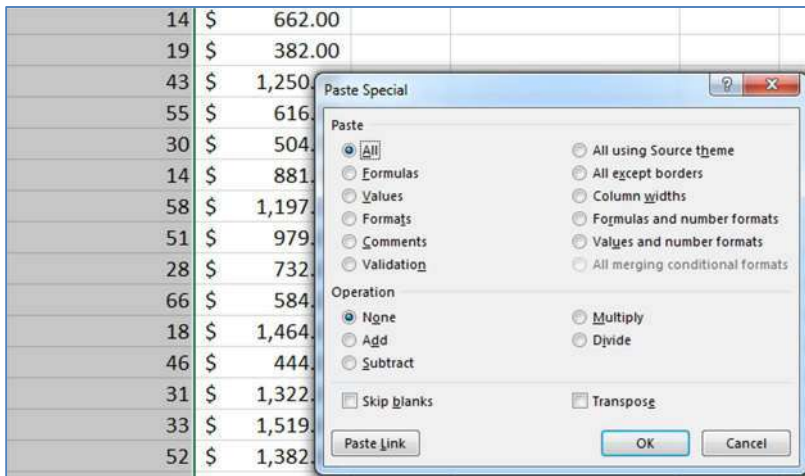
*If you wanted to add to cells, but did not want to use a formula, special pasting can help. We want to add 6 months to every cell in column C.*

15. Type 6 in cell E1 and copy the cell.



16. Select column C and press ctrl + alt + v on the keyboard.

*This opens the special pasting dialog box. Some options are available on a right click, but we need more specific options.*



17. Choose Add and skip blanks, then click OK.

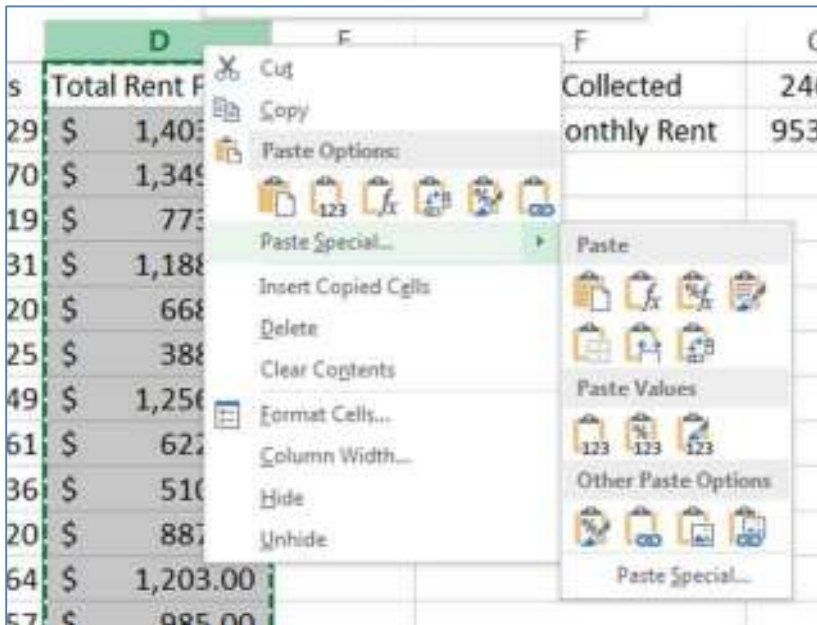
*This told Excel to add the copied value to all of the cells in this column. Notice the text data does not change.*

The image shows the same Excel spreadsheet after the special paste operation. Column C is highlighted. The values in column D are now the sum of the values in column C and the original values in column D. The text data in columns A and B remains unchanged.

	A	B	C	D	E	F	G	H
		Monthly Rent	Number of Months	Amount Paid		Total Rent Collected		Average Monthly Rent
1	Tenant					246278		953.579
2	Albert Alexander	\$ 1,174.00	29	\$ 1,403.00				
3	Albert Harris	\$ 1,279.00	70	\$ 1,349.00				
4	Alice Watson	\$ 754.00	15	\$ 773.00				
5	Alice Wilson	\$ 1,157.00	31	\$ 1,188.00				
6	Amanda Gonzalez	\$ 645.00	20	\$ 668.00				
7	Amanda Howard	\$ 263.00	25	\$ 284.00				
8	Ann Reed	\$ 1,207.00	49	\$ 1,256.00				
9	Andrew Hill	\$ 561.00	61	\$ 622.00				
0	Andrew Thomas	\$ 474.00	36	\$ 510.00				
1	Angela Hall	\$ 887.00	20	\$ 887.00				
2	Angela James	\$ 1,139.00	64	\$ 1,203.00				
3	Ann Walker	\$ 808.00	57	\$ 985.00				
4	Anne Butler	\$ 784.00	34	\$ 738.00				
5	Anne Long	\$ 519.00	72	\$ 590.00				
6	Arthur Kelly	\$ 1,486.00	24	\$ 1,470.00				
7	Ashley Torres	\$ 393.00	52	\$ 450.00				
8	Barbara Martinez	\$ 1,291.00	37	\$ 1,328.00				
9	Barbara Sanders	\$ 1,486.00	39	\$ 1,525.00				
0	Benjamin Bennett	\$ 1,330.00	58	\$ 1,388.00				
1	Benjamin Moore	\$ 1,353.00	31	\$ 1,390.00				
2	Betty Gonzalez	\$ 585.00	44	\$ 629.00				
3	Beverly Frazier	\$ 1,010.00	60	\$ 1,140.00				
4	Beverly Simmons	\$ 636.00	73	\$ 559.00				
5	Billy Martin	\$ 527.00	58	\$ 585.00				
6	Billy Morgan	\$ 673.00	58	\$ 731.00				
7	Bonnie White	\$ 636.00	37	\$ 673.00				
8	Brandon Diaz	\$ 1,295.00	36	\$ 1,261.00				
9	Brenda Bailey	\$ 1,111.00	38	\$ 1,129.00				
0	Brenda Foster	\$ 830.00	37	\$ 875.00				
1	Brenda Morgan	\$ 388.00	28	\$ 426.00				
2	Brian Ward	\$ 1,144.00	39	\$ 1,180.00				
3	Bruce Carter	\$ 612.00	46	\$ 658.00				

*Suppose you wanted the data in column D to be displayed, but you did not want the formula contained in the sheet. Using special pasting, we can remove all of the formulas from column D.*


18. Select and copy column D.
19. Right click on column D.



20. Choose the special pasting menu.

*This menu contains many different pasting options. If more options are needed, choosing Paste Special from here would bring up the special pasting dialog box which we saw earlier.*

21. Click on the values option.

*This option, , tells excel to only paste the values from the copied cells into the now selected cells.*

22. Click a few of the cells in column D to observe that the data is now simply a value.

*The downside to doing this is that if you edited the Number of months data, column D would not be updated.*

1403			
B	C	D	E
Monthly Rent	Number of Months	Total Rent Paid	(Ctrl)
1,374.00	29	\$ 1,403.00	
1,279.00	70	\$ 1,349.00	

We have just explored some time saving techniques to use with functions and formulas in Excel. The next subsection talks about how naming ranges can save time with referencing in functions.

## Range Names

Sometimes when referencing cells in formulas, it can be more convenient to name the cell or range of cells. Naming data ranges adds meaning to formulas because others who are editing can see what the data, that a formula is referencing, is for. The first step to using a data range is to name it. Once a range is named, other cells or formulas the range will absolutely reference that range. This allows you to copy formulas without applying "\$" in the range name.

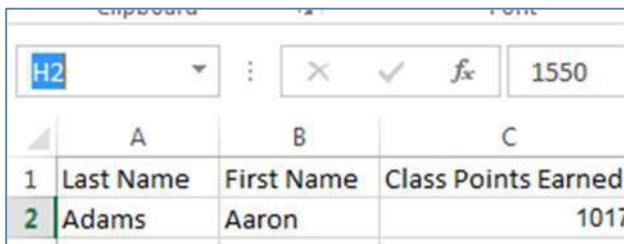
1. Open the file named Students\_Grades.xlsx.

*This workbook has a list of names followed by the points they have received in the class. There is also a column labeled Class Grade. Here only the first student's Class Grade is calculated. In cell F2, there is a seemingly random number. We want to designate this as the total possible points in the class so that we can use it to calculate the student's final grades.*

2. Double click into cell D2.

*The cell uses relative referencing to divide the value from column C by the value in cell H2 and formatted to return a percent. If this formula was copied down column D, every cell besides D2 would return an error. We could fix this by using absolute referencing, but it is also fixed by naming the data in H2 and using this name in the formula.*

3. Press the escape key to move from cell D2 without editing it, and click into H2.
4. Hover over the box to the left of the formula bar that displays 'H2'.



	A	B	C
1	Last Name	First Name	Class Points Earned
2	Adams	Aaron	1017

*This is the name box where data ranges can be named. Clicking the down arrow on this box displays all the names that are used in this workbook. Since we do not have any names, the list is empty.*

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- Click into the name box and type "Total\_Points".

*Names must not contain spaces nor start or end with a number; however, they can use underscores as well as capital letters. Here we used the underscore to separate the words, but capital letters at the beginning of words can do the same.*

- Press enter to accept the name.

*Whenever H2 is the active cell, the name box will display 'Total\_Points'. Clicking the down arrow in the name box and selecting this name will also make F2 the active cell.*

Total_Points				1550				
	A	B	C	D	E	F	G	H
1	Last Name	First Name	Class Points Earned	Class Grade	Letter Grade		Grade Statistics	Total M
2	Adams	Aaron	1017	66%			Points	1550
3	Alexander	Billy	1523				Percent	100%

- In D2, change 'H2' to 'Total\_Points' and press enter.

