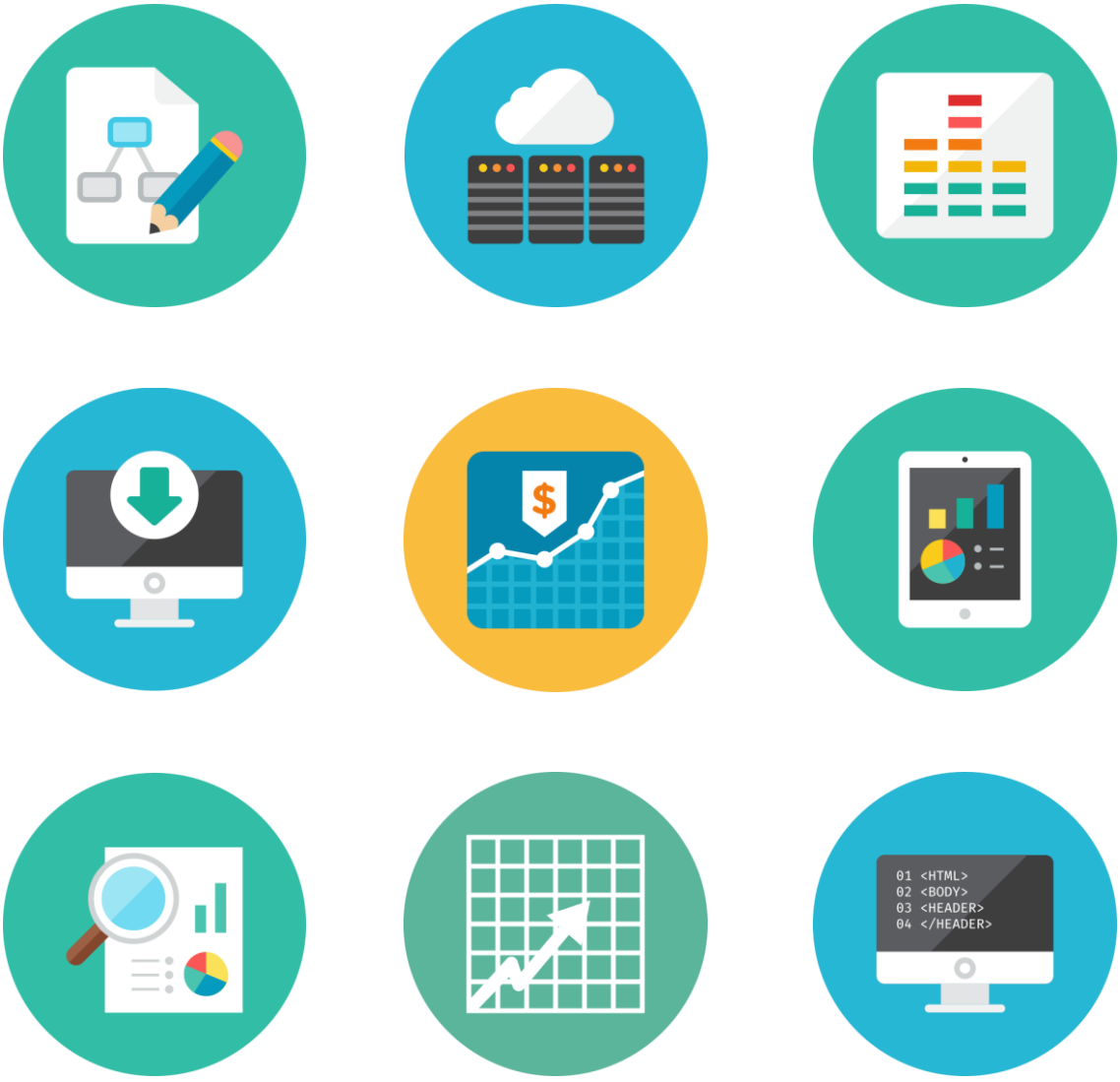
Wisdify

Microsoft Excel® for the Real World



Coughran | Coughran

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WEEK 1: EXCEL OVERVIEW & FORMATTING

Introduction to the Excel interface and structure

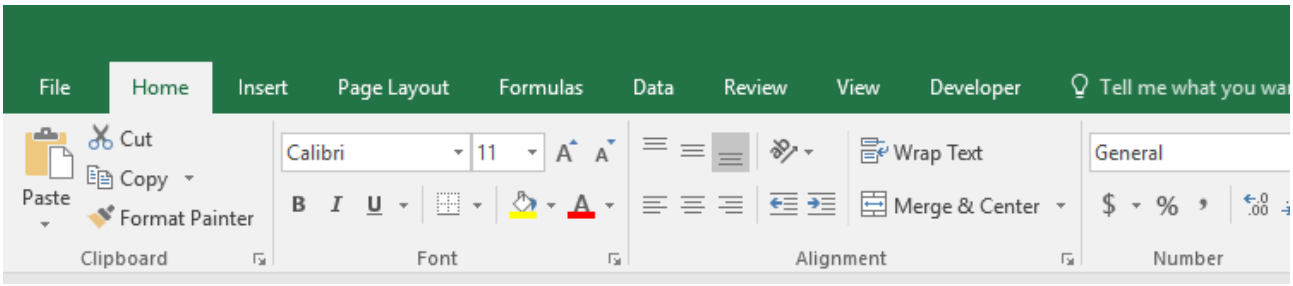
Excel Interface & Structure

The Excel workbook navigation is made up of the following components:

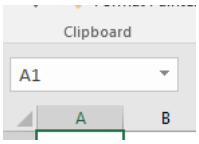
1. ***File –*** When clicked, this button opens the new **Backstage View** where you can access options including **New**, **Save As**, **Print**, and the **Excel Options** button (which enables you to change Excel's default settings).