*When you start typing the cell's name, it appears in the dropdown formula list as shown in the picture below. You can then use the down key and tab or double click the name to insert it into the formula. The formula now absolute references the named cell without using the '\$' in front of the name.*

- Copy the formula through the rest of column D.

	A	B	C	D	E	F	G	H	I	J
1	Last Name	First Name	Class Points Earned	Class Grade	Letter Grade		Grade Statistics	Total	Min	Max
2	Adams	Aaron	1017	66%			Points	1550		
3	Alexander	Billy	1523	98%			Percent	100%		
4	Allen	Alice	1213	78%						
5	Allison	Loren	1480	95%						
6	Anderson	Edward	796	47%			Letter Grade Table			Nur
7	Armstrong	Lela	1124	73%			66%	E		E
8	Bailey	Roy	824	25%			88%	D-		D-
9	Baker	Anne	210	14%			90%	D		D
10	Banks	Cary	366	23%			85%	D+		D+
11	Barker	Jermaine	1162	75%			88%	C-		C-
12	Barnes	Louise	1349	87%			70%	C		C
13	Barnes	Heidi	1100	76%			75%	C+		C+
14	Barton	Katie	891	63%			78%	B-		B-
15	Bates	Alma	764	49%			80%	B		B
16	Bell	Jesse	1300	89%			85%	B+		B+
17	Bell	Devon	1491	96%			88%	A-		A-
18	Bennett	Todd	747	48%			92%	A		A
19	Berry	Leona	1536	99%						
20	Bishop	Nelson	76	5%						
21	Bowers	Willie	834	45%						
22	Briggs	Erika	169	10%						
23	Brooks	Dorothy	1020	66%						

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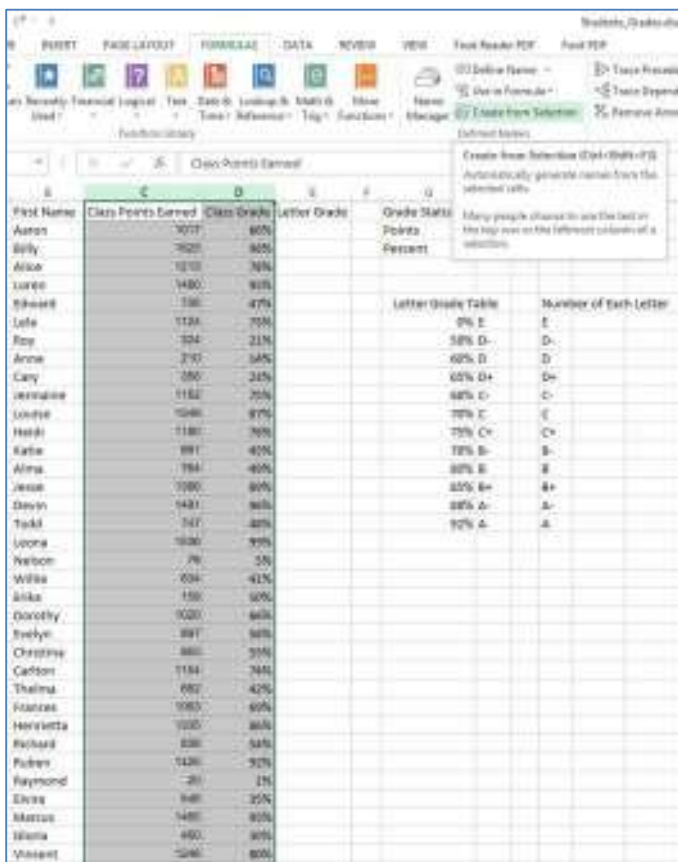
*In addition to naming one cell, a range of cells can be named. This is useful if there are large ranges that need to be manipulated. In this sheet, there is a table displaying the class statistics, we will use range names to calculate these statistics.*

9. With Students\_Grades.xlsx open, select column C and D.

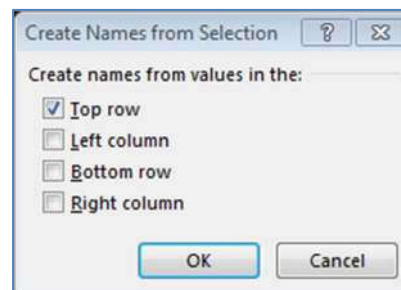
*We want to use some functions on these data sets, but we don't want to select the sets every time we use the data, so we will name the columns.*

10. Navigate to the Defined Names group in the Formulas tab and click Create from selection.

*A dialog box displaying different options for naming the columns is displayed. The 'Top Row' option is selected. This means the name of each column will be based on the data in the top cell of that column.*



First Name	Class Points Earned	Class Grade	Letter Grade	Grade Status
Aaron	707	80%		
Billy	702	80%		
Alice	1210	90%		
Lorge	1480	90%		
Edward	136	47%		
Lafe	1124	70%		
Ray	704	21%		
Anne	210	54%		
Carly	550	34%		
Jermaine	1182	75%		
Joseph	646	87%		
Heidi	1180	76%		
Kate	881	47%		
Alma	764	46%		
Jesse	1090	80%		
David	1481	80%		
Teddi	747	48%		
Leone	806	77%		
Nelson	76	5%		
Willis	604	41%		
Aika	159	50%		
Dorothy	1020	66%		
Fredyn	887	68%		
Christy	866	59%		
Carlton	1184	74%		
Thalma	857	42%		
Francis	1063	66%		
Hervetta	1020	66%		
Richard	836	54%		
Fubren	1126	72%		
Raymond	26	1%		
Elvra	648	25%		
Marcus	1480	80%		
Wima	460	60%		
Yusuf	146	80%		



11. Click ok.

*If you were to click into the name box now and select either of the names we just created, Excel would navigate to those ranges.*

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12. Type “=MIN(Class\_Points\_Earned)” into cell I2, “=MAX(Class\_Points\_Earned)” into cell J2, and “=AVERAGE(Class\_Points\_Earned)” into cell K2.

*Notice that Excel calculated this data from the cells in column C only taking cells with actual data into account.*

Name	Class Points Earned	Class Grade	Letter Grade	Grade Statistics	Total	Min	Max	Average
ron	1017	66%		Points	1550	3		AVERAGE(Class_Points_Earned)
ly	1523	98%		Percent	100%			
ce	1213	78%						
ran	1480	95%						
ward	735	47%		Letter Grade Table			Number of Each Letter	
la	1124	73%		0% E			E	
y	324	21%		58% D-			D-	
ne	210	14%		60% D			D	
ry	358	23%		65% D+			D+	
maine	1182	75%		68% C-			C-	
alde	1349	82%		70% C			C	
idi	1180	76%		75% C+			C+	
tie	691	45%		78% B-			B-	
na	754	49%		80% B			B	

13. Repeat the previous step for cells H3:J3 using the min, max, and average formulas respectively.

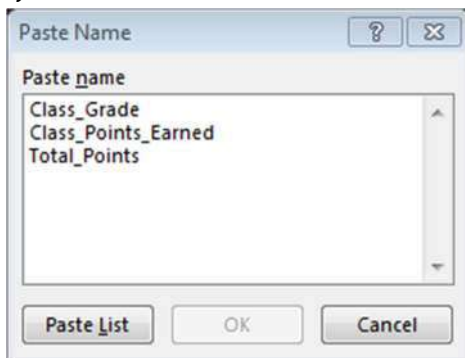
A downside to using names is that when there are a lot of names in a workbook, knowing what those names are can become tricky. Now that we have a few different names in the workbook, we can look at how to manage the names. The names can be pasted into the sheet so that anyone using the sheet later knows what range the names are for.

14. Click into cell G20.

*We want an area on the sheet that has a lot of space for the list to be placed. Our current list is not very long, but even if we had a longer list, this area would have enough space.*

15. Press F3 on the keyboard.

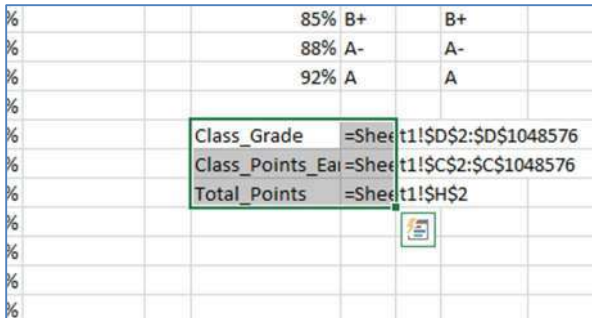
*A dialog box displaying the possible range names are listed. At the bottom left hand side of this box is a button labeled 'Paste List'.*



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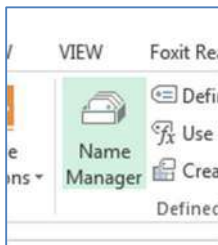
### 16. Click 'Paste List'.

*Our list of names is now put in one column and the location or range of cells that the name reference is placed in the column to the right of this list. This is a quick way for anyone who is using the worksheet in the future to see the names in the sheet; however, using the 'Name Manager' you can edit the names and add comments about the names.*

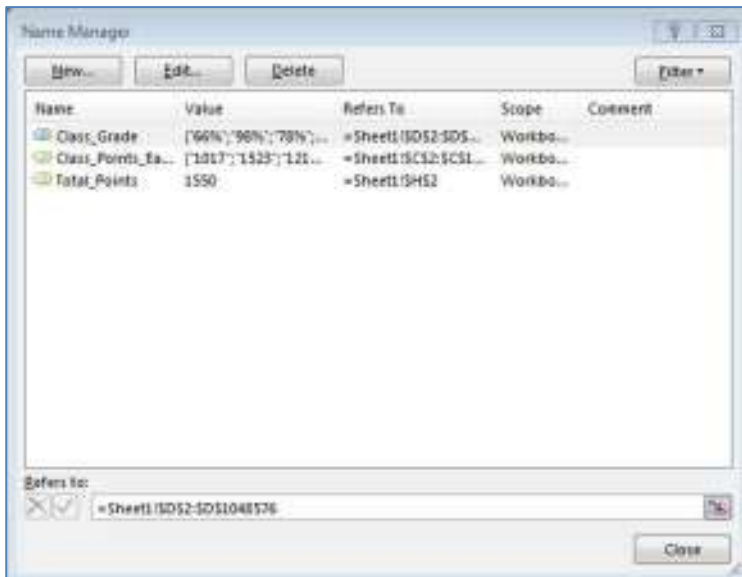


%			85% B+	B+	
%			88% A-	A-	
%			92% A	A	
%					
%			Class_Grade	=Sheet1!\$D\$2:\$D\$1048576	
%			Class_Points_Ea	=Sheet1!\$C\$2:\$C\$1048576	
%			Total_Points	=Sheet1!\$H\$2	
%					
%					
%					
%					
%					

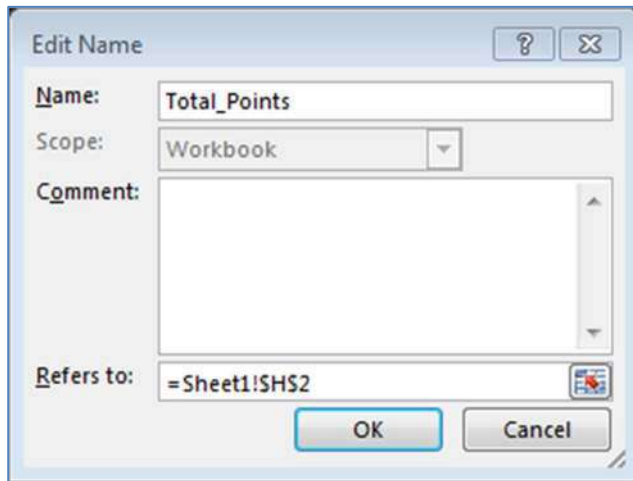
### 17. Navigate to the Formulas tab and click Name Manager.



*A dialog box displaying the names from this worksheet is shown. There are options to edit and delete selected names as well as the option to sort the list using column names and to filter through the list. There is also the option to redefine the cells that are named. Notice in the list of names, there is a section for comments. We want to add a comment to the cell named 'Total\_Points'.*



18. Choose 'Total\_Points' and click 'Edit'.



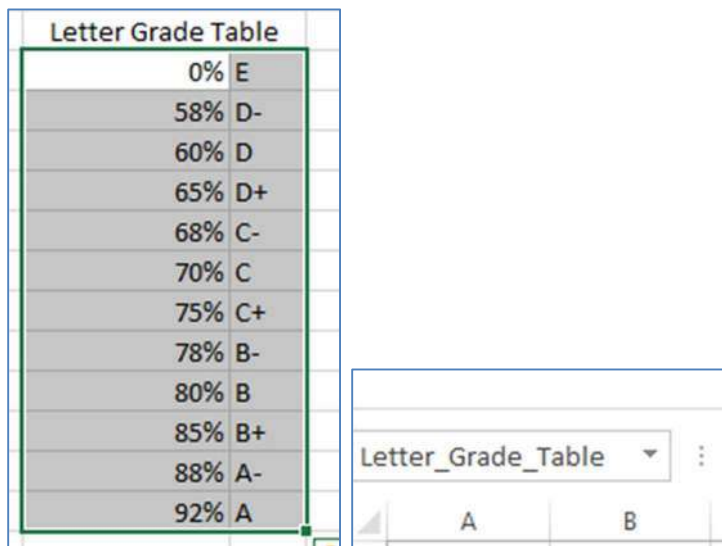
19. In the comments area type: "This is the total points possible in the class. Use it to find students overall class grade."

20. Click 'Ok' to save the comment.

*The comment is partially showed in the comment section, but for future viewers of the worksheet to see the whole comment, they too would have to choose the name and click 'Edit'.*

21. As practice, define "Letter\_Grade\_Table" as a name for cells G7:H18.

*We will use this name in the next subsection.*



*Range names can add meaning to formulas and allow large sets of data to be manipulated without having to select the entire set each time it is used.*



## Lookup, If, and Time Functions

Many functions in Excel do not simply perform calculations. One example is the vlookup function. Other functions, such as if functions perform calculations based on whether certain criteria are met, and other functions display or calculate based on dates and times. In this section, we will look at these functions and how to use them in a sheet.

1. With Students\_Grades.xlsx open, select E2.

*In this column, we want to display the respective letter grades based on the grade range found in the letter grade table.*

2. Type “=vlookup(“

*This is the function that will look up a value and decide where it is on our table. The difference between the vlookup and the hlookup functions is the orientation of the table. In our sheet, the table is vertical, so we use vlookup, but if the table was horizontal, we would use hlookup.*

	C	D	E	F
me	Class Points Earned	Class Grade	Letter Grade	Gr
	1017	66%	=VLOOKUP(	Pc
	1523	98%	VLOOKUP(lookup_val	
	1213	78%		

3. Select column D and type a comma.

*The first entry for this formula designates what will be evaluated. We want to return a letter grade based on the percent found in cell D2.*

4. Type “Letter\_Grade\_Table,”.

*This tells the function where to get the return data. Here, if data is greater than a value in the left column on the table, it returns the value from that row.*

5. Type “2)”.

*This tells Excel that the value returned will be from the second column in the table. If the table was horizontal, it would signify the second row.*

	D	E	F	G	H
d	Class Grade	Letter Grade	Grade Statistics	To	
17	66%	=VLOOKUP(D	Points	15	
23	98%	Letter Grade	Percent	10	
13	78%				
80	95%				
35	47%		Letter Grade Table		
24	73%		n% E		

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6. On the keyboard press enter.

*In our case, the data is in ranges; however, if our data was meant to matchup exactly to the data in the table, we could specify that here.*

7. Copy the formula down the rest of the column.

	D	E	F	G
ed	Class Grade	Letter Grade		Grade St.
017	66%	D+		Points
023	98%	A		Percent
0213	78%	B-		
0480	95%	A		
0735	47%	E		Letter
0724	73%	C		
0824	21%	E		
09210	14%	E		
0856	23%	E		
0162	75%	C		
0849	87%	B+		
0180	76%	C+		
0991	45%	E		
0764	49%	E		
0886	89%	A-		
0991	96%	A		
0747	48%	E		
0336	99%	A		
0176	5%	E		Class_Gr
0334	41%	E		Class_Po
0159	10%	E		Total_Po
0220	66%	D+		
0897	58%	E		
0853	55%	E		
0154	74%	C		

*Just by looking at this table, it is unclear how successful this class as a whole was. We can use If functions to display how many of each letter grade was present in the class. We will input this information in the second column of the 'Number of Each Letter' table.*

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8. Click into K7.

*This is the cell where we want to display how many of each letter there is.*

	1550	0%	1537	791.545
	100%	0%	99%	51%
Table	Number of Each Letter			
% E	E			
% D-	D-			
% D	D			
% D+	D+			
% C-	C-			
% C	C			
% C+	C+			

9. Type “=countif(“

*This formula has two arguments, a range and criteria. The range is simply where the data we are counting is located. The criteria designate what will be counted.*

10. Choose column E and type a comma.

*All of the letters that will be counted is in this column.*

11. Choose cell J7 and press ctrl + enter.

C	D	E	F	G	H	I	J	K	L	M	N
Points Earned	Class Grade	Letter Grade		Grade Statistics	Total	Min	Max	Average			
1017	66%	D+		Points	1550	3	1537	791.545			
1523	98%	A		Percent	100%	0%	99%	51%			
1213	78%	B-									
1480	95%	A									
735	47%	E		Letter Grade Table				Number of Each Letter			
1124	73%	C		0% E	E			=COUNTIF(E:E,I7)			
324	21%	E		58% D-	D-			COUNTIF(range, criteria)			
210	14%	E		60% D	D						
356	23%	E		65% D+	D+						
1162	75%	C		68% C-	C-						
1349	87%	B+		70% C	C						
1180	76%	C+		75% C+	C+						
691	45%	E		78% B-	B-						
764	49%	E		80% B	B						
1386	89%	A-		85% B+	B+						
1491	96%	A		88% A-	A-						
747	48%	E		92% A	A						
1536	99%	A									
76	5%	E		Class_Grade	=Sheet1!\$D\$2:\$D\$1048576						
634	41%	E		Class_Points_Ea	=Sheet1!\$C\$2:\$C\$1048576						
189	10%	E		Total_Points	=Sheet1!\$H\$2						

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Number of Each Letter	
E	116
D-	
D	
D+	
C-	
C	
C+	
B-	
B	
B+	
A-	
A	

*The criterion for this cell is that the letter is E. Since we want to be able to copy the formula and since the data is already displayed to the left, that cell is our criterion.*