2. ***Quick Access Toolbar –*** The **Quick Access Toolbar** is used for common tasks. The default actions are the **Save**, **Undo**, and **Redo** buttons. You can customize this tool bar, which is discussed later.

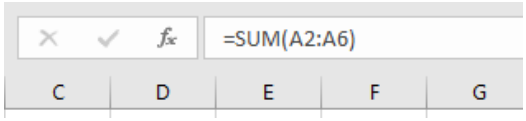
3. ***Ribbon –*** The majority of Excel's commands are located in the **Ribbon**. The Ribbon is arranged into a series of tabs.



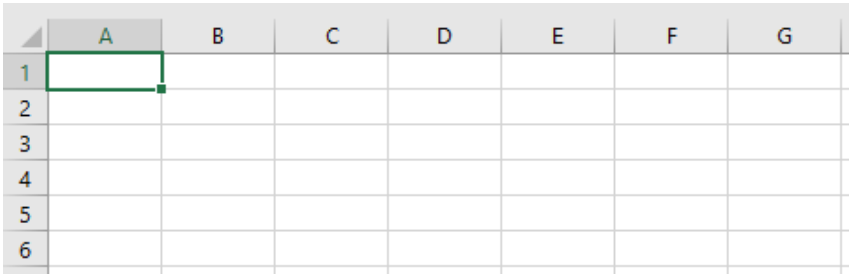
4. ***Name Box –*** This displays the address of the current selected cell or if you have a named range, the name of that range.



5. ***Formula Bar –*** This displays the formula or contents of the currently selected cell.

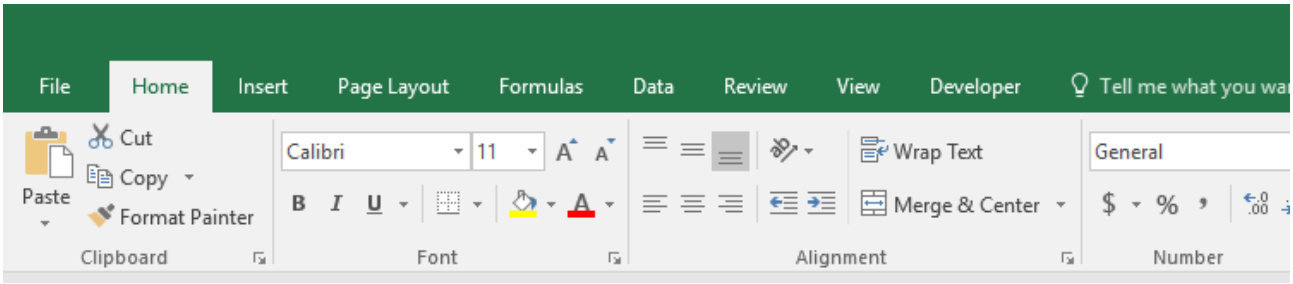


6. ***Rows, Columns & Cells –*** Rows are number on the left-hand side and columns are lettered on the top. These rows and columns are shown as grid lines on your spreadsheet (these gridlines can be removed by going to the View tab and then unchecking the Gridlines box).



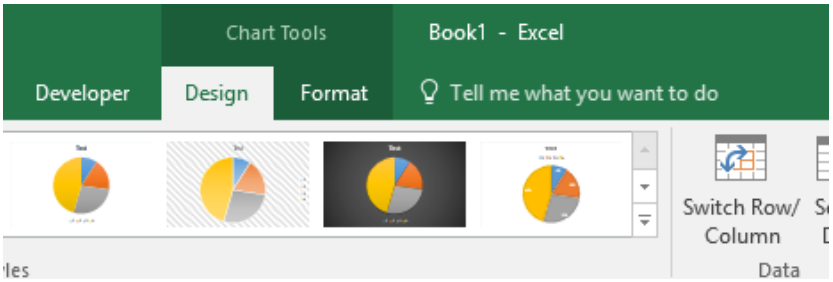
7. ***Status Bar –*** The bar at the lower right-hand corner of the workbook allows you to select a new worksheet view and to zoom in and out on the worksheet.

The Ribbon



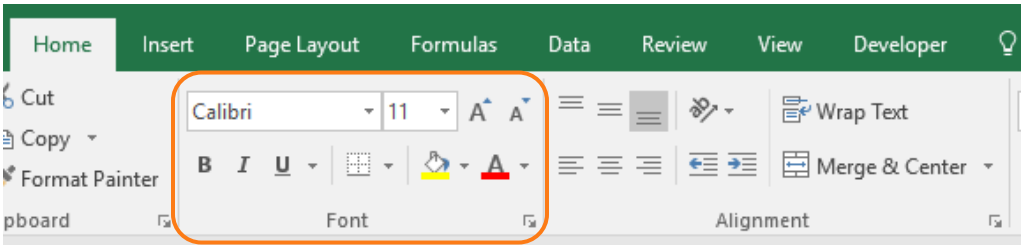
The Ribbon is made up of the following components:

- ***Home:*** Used to format your spreadsheet and sort/filter your data.
- ***Insert:*** Used to add charts, PivotTables, shapes, and pictures to a spreadsheet.
- ***Page Layout:*** Used to prepare your spreadsheet for printing.
- ***Formulas:*** Used to insert formulas (although this is a very ineffective method), check your worksheet for formula errors, and manage named ranges.
- ***Data*****:** Used to import and group your data, create dropdown lists, and to analyze different scenarios utilizing Data Tables and Goal Seek.
- ***Review:*** Used to proof, protect, and marking-up your spreadsheet.
- ***View:*** Used to change the display of the worksheet area.
- ***Developer:*** This is not a default tab but can be activated on the File tab. This is used when creating or editing macros.
- ***Additional Tabs***: If you are working with a chart, PivotTable or other object, additional tabs will appear to modify that particular object.



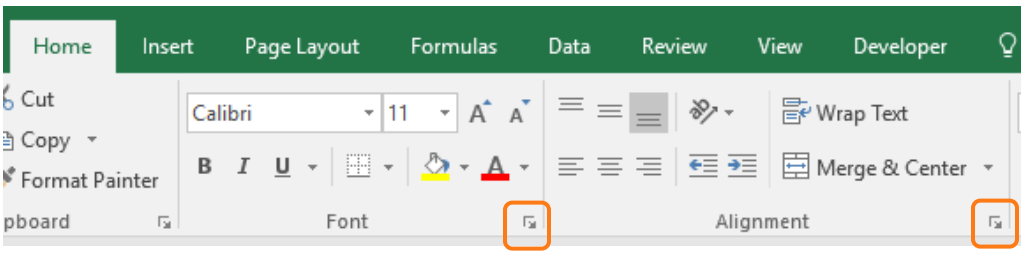
Groups

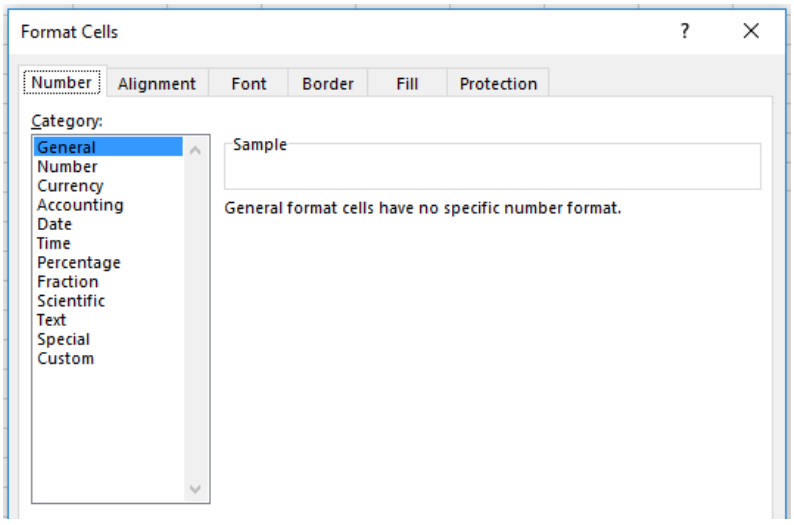
Each tab contains a plethora of functions and tools. These items are organized into groups. For example, on the Home tab, the Font group contains the tools to modify the text of a cell.



Dialog Box launcher

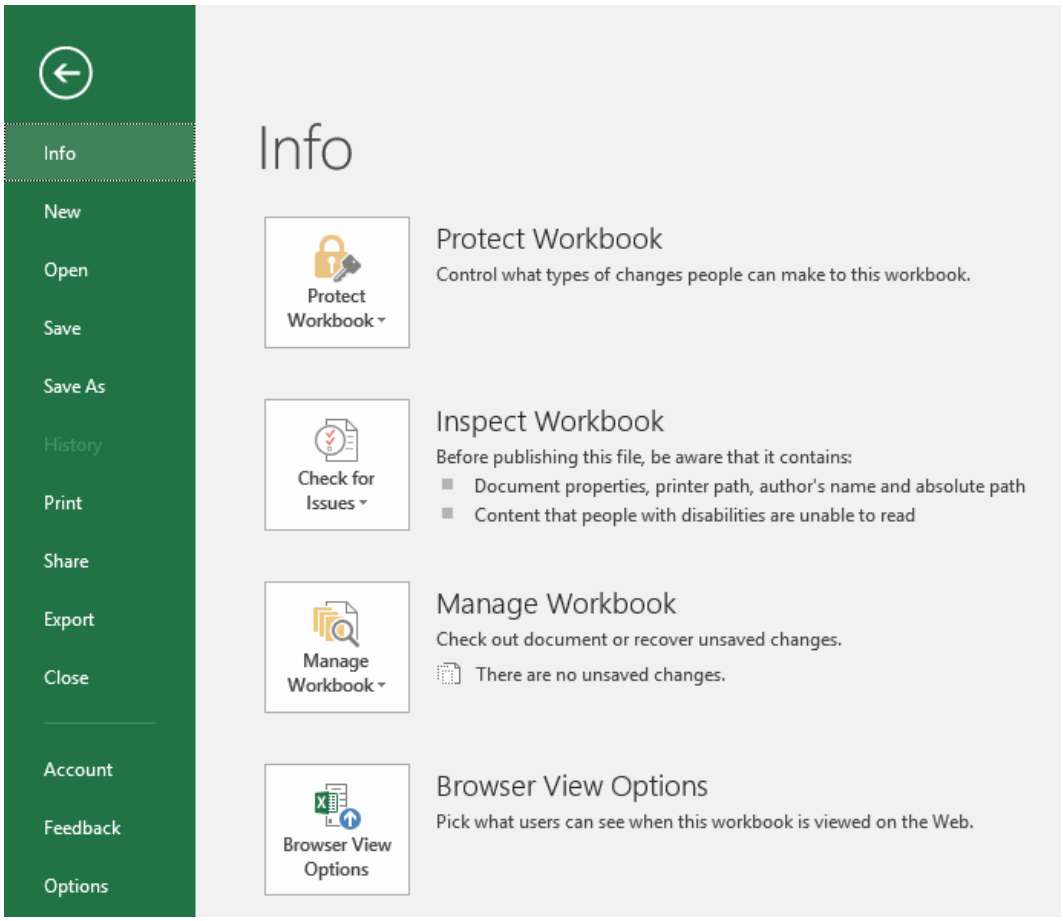
This button is located in the lower-right corner of the Font, Alignment, and Number groups on the Home tab opens a **Format Cells** dialog box that contains many more ways to format your cells. However, the preferred method to activate the Format Cells dialog box is to use the keyboard shortcut **Ctrl + 1**.