12. Copy the formula through the rest of the table.

Number of Each Letter	
E	116
D-	3
D	8
D+	4
C-	5
C	14
C+	4
B-	2
B	8
B+	4
A-	8
A	22

Sheet1!\$D\$2:\$D\$1048576

*We will now be opening a different workbook to use some more if functions.*

## AT Computer Labs

13. Open Employee\_Info.xlsx and choose the sheet labeled Status.

*On this sheet, there is a list of employees along with some pay info. There is also a table that is meant to display totals based on the employee's status. We want to calculate the total salaries for each type of employee and place them in this table. The sumif function will help us do that.*

14. Type “=sumif(“ into J4.

*This function has three arguments. The first is the range where the if statement will look. The criteria is what the if statement is looking for in the first range, and the sum range is what will be added if the criteria is met.*

	A	B	C	D	E	F	G	H	I	J	K
1	Name	Pay Rate	Average Hours/Month	Monthly Pay	Yearly Pay	Status	Benefits				
2	Albert Alexander	\$ 13.72	188	\$ 2,579.36	\$30,952.32	Contract					
3	Albert Harris	\$ 27.87	136	\$ 3,790.32	\$45,483.84	Contract			Totals	Monthly	Yearly
4	Alice Watson	\$ 22.71	128	\$ 2,906.88	\$34,882.56	Contract			Full Time	=sumif(	
5	Alice Wilson	\$ 32.41	107	\$ 3,467.87	\$41,614.44	Full Time			Contract	SUMIF(range,	
6	Amanda Gonzalez	\$ 13.07	244	\$ 3,189.08	\$38,268.96	Contract					
7	Amanda Howard	\$ 26.08	179	\$ 4,668.32	\$56,019.84	Fulltime					
8	Amy Reed	\$ 20.84	214	\$ 4,459.76	\$53,517.12	Fulltime					

15. Select Column F for the first entry and type a comma.

*Since we are summing the salaries of Full Time employees, we want the function to look in this column for that information.*

16. Type “ I4,”.

*If this information was not in the sheet, typing “Full Time” including the parenthesis would suffice.*

17. Last choose column D for the sum range.

	B	C	D	E	F	G	H	I	J	K	L	M
	Pay Rate	Average Hours/Month	Monthly Pay	Yearly Pay	Status	Benefits						
	\$ 13.72	188	\$ 2,579.36	\$30,952.32	Contract				Totals	Monthly	Yearly	
	\$ 27.87	136	\$ 3,790.32	\$45,483.84	Contract				Full Time	=sumif(F:F,I4,D:D)		
	\$ 22.71	128	\$ 2,906.88	\$34,882.56	Contract				Contract	SUMIF(range, criteria, [sum_range])		
	\$ 32.41	107	\$ 3,467.87	\$41,614.44	Full Time							
	\$ 13.07	244	\$ 3,189.08	\$38,268.96	Contract							
	\$ 26.08	179	\$ 4,668.32	\$56,019.84	Fulltime							
	\$ 20.84	214	\$ 4,459.76	\$53,517.12	Fulltime							
	\$ 22.59	122	\$ 2,755.98	\$33,071.76	Contract							
	\$ 30.04	200	\$ 6,008.00	\$72,096.00	Fulltime							
	\$ 15.39	147	\$ 2,262.33	\$27,147.96	Contract							

18. Copy this formula into cell J5.

*Now that we know how to use the sumif function, we can fill out the rest of the table.*

Totals	Monthly	Yearly
Full Time	\$118,765.57	
Contract	\$394,427.02	

19. Repeat these steps for the rest of this table using column E for the sum range.

Totals	Monthly	Yearly
Full Time	\$118,765.57	\$ 1,425,186.84
Contract	\$394,427.02	\$ 4,733,124.24

*The average if function works similarly to the sumif and countif functions; however, the if function is slightly different, so we will learn about it now. In the sheet there is a Benefits column. We want to specify whether an employee gets benefits based on their employment status.*

20. In cell G2, type

fx =IF(F:F="Contract", "Half Coverage", "Full Coverage")								
C	D	E	F	G	H	I	J	K
Hours/Month	Monthly Pay	Yearly Pay	Status	Benefits				
188	\$ 2,579.36	\$30,952.32	Contract	=IF(F:F="Contract", "Half Coverage", "Full Coverage")				
136	\$ 3,790.32	\$45,483.84	Contract	IF(logical_test, [value_if_true], [value_if_false])			Yearly	
128	\$ 2,906.88	\$34,882.56	Contract			Full Time	\$118,765.57	\$ 1,425,186.84
107	\$ 3,467.87	\$41,614.44	Full Time			Contract	\$394,427.02	\$ 4,733,124.24

*In this company, they want all employees except for contracted employees to have full benefits, so we are using the if function to test whether an employee is under contract or not. This function has three arguments. The first is a logic test where we put F2="Contract". Anytime Excel logic tests are looking for or returning text it is necessary to include the parenthesis. The second entry specifies the result if the logic test is true, and the third entry designates what to return if the logic test is false. If the logic test was comparing numbers, equal to, less than, less than or equal to, greater than, greater than or equal to, or not equal to could have been entered respectively as =, <, <=, >, >=, or <>.*

21. Copy the function through the column.

Font		Alignment		Number		
=IF(F:F="Contract", "Half Coverage", "Full Coverage")						
B	C	D	E	F	G	H
Pay Rate	Average Hours/Month	Monthly Pay	Yearly Pay	Status	Benefits	
\$ 13.72	188	\$ 2,579.36	\$30,952.32	Contract	Half Coverage	
\$ 27.87	136	\$ 3,790.32	\$45,483.84	Contract	Half Coverage	
\$ 22.71	128	\$ 2,906.88	\$34,882.56	Contract	Half Coverage	
\$ 32.41	107	\$ 3,467.87	\$41,614.44	Full Time	Full Coverage	
\$ 13.07	244	\$ 3,189.08	\$38,268.96	Contract	Half Coverage	
\$ 26.08	179	\$ 4,668.32	\$56,019.84	Fulltime	Full Coverage	
\$ 20.84	214	\$ 4,459.76	\$53,517.12	Fulltime	Full Coverage	
\$ 22.59	122	\$ 2,755.98	\$33,071.76	Contract	Half Coverage	
\$ 30.04	200	\$ 6,008.00	\$72,096.00	Fulltime	Full Coverage	

The last function type we are going to look at are time functions. These functions do things like displaying the current date or date and time. Times can also be incorporated into general functions.

22. Navigate to the Time Worked worksheet.

In this sheet there are is a list of employees along with their starting and projected ending dates. We will be calculating both how many months have been worked and how many months are projected to be worked per person.

23. In cell E2, type “=datedif(“.

Font		Alignment		Number	
=dateif(					
D	E				
Projected End Date	Projected Months	Curr			
7/11/2013	=dateif(				
4/16/2013					
8/21/2013					

This is a hidden function in Excel. If you search for it, you will not be able to find it, but it is still a useable function. There are three arguments in the formula which are: The first date, the date that the first date is being subtracted from, and how the result will be displayed. The possible choices for display are year (y), month (m), day (d), days since last full year (yd), months since last full year (ym), and days since last full month (md).

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24. Select cell C2 and D2 typing a comma after each.

*This is telling excel where to find the dates used in the difference.*

Font		Alignment	
=DATEDIF(C2,D2			
C	D	DATEDIF()	F
Date Started	Projected End Date	Projected Months	Current Month
8/14/2012	7/11/2013	=DATEDIF(C2,D2	
7/23/2012	4/16/2013		
8/22/2012	8/21/2013		

25. Type "m" including the quotations and press enter.

*When the function is run, it displays the months. This function does not round, so if someone worked 29 days, the function would say that they worked 0 months.*

Font		Alignment	
=DATEDIF(C2,D2,"m")			
D	E	F	
Projected End Date	Projected Months	Current Month	
7/11/2013	10		
4/16/2013	8		
8/21/2013	11		
8/6/2013	11		
2/25/2013	8		
5/7/2013	8		
3/21/2013	11		
7/10/2013	9		
6/4/2013	10		
10/4/2013	10		
10/17/2013	10		

Font		Alignment	
=DATEDIF(C2,D2,"m")			
B	C	D	E
Name	Date Started	Projected End Date	Projected Months
na	8/14/2012	7/11/2013	=DATEDIF(C2,D2,"m")
	7/23/2012	4/16/2013	
marie	8/22/2012	8/21/2013	



26. Fill in the rest of the table with this function.

First Name	Date Started	Projected End Date	Projected Months	Current Months
Deanna	8/14/2012	7/11/2013	10	
Carl	7/23/2012	4/16/2013	8	
Rosemarie	8/22/2012	8/21/2013	11	
Benjamin	8/16/2012	8/6/2013	11	
Evelyn	6/25/2012	2/25/2013	8	
Diana	8/9/2012	5/7/2013	8	
Danielle	4/19/2012	3/21/2013	11	
Steve	9/14/2012	7/10/2013	9	
Cary	7/12/2012	6/4/2013	10	
Jason	11/14/2012	10/4/2013	10	
Willie	11/20/2012	10/17/2013	10	
Robyn	2/1/2012	1/21/2013	11	
Belinda	10/1/2012	9/20/2013	11	
Kevin	7/12/2012	3/18/2013	8	
Muriel	10/15/2012	10/1/2013	11	
Stephanie	8/10/2012	5/9/2013	8	
Jeffrey	10/26/2012	8/30/2013	10	

27. Select F2.

We know want to display how many months have currently been worked. Since we don't want to update this function every time we open the file, we will use a function that always relies on the current date.

28. Type “=datedif(C2,today(), “m”)” and press enter on the keyboard.

Date Started	Projected End Date	Projected Months	Current Months
8/14/2012	7/11/2013	10	=datedif(C2,TODAY(),"m")
7/23/2012	4/16/2013	8	
8/22/2012	8/21/2013	11	
8/16/2012	8/6/2013	11	

The today function returns the current date, so in this formula, Excel is subtracting the date in C2 from today's date and displaying the number in months. This screenshot is from December 20<sup>th</sup>, 2012, so it makes sense that F2 is displaying a four with this formula.

Projected End Date	Projected Months	Current Months
7/11/2013	10	12
4/16/2013	8	
8/21/2013	11	

29. Copy this formula through the table.

Clipboard		Font		Alignment	
				=DATEDIF(C2,TODAY(),"m")	
B	C	D	E	F	G
First Name	Date Started	Projected End Date	Projected Months	Current Months	
Deanna	8/14/2012	7/11/2013	10	12	
Carl	7/23/2012	4/16/2013	8	12	
Rosemarie	8/22/2012	8/21/2013	11	11	
Benjamin	8/16/2012	8/6/2013	11	12	
Evelyn	6/25/2012	2/25/2013	8	13	
Diana	8/9/2012	5/7/2013	8	12	
Danielle	4/19/2012	3/21/2013	11	16	
Steve	9/14/2012	7/10/2013	9	11	
Cary	7/12/2012	6/4/2013	10	13	
Jason	11/14/2012	10/4/2013	10	9	
Willie	11/20/2012	10/17/2013	10	9	
Robyn	2/1/2012	1/21/2013	11	18	
Belinda	10/1/2012	9/20/2013	11	10	
Kevin	7/12/2012	3/18/2013	8	13	
Muriel	10/15/2012	10/1/2013	11	10	
Stephanie	8/10/2012	5/9/2013	8	12	
Jeffrey	10/26/2012	8/30/2013	10	9	
Carroll	3/23/2012	3/4/2013	11	16	
Cristina	2/8/2012	1/31/2013	11	18	
Ollie	1/23/2012	1/7/2013	11	18	
Kathy	9/25/2012	7/17/2013	9	10	

*If there are errors, it could be because the starting date is after the current date.. In this formula, it is important to keep to earliest date as the first argument.*

*We have just looked through some advanced features and formulas that are useable in Excel. With some of these formulas, specific types of data must be used. The next section covers how to ensure that data is entered in a specific way.*

## Data Validation

When multiple people are working on the same file, sometimes it is necessary for a cell to warn users that the data is not the correct type for that cell. Data validation allows you to designate a type of data for a cell. It also allows you to designate if Excel will block incorrect data or allow it and give a warning after the incorrect data has been entered. This can help keep forms neat by not allowing data which would cause errors in formulas.

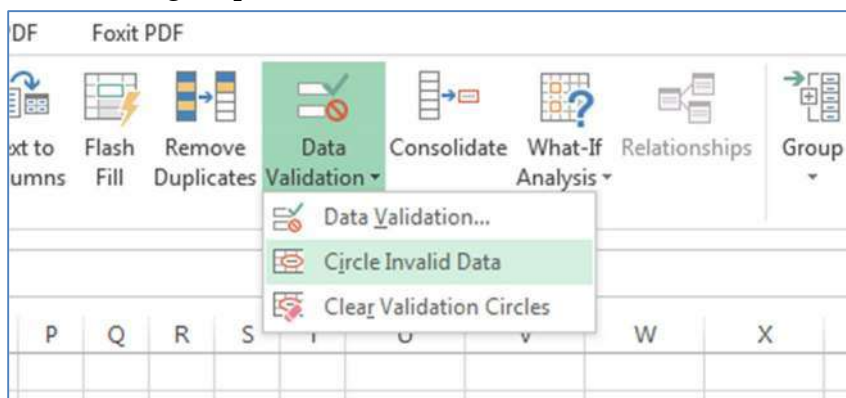
1. Open the Order\_Form.xlsx workbook.

*In the first sheet in this book, we have an order form. We want the data entered into this form to be both realistic and coherent. To make sure this is done, we will restrict the type of data that can be placed in each column.*

2. Select Column A.

*In this column, we want to ensure that the only data entered is text.*

3. Navigate to the Data tab and click the Arrow that says 'Data Validation' in the Data Tools group.



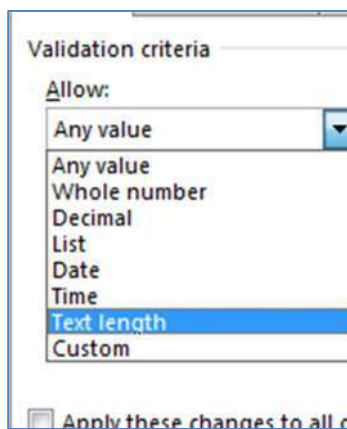
*Three options are shown here. In the next step, we will look at the first option labeled 'Data Validation...'. If a cell allows invalid data, using the 'Circle Invalid Data' allows you find that data easily, and 'Clear Validation Circles' clears the circles that have been placed around invalid data.*

4. Choose 'Data Validation...'

*A dialog box is displayed with three tabs. In the first tab, you can choose the type of data to be entered in that cell.*



5. In the section labeled 'Allow:', choose 'Text Length'.



6. In the section labeled 'Data:', choose 'less than'.

*We choose this option because we want the length to be less than 19 characters, but we are not concerned with the text length being too short.*

7. Specify the max length to 19 characters.



8. Navigate to the 'Input message' tab.

*This tab edits whether or not a message is displayed while one of the validated cells is active.*



9. In the title section, type "Last name, First name".

*This is so that users of this sheet know to put the name in with their last name first.*

10. In the message section, type "Names may be at most 19 characters in length."

*In some cases, names that are too long can cause problems such as when a name does not fit on a shipping label.*

11. Click on the Error Alert Tab.

*This designates whether or not a user can enter invalid data as well as whether they will receive a message or not.*



12. Under style, select 'stop'.

*This option will stop the user from saving invalid data in the sheet. They will also receive a message saying that they entered invalid data.*

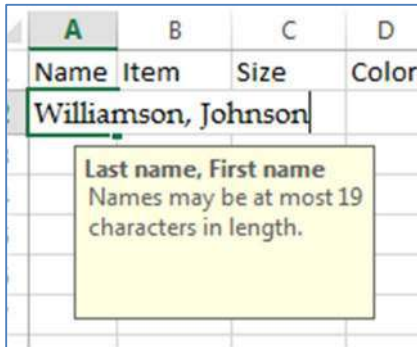
13. For the error message, type 'Names must be less than 19 characters.'

*Since the general message does not specify why the data was entered incorrectly, we want to tell users what kind of data should be entered.*

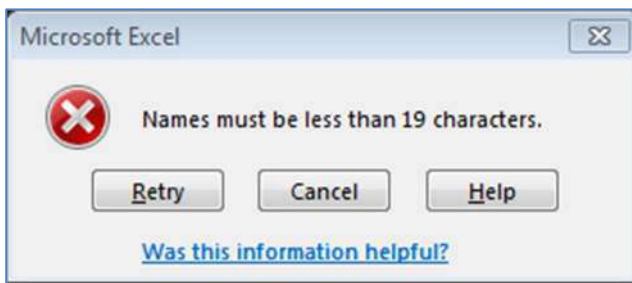
14. Click 'Ok' to save the data validation.



15. Click into cell A2, type “Williamson, Jonathan” and press enter.



*Notice the input message is displayed here. This name is longer than 19 characters, so we will get an error message when we navigate away from this cell.*



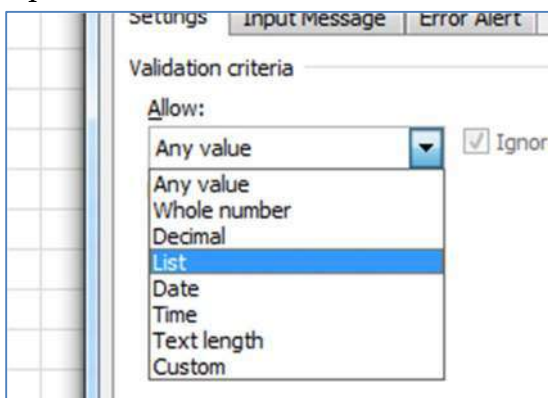
16. Press Cancel to delete this name.