Components of the Backstage View

When you click the **File** button, the **Backstage View** appears. The screen contains a menu of file-related options running down a column on the left side.



- ***Info:*** Shows you the high-level information about the spreadsheet and create workbook protections. By default, your spreadsheet will allow anyone to open, copy, and change it.
- ***New:*** Create a new, blank workbook or open one of many pre-made templates.
- ***Open:*** Quickly view and open recently used Excel files.
- ***Save:*** Save your workbook. However, you should never save your workbook via this method. You should always use the keyboard shortcut **Ctrl + S**.
- ***Save As:*** By default, your workbook will save as an Excel Workbook (Excel 2007-2016). You can also save your workbook as an Excel 2003 workbook or as a PDF. Note that a file saved as an Excel Workbook (Excel 2007-2016) will not open if a person has Excel 2003. However, the opposite is not true. Excel 2007-2016 can open an Excel workbook created in 2003.
- ***Print:*** All of the print settings are located in this tab. You can further modify the print ranges and page view in the Page Layout tab on the Ribbon.
- ***Share*:** Email the workbook you are currently working on to a co-worker or create a PDF of the workbook.

- ***Options:*** Modify the default settings in Excel, such as the Ribbon or the Quick Access Toolbar, on this menu.

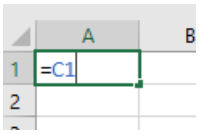
To exit out of the **Backstage View**, simply press the **Esc** key to get back to your workbook.

Entering and editing formulas and text

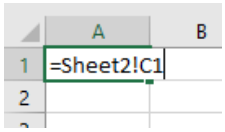
Working with cell references

If you want to reference another cell as part of a formula or to just pull in that cell's contents, simply hit the equal key "=" and then select the cell you want to reference. You can either select a cell on the same worksheet, different worksheet, or an entirely different workbook. Where that cell is located will determine how the cell reference looks in your formula.

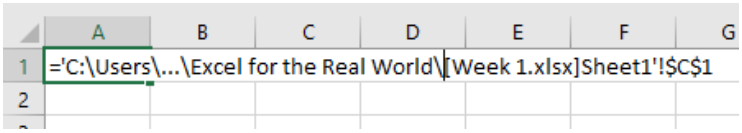
- Within the same worksheet:



- On a different worksheet (notice that the sheet name is referenced first, then an exclamation point "!", and finally the cell reference on the other sheet:



- Within a different workbook (notice that the workbook location is referenced first, then the workbook name, then the worksheet name, and finally the cell reference:



Basic Operators

The four basic operators are: **Addition**, **Subtraction**, **Division**, and **Multiplication**. The operators in excel are as follows:

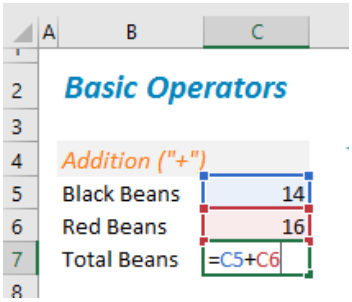
Addition: +

Subtraction: -

Multiplication: * *(Shift + 8)*

Division: /

To use an operator, simply type in the equal sign (which is how we start all formulas), select the cell you want to include in the formula, add the operator, and then select the cell you want to also include in the formula. Here is an example:



Order of Operations

Just like in math, order of operations is essential when you are building out your formulas. The same order of operations that you learned in high school, still apply to Excel. Excel will always run through a formula based on this order:

1. Parentheses
2. Exponents
3. Multiplication / Division
4. Addition / Subtraction

An easy way to remember this is "**P**lease **E**xcuse **M**y **D**ear **A**unt **S**allie". The easiest way to ensure the proper order of operations is the use parentheses. Parentheses will be your best friend as you work through complicated formulas.