*If more control is needed, user's data validation can cause anyone who edits this cell to select from a list of possible entries.*

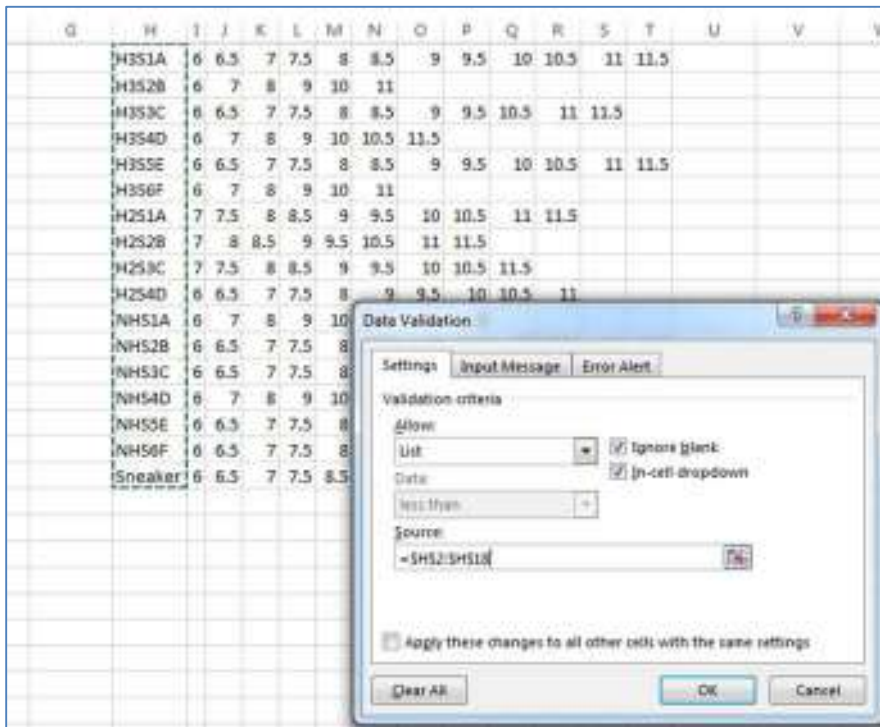
17. Select Column B.

*We want to make sure any data in this column is from the list in column G.*

18. Open the Data Validation menu and choose 'List' in the allow section.



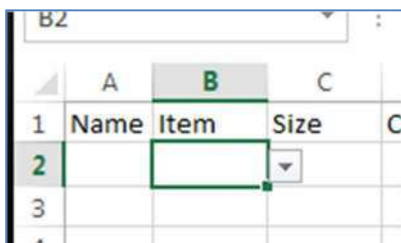
19. Choose cells G2:G18 for the source of the list.



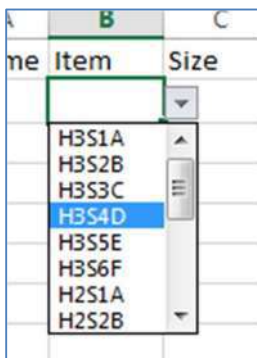
*Notice the absolute referencing in the source field. If this data was moved anywhere in this workbook, the list in column B would remain the same; however, the list cannot be removed from the sheet.*

20. Click Ok and click into cell B2.

*Notice there is now a dropdown arrow next to this cell.*



21. Click on the dropdown arrow and choose one of the items.





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22. Fill in a few more cells in column B.

*For the next column, we want the list to be dependent on the data in the item column.*

*Notice to the right of each item in column G is a list of sizes. Each item has a different list of sizes, so we are going to use a name range to create a list which will be dependent on the previous selection in the form.*

H3S1A	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
H3S2B	6	7	8	9	10	11						
H3S3C	6	6.5	7	7.5	8	8.5	9	9.5	10.5	11	11.5	
H3S4D	6	7	8	9	10	10.5	11.5					
H3S5E	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
H3S6F	6	7	8	9	10	11						
H2S1A	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5		
H2S2B	7	8	8.5	9	9.5	10.5	11	11.5				
H2S3C	7	7.5	8	8.5	9	9.5	10	10.5	11.5			
H2S4D	6	6.5	7	7.5	8	9	9.5	10	10.5	11		
NHS1A	6	7	8	9	10	10.5	11	11.5				
NHS2B	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
NHS3C	6	6.5	7	7.5	8	8.5	9	9.5	10.5	11.5		
NHS4D	6	7	8	9	10	10.5	11					
NHS5E	6	6.5	7	7.5	8	8.5	9	9.5	10.5	11.5		
NHS6F	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
Sneaker	6	6.5	7	7.5	8.5	9	9.5	11				

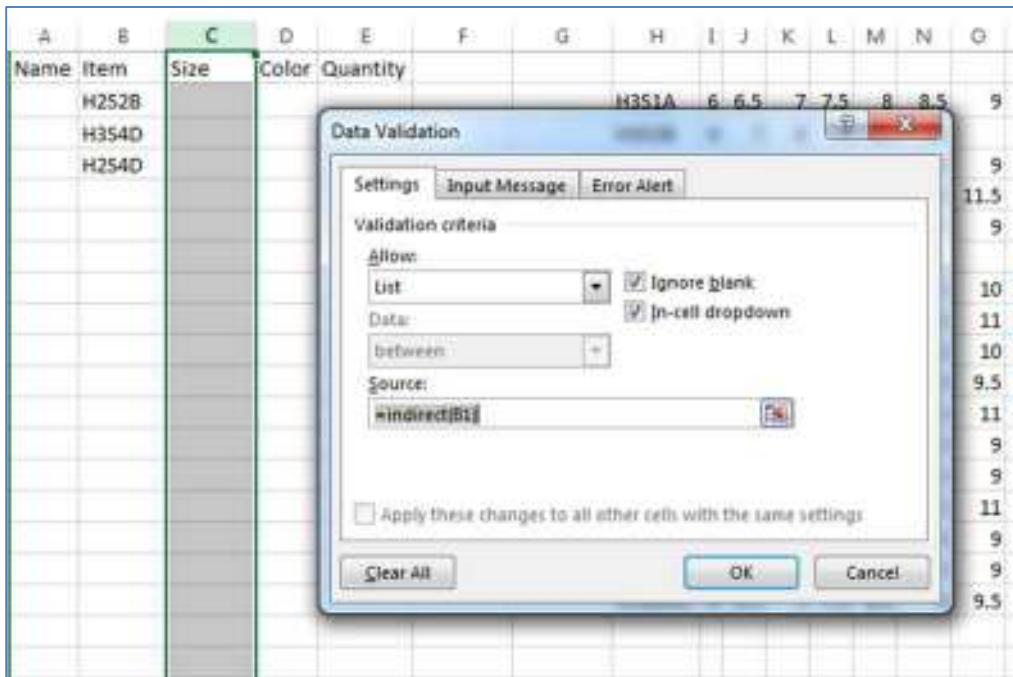
23. Select column C.

24. Open the Data Validation window and select list.

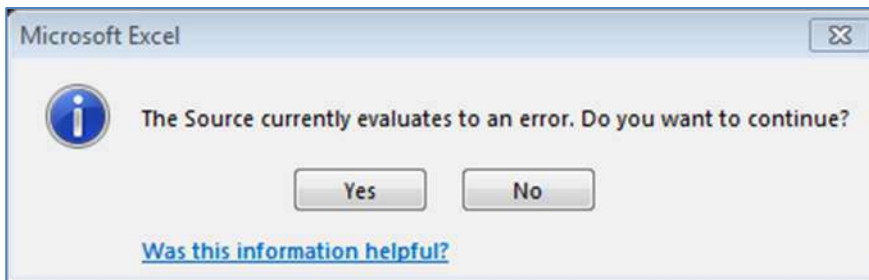
*We won't actually be choosing a list, but we will be entering a formula to tell excel where to find the name of the list.*

25. Type “=indirect(B1)”.

*Since C1 is the active cell, this tells Excel to look to the cell to the left for the name of the list.*



26. Click 'Ok'.



*An error message is shown asking if we want to proceed.*

27. Click 'Yes'.

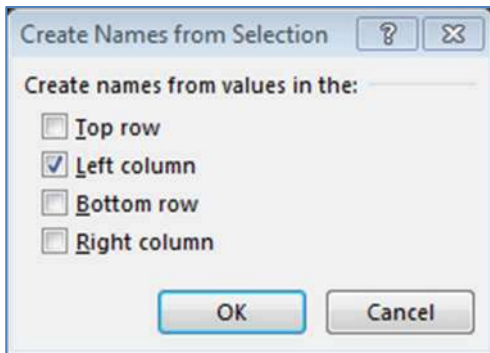
28. Click on the dropdown arrow next to cell C1.

*At this point, we have not named the ranges that our list will come from, so there are no entries in our list and nothing happens.*

29. Select Cells H2:T18.

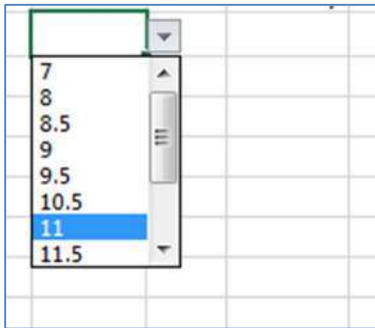
H3S1A	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
H3S2B	6	7	8	9	10	11						
H3S3C	6	6.5	7	7.5	8	8.5	9	9.5	10.5	11	11.5	
H3S4D	6	7	8	9	10	10.5	11.5					
H3S5E	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
H3S6F	6	7	8	9	10	11						
H2S1A	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5		
H2S2B	7	8	8.5	9	9.5	10.5	11	11.5				
H2S3C	7	7.5	8	8.5	9	9.5	10	10.5	11.5			
H2S4D	6	6.5	7	7.5	8	9	9.5	10	10.5	11		
NHS1A	6	7	8	9	10	10.5	11	11.5				
NHS2B	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
NHS3C	6	6.5	7	7.5	8	8.5	9	9.5	10.5	11.5		
NHS4D	6	7	8	9	10	10.5	11					
NHS5E	6	6.5	7	7.5	8	8.5	9	9.5	10.5	11.5		
NHS6F	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
Sneaker	6	6.5	7	7.5	8.5	9	9.5	11				

30. From this selection, define the range name based on the values in the left row.



*As we did before with range names, we are defining a list by the name to the left of the range.*