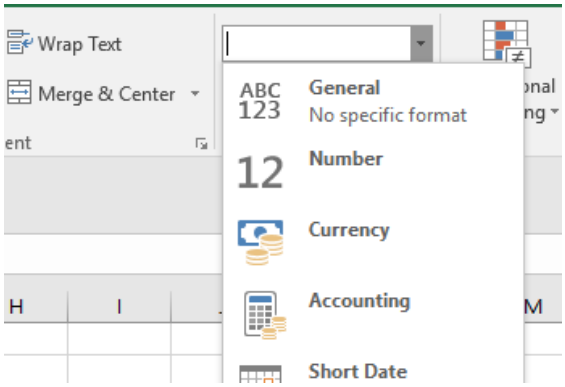
Formatting Data

Formatting Numbers

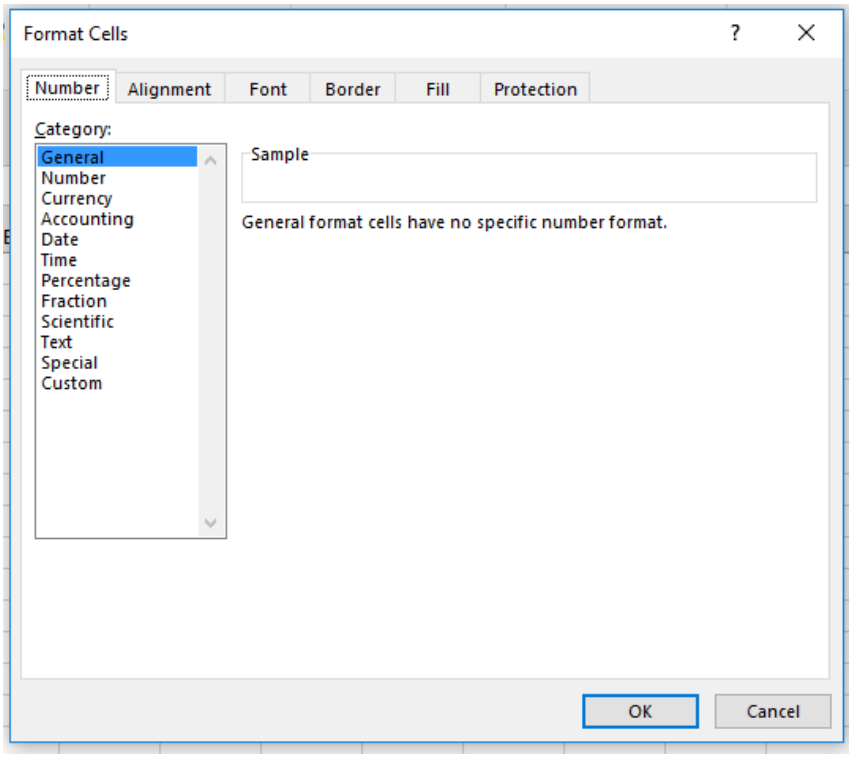
There are various ways to format numbers in Excel. The default is the General number format. This format drops any formatting, including adding commas to separate your numbers.

To change the number format, go to the Home tab and select either:

1. The drop-down list under the Number group to choose your desired format from the list



2. The Dialog Box Launcher under the Number group. We recommend option #2 as this provides more options to customize your number. We also recommend using the keyboard shortcut **Ctrl + 1** to access this same option box.

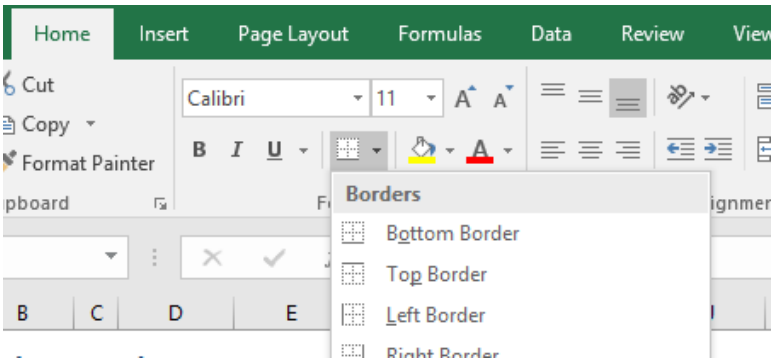


The most useful formats are:

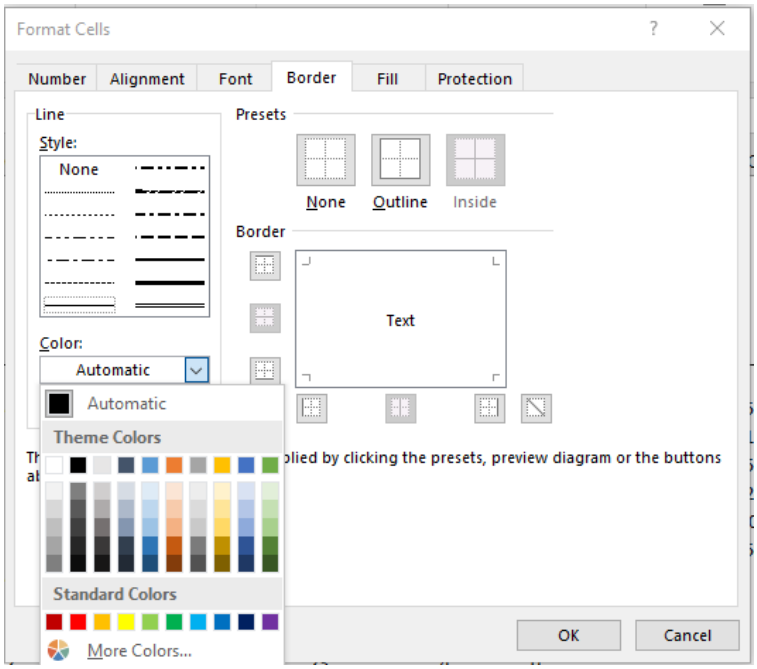
- **General:** Default Excel format
- **Number:** Creates a number with or without decimals and commas separating 1,000's
- **Currency:** Creates a number with a currency symbol which can be changed. You can also select the number of decimal places.
- **Date:** Formats the date to a wide range of options showing a combination of day, month and year.
- **Percentage:** Shows numbers with a "%" symbol and a specified number of decimal places.

Applying Borders

To add/remove borders, use the Border button in the Font section on the Home tab in the Font group. From there you can quickly change the border settings of selected cells.

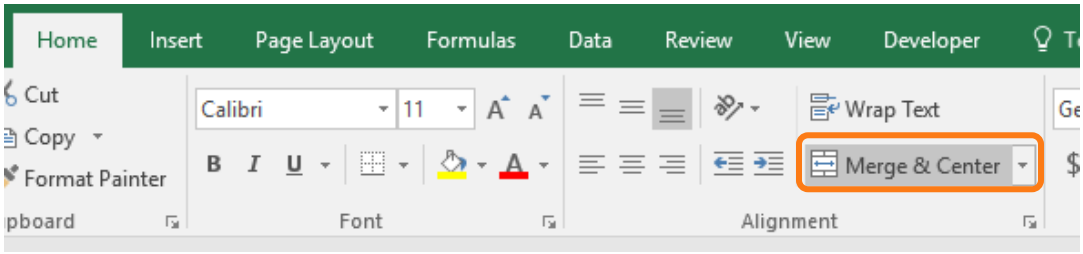


For a more customized border, activate the Format Cells dialog box by hitting **Ctrl + 1**. On the Border tab, you can select borders with various weights, patterns and colors.

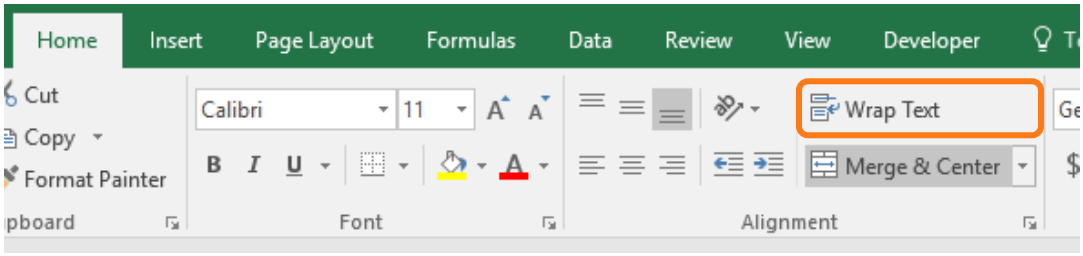


Merging Cells, Wrapping Text, and Auto Fit

You can merge cells using **Merge & Center**. This merges your cell selection into a single cell and then centers the combined entry in the first cell between its new left and right borders. To do this, select multiple cells and then click the Merge button under the Alignment section on the Home tab.



If you have more text than can fit in the width of the column, you can wrap the text so that it goes onto multiple lines. To do so, select the cell you want to wrap and click Wrap Text under the Alignment section on the Home tab).

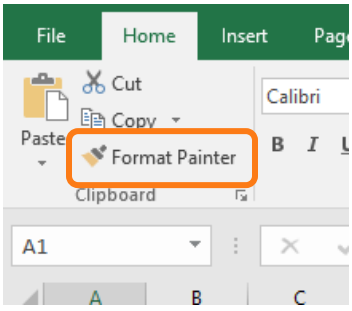


When the value in the cell is longer than the width, Excel puts ##### to indicate you need to increase the column size. You can automatically auto fit all of your columns by selecting them and hovering your mouse pointer to a column intersection. Your pointer should change to a line with two arrows. Now double click. Done!

Format Painter

Format Painter allows you to quickly copy the formatting from one cell to another. The icon is found on the Home tab on the left-hand side. To use it, first select the cell (or range of cells) that contains the formatting you want to copy and click the Format Painter button. Now select the cells to which you want the formatting to apply.

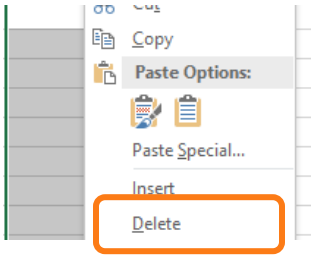
The faster way to use Format Painter is utilizing keyboard shortcuts. The keyboard shortcut is **Alt + H + F + P**. After the formatting is copied, you can apply the formatting using the method above.



Modifying Rows and Columns

Add a Row / Column

To add a row, right click on the row directly below where you want the new row to be inserted and choose **Insert**. To insert a new column, right click on the column directly to the right of where you want the new column to be inserted. Again, right click and select Insert.



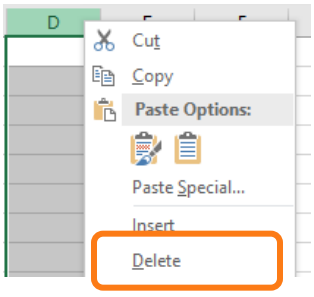
To add multiple rows or columns, select the number of rows/columns you want to insert and then right click and select **Insert**. The number of rows / columns you have selected will be inserted.

The preferred method to insert a row or column is using keyboard shortcuts. To insert a row, hit **Shift + Space Bar**, this selects an entire row. Now hit **Ctrl + Shift + "+="**.

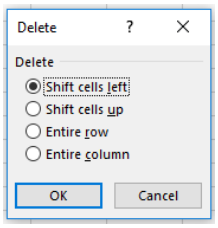
To insert a column, hit **Ctrl + Space Bar**, this selects an entire column. Now hit **Ctrl + Shift + "+="**.

Delete a Row / Column

To delete rows or columns, select the rows / columns you would like deleted, right click, and then select **Delete**.



If you only want to delete one cell, or range of cells, select the cell(s) you want to delete, right click, and select **Delete**. A prompt will come up asking you how you want to shift that data. Just be careful! Deleting or inserting cells this way may affect the rest of the data.



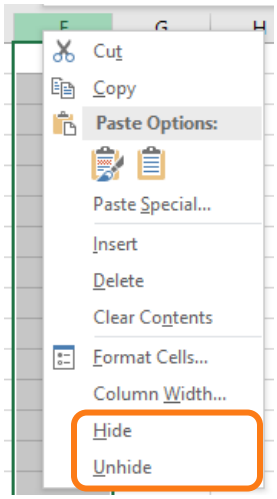
When you insert a column or row, Excel automatically adjusts the cell references in the formulas. However, if you delete data that is being referenced elsewhere in the workbook, that cell will come up with a #REF error and will need to be relinked in order to work again.

The preferred method to delete a row or column is using keyboard shortcuts. To delete a row, hit **Shift + Space Bar**, this selects an entire row. Now hit **Ctrl + "-"**.

To delete a row, hit **Ctrl + Space Bar**, this selects an entire column. Now hit **Ctrl + "-"**.