31. Click on the drop down list in cell C2.

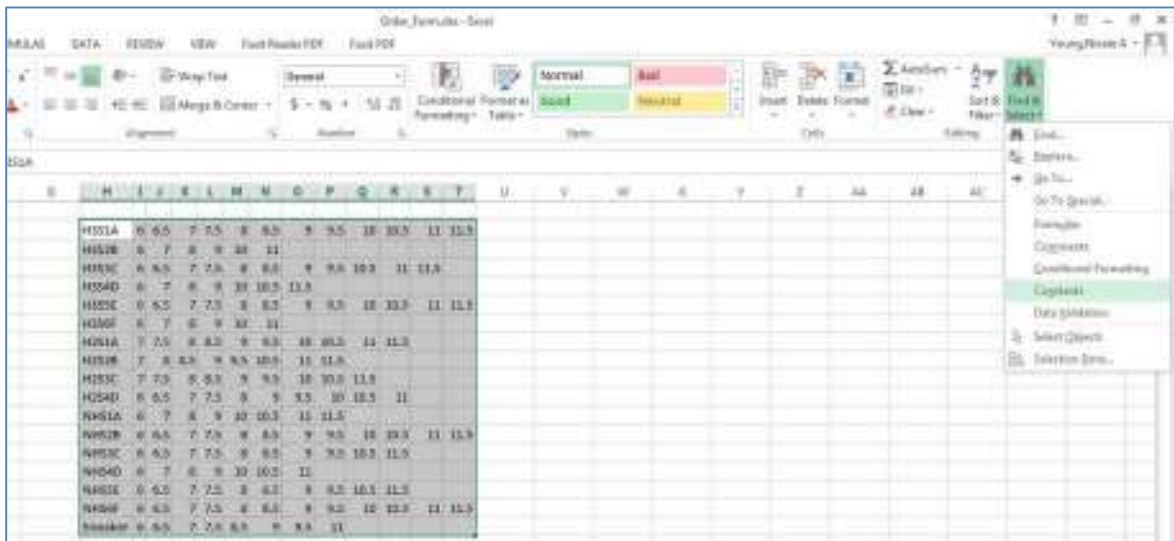


*Since we have defined a list to each name in column B, there are now options in the drop down list in column C. For most of these lists, there are blank entries, and the actual options cannot be seen without scrolling through the list. This is because with our set of data, there were blank entries in the rows. We can fix this by simply deleting the blank cells in our named ranges.*

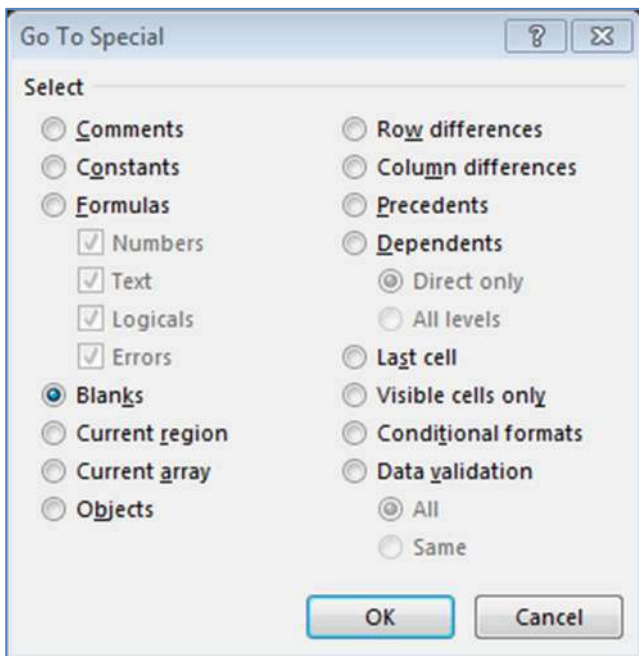
32. Select cells H2:T18.

*We will be using a search function, but we only want to search within this range of data.*

33. Navigate to the editing group on the Home tab and choose Find and select.



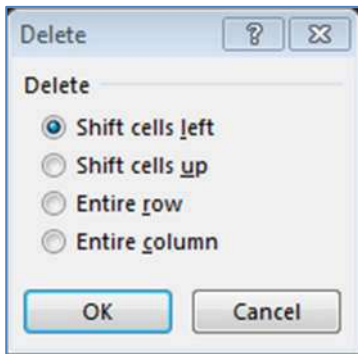
34. Choose Go To special..., select blanks, and click 'Ok'.



*This selects all of the blank cells in our selected range. With these cells selected, we can now delete them.*

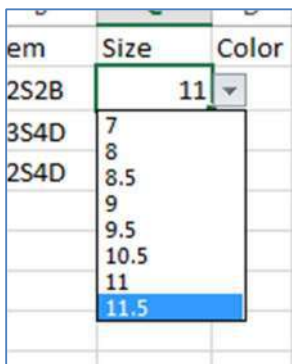
H3S1A	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	
H3S2B	6	7	8	9	10	11							
H3S3C	6	6.5	7	7.5	8	8.5	9	9.5	10.5	11	11.5		
H3S4D	6	7	8	9	10	10.5	11.5						
H3S5E	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	
H3S6F	6	7	8	9	10	11							
H2S1A	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5			
H2S2B	7	8	8.5	9	9.5	10.5	11	11.5					
H2S3C	7	7.5	8	8.5	9	9.5	10	10.5	11.5				
H2S4D	6	6.5	7	7.5	8	9	9.5	10	10.5	11			
NHS1A	6	7	8	9	10	10.5	11	11.5					
NHS2B	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	
NHS3C	6	6.5	7	7.5	8	8.5	9	9.5	10.5	11.5			
NHS4D	6	7	8	9	10	10.5	11						
NHS5E	6	6.5	7	7.5	8	8.5	9	9.5	10.5	11.5			
NHS6F	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	
Sneaker	6	6.5	7	7.5	8.5	9	9.5	11					

35. Now right click on a selected cell, choose delete, and shift cells left.



*Nothing actually changed on the sheet, but the blank cells are now removed from our named ranges. The ranges could have been made without having the blank cells; however, that would have involved selecting each row and naming the ranges individually. There should no longer be blank cells available to be selected in column.*

36. Click the dropdown arrow in cell C2 to check for blank entries.



*Because we do not want our lists to be on the same page as our order form, we can move it to another sheet.*

37. Select cells G2:T18 and press ctrl + x on the keyboard.

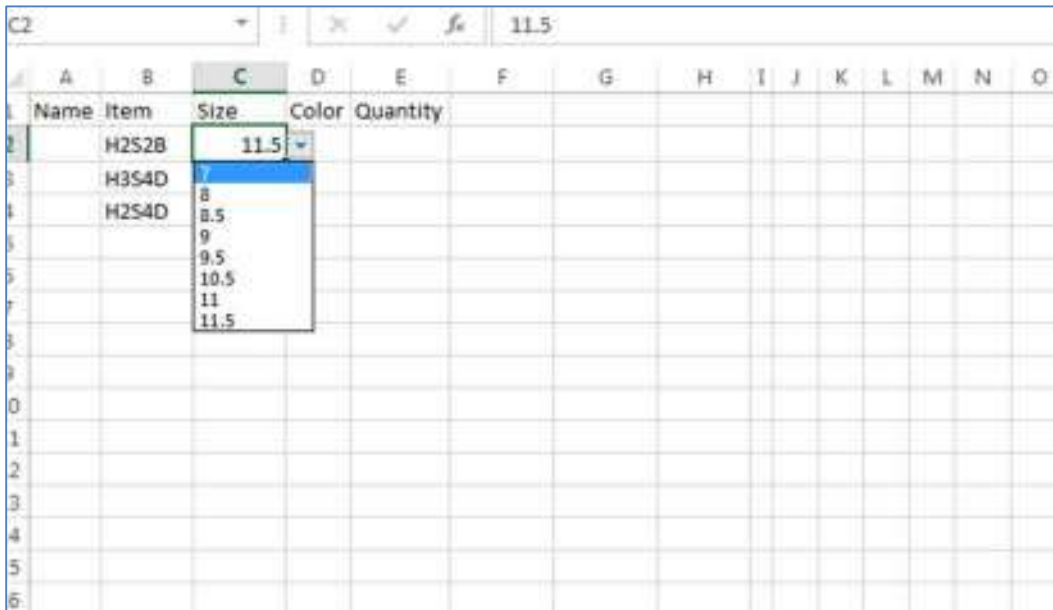
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	Name	Item	Size	Color	Quantity															
2		H2S2B	11.5					H3S1A	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
3		H3S4D						H3S2B	6	7	8	9	10	11						
4		H2S4D						H3S3C	6	6.5	7	7.5	8	8.5	9	9.5	10.5	11	11.5	
5								H3S4D	6	7	8	9	10	10.5	11.5					
6								H3S5E	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
7								H3S6F	6	7	8	9	10	11						
8								H2S1A	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5		
9								H2S2B	7	8	8.5	9	9.5	10.5	11	11.5				
10								H2S3C	7	7.5	8	8.5	9	9.5	10	10.5	11.5			
11								H2S4D	6	6.5	7	7.5	8	9	9.5	10	10.5	11		
12								NHS1A	6	7	8	9	10	10.5	11	11.5				
13								NHS2B	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
14								NHS3C	6	6.5	7	7.5	8	8.5	9	9.5	10.5	11.5		
15								NHS4D	6	7	8	9	10	10.5	11					
16								NHS5E	6	6.5	7	7.5	8	8.5	9	9.5	10.5	11.5		
17								NHS6F	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
18								Sneaker	6	6.5	7	7.5	8.5	9	9.5	11				