Hide a Row / Column

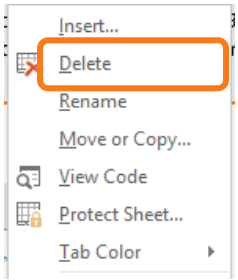
If you want to hide rows or columns so that they don't appear (but aren't deleted), select the rows or columns that you want hidden, right click and select **Hide**. To unhide them, select the rows/columns above and below the hidden rows/columns, right click and select **Unhide**.



Modifying Worksheets

Add or Delete a Sheet

To completely delete a sheet, right click on the name of the worksheet you want to delete and choose Delete. Note that this is permanent and cannot be undone. Therefore, we recommend that before you delete a sheet, you save your workbook. If you want to get your workbook back, just exit your workbook *without* saving and open it again.



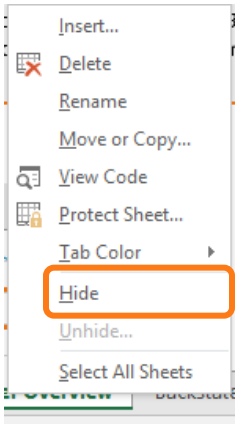
Insert a New Sheet

To insert a new worksheet, right click on any of the tab names and select **Insert**.

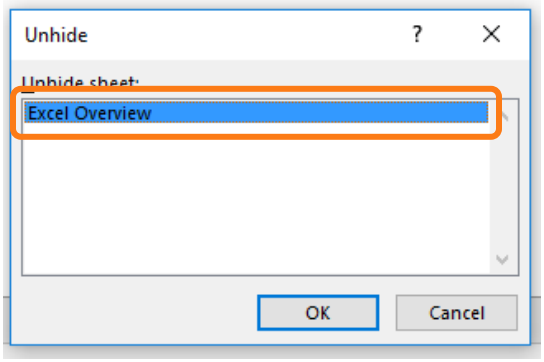
You can also click on the plus "+" button next to the horizontal scroll bar.

Hide/Unhide Sheets

You can choose to show only certain sheets in your workbook. To hide a sheet, simply right click on the sheet and select **Hide**.

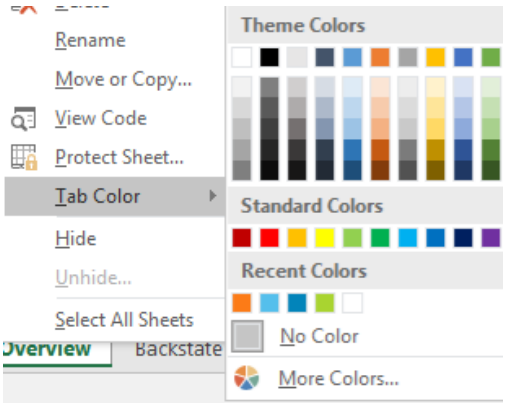


You can Unhide this sheet by right clicking on any sheets and selecting **Unhide**. After you select Unhide, a dialog box will appear. Click the sheet you want to unhide and click **OK**.



Rename or Color a Sheet

To rename a sheet, double-click on the sheet tab and then rename it. To change the color, right click on the sheet, select **Tab Color**, and then select the desired color. When coloring your sheet, don't just create the rainbow of colors. Make sure the coloring means something.



WEEK 2: BASIC FORMULAS & KEYBOARD SHORTCUTS

Basic Excel Functions

SUM

The **SUM** formula does exactly what it says, it sums the contents of a range of cells. To use SUM**,** use the following syntax:

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

The first number is required and then you can add up to 29 other optional number arguments. Make sure each one is separated by a comma. Below are a couple examples of how you could use the SUM function:

=SUM(A10:A50)

=SUM(A1,B5,C10)

AVERAGE

The **AVERAGE** function takes the average of the cells or ranges selected. To use AVERAGE, use the following syntax:

=AVERAGE(number1, number2, [...])

Below are a few examples of how you could use the AVERAGE function:

=AVERAGE(A10:A50)

=AVERAGE(E1:E10,G1:G10)

COUNTA

The **COUNTA** function counts the number of cells in a range that contain any type of character. To use COUNTA, use the following syntax:

=COUNTA(value1,value2,[...])

Below are a couple examples of how to use COUNTA:

=COUNTA(A15:A100)

=COUNTA(D:D) – Note that this would count all the cells in the entire column that contain a character.

Note that the COUNTA function counts a cell as long it has some entry, even if the entry is empty text set off by a single apostrophe (').

COUNT

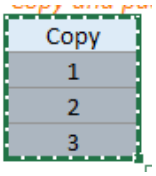
The **COUNT** function works almost exactly the same way the COUNTA formula does. However, the difference is the COUNT formula only counts cells that contain a number. So, if cell A1 contained the value "Gwyn12", the COUNT formula would not count it. However, if the cell contained the value "12", the COUNT formula would count it. To use COUNT, use the following syntax:

=COUNT(value1,value2,[...])

Copy, Cut and Paste your Data

Copy

To copy the contents of a cell or range of cells, select the cell you want to copy and either a) click on **Copy** on the **Home tab** or b) hit **Ctrl + C** on the keyboard. In fact, you should only use the b method. After the cell is copied, you will see little marching ant dancing around the cell indicating that the cell has been copied.



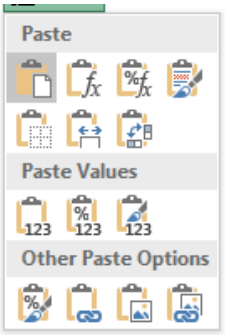
Paste

After you copy a range, select the range where you want to paste the copied cells. Once selected, either a) click on the **clipboard icon** on the **Home tab** (above Paste) or b) hit **Ctrl + V** on the keyboard. Once again, never, ever use method a.

When you use normal Paste, you are copying the values, formulas, and formatting of the cell. Therefore, when you paste the copied cells, everything in the copied cells is copied over.

Paste Special

Paste Special allows you to paste only certain aspects of a copied cell. You access the Paste Special by either clicking on the **Paste menu** on the **Home** tab or by hitting **Ctrl** after hitting **Ctrl + V**.



The most common Paste Special options are:

1. **Formula:** Only pastes the formula reference and nothing else (including formatting)
2. **Value:** Only pastes the value of the cell and nothing else. For example, let's say cell A1 has the formula =3*4. When you copy cell A1 and paste it to B1 but just select Value, just the number 12 (3*4) will be pasted over, not the formula itself.
3. **Transpose:** Transpose from either horizontal to vertical or vertical to horizontal (this neat function is bound to make you a party favorite).

Cut

Instead of copying a cell, you can completely cut it in order to move it to a different location. To cut a cell, either a) click on the **Cut icon** on the **Home tab** (above Copy) or b) hit **Ctrl + X** on the keyboard. Once again, never, ever use method a.

After you cut a cell or range of cells, simply paste it wherever you want to put it.

Quickly Navigating Excel

Keyboard Shortcuts

Keyboard shortcuts can save you enormous amounts of time. At first, using shortcuts instead of your mouse will be much slower. However, after a couple days and after your fingers learn the motions, you'll be amazed with how much faster you are! Below is a list of the most common actions and their associated keyboard shortcuts.

We do NOT recommend you memorize every single one of them. Instead, memorize the ones that you more useful to you and your use of Excel.

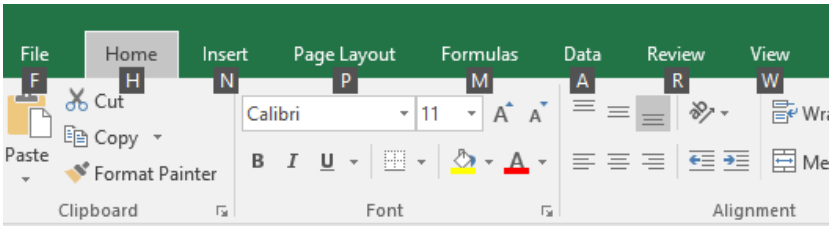
General		Navigating	
New file	Ctrl + N	Move to next cell in row	Tab
Open file	Ctrl + O	Up one screen	Page Up
Save file	Ctrl + S	Down one screen	Page Down
Close file	Ctrl + F4	Move to next worksheet	Ctrl + Page Down
Save as	F12	Move to previous worksheet	Ctrl + Page Up
Display the print menu	Ctrl + P	Go to first cell in data region	Ctrl + Home
Select whole group of data	Ctrl + A	Go to last cell in data region	Ctrl + End
Select column	Ctrl + Space	Data region left	Ctrl + Left Arrow
Select row	Shift + Space	Data region right	Ctrl + Right Arrow
Insert columns/rows	Ctrl + Shift + "+"	Data region down	Ctrl + Down Arrow
Delete columns/rows	Ctrl + "-"	Data region up	Ctrl + Up Arrow
Insert a new worksheet	Shift + F11	Select whole data region	Ctrl + Shift + 8
Manual select	Shift + Arrow Key	Move to next sheet	Ctrl + Page Down
Undo last action	Ctrl + Z	Move to Prior sheet	Ctrl + Page Up
Redo last action	Ctrl + Y	Access Drop down menu	Alt + Down/Up Arrow
Spell Check	F7	Zoom in / out	Ctrl + mouse scroll
Cut	Ctrl + X	Edit active cell	F2
Copy	Ctrl + C	Cancel cell entry	Escape Key
Paste	Ctrl + V		
Find text/number	Ctrl + F		
Recalculate	F9		

Formatting Cells		Formatting Text	
Format cells	Ctrl + 1	Bold selection	Ctrl + B
Format as number	Ctrl + Shift + 1	Italic selection	Ctrl + I
Format as date	Ctrl + Shift + 3	Underline selection	Ctrl + U
Format as currency	Ctrl + Shift + 4	Insert multiple lines in cell	Alt + Enter
Format as percentage	Ctrl + Shift + 5	Apply formatting as last	F4
Insert a comment	SHIFT + F2		

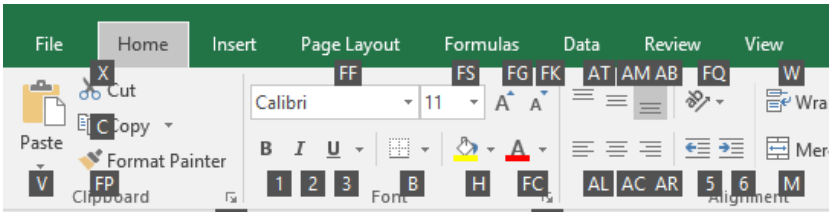
Additional Shortcuts	
Autosum a range of cells	Alt + Equals Sign
Insert the date	Ctrl + ; (semi-colon)
Insert the time	Ctrl + Shift + ; (semi-colon)
Go to precedent cells	CTRL + [
Go to dependent cells	CTRL +]
New sheet	Shift + F11
Fit column width	ALT + H + O + I

The Alt Key

Beyond the standard keyboard shortcuts, you can also perform ANY task in Excel using only your keyboard. The trick is using the **Alt** key. If you hit the Alt key, letters will appear on the Ribbon.



If you type any of these letters, you will be taken to that tab where more letters will appear. For instance, if you type **H** after hitting Alt, these new options will appear.



If you now type in **A+L**, your text in the current cell will become left aligned. So, the keyboard shortcut to left align your text is: **Alt + H + A+L**.

Working with Auto Fill

Auto Fill allows you to quickly fill cells with data that follow a pattern (ex. months) or that is based on data in other cells (ex. formulas). For instance, you can automatically populate a sequence of numbers