38. Click on sheet 2 and select cell A1.

39. Press ctrl + v on the keyboard.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	H3S1A	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
2	H3S2B	6	7	8	9	10	11						
3	H3S3C	6	6.5	7	7.5	8	8.5	9	9.5	10.5	11	11.5	
4	H3S4D	6	7	8	9	10	10.5	11.5					
5	H3S5E	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
6	H3S6F	6	7	8	9	10	11						
7	H2S1A	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5		
8	H2S2B	7	8	8.5	9	9.5	10.5	11	11.5				
9	H2S3C	7	7.5	8	8.5	9	9.5	10	10.5	11.5			
10	H2S4D	6	6.5	7	7.5	8	9	9.5	10	10.5	11		
11	NHS1A	6	7	8	9	10	10.5	11	11.5				
12	NHS2B	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
13	NHS3C	6	6.5	7	7.5	8	8.5	9	9.5	10.5	11.5		
14	NHS4D	6	7	8	9	10	10.5	11					
15	NHS5E	6	6.5	7	7.5	8	8.5	9	9.5	10.5	11.5		
16	NHS6F	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5
17	Sneaker	6	6.5	7	7.5	8.5	9	9.5	11				

40. Return to sheet one and test some cells in columns C and B to check the data validation.

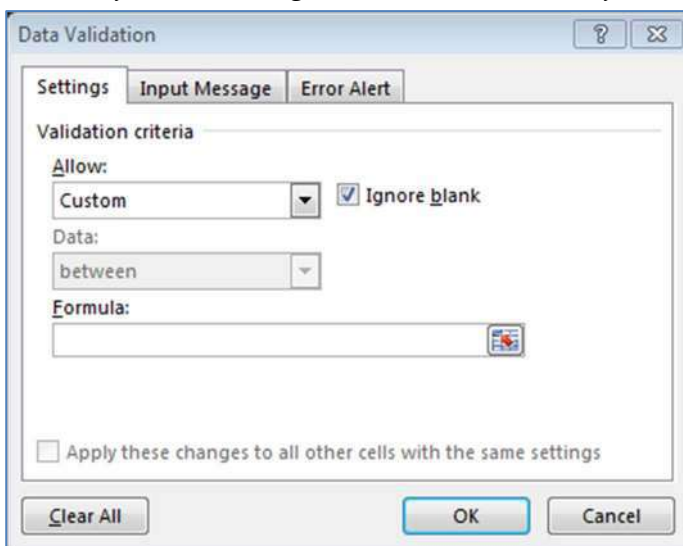


*Another useful data restriction is the ability to use formulas to validate data. In our order form we do not want the ability for the order date to be before the current date. We will setup a formula using the TODAY() function in the data validation window.*

41. Select column F and open the data validation window.

42. In the allow section, choose custom.

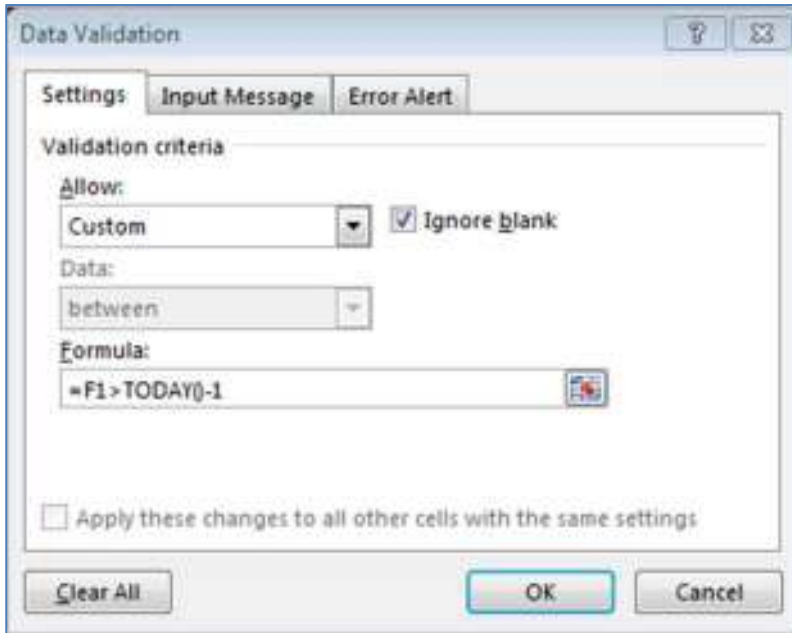
*If a time range restriction was required, or if the date was not dependent on the current date, the date option could be chosen here. Since the date that we want information entered after will change, we will have to use a formula.*





43. In the formula section type “=F1>TODAY()-1”.

*This is telling Excel that the date in D1 must be greater than the current date minus one day. This way, we allow users to enter today's date in addition to any date after today.*



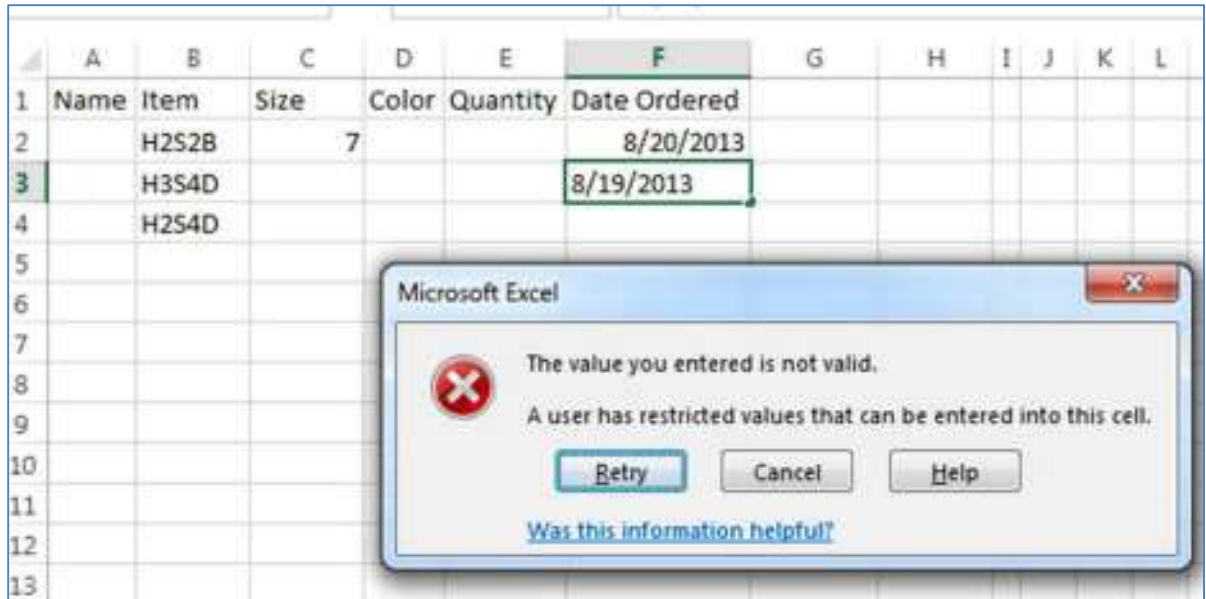
44. Press ok and try to enter today's date in the cell F2.

*Since the current date is included, we do not get an error for this data.*

Get External Data						Connections	
From Access		From Web	From Text Sources	From Other Sources	Existing Connections	Refresh All	Edit Links
F2		: X ✓ fx		8/20/2013			
A	B	C	D	E	F	G	
Name	Item	Size	Color	Quantity	Date Ordered		
	H2S2B	7			8/20/2013		
	H3S4D						
	H2S4D						

45. In cell F3 try to enter yesterday's date.

*Since yesterday's date is not greater than the current date minus one day, Excel returns an error. Now, if today's date was entered and the document was reopened another day, we would not receive an error unless the cell was edited. This is because data validation only returns errors on data that is entered.*



*As we have just seen, when it is important that data follow certain rules in a worksheet, data validation can ensure that this happens.*

## Conclusion

This lesson went over many of the advanced features in Excel. We started with time-saving interface customization features which included the ability to add a tab in the ribbon, customize the status bar, navigate in multiple files simultaneously using multiple windows, and use static columns or rows. We then looked at how referencing across sheets. This lead to advanced formatting features which were creating custom lists, using groups to format over multiple worksheets and transposing tables. The advanced formulas section explored different formula tools as well as the use of range names in formulas. We used some of these tools and range names to create various advanced functions. Last we looked at how Excel allows us to block incorrect data using data validation. With this information, you can now use Excel efficiently and confidently.

For additional information regarding Excel, including live videos, consult [Lynda.com](http://Lynda.com) which is free to all University of Florida students and staff.

# Advanced Excel Activity

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This activity is here to allow you to practice the features we have discussed in this lesson. It will require you to populate new data into sheets, so you can use random number generators to get that data.

Using the Units\_per\_Customer.xlsx exercise use what you have learned in this lesson to complete the following tasks:

- Create a new tab and place it between the Insert and page layout tabs.
  - Create two groups and place 3 tools in each group
- Save a workspace that displays sheet 1 and sheet 2 side by side
- In sheet 2, reference a cell with data from sheet 1
- Create a custom list from 10 of the last names in column A

Create a new worksheet to complete the following tasks:

- Format 5 sheets to have a table with a name column.
- Populate your custom name list into the name column
- Create the data and use a lookup and if function.
- Using the today function, place the current date in a cell
- Apply data validation to three of your columns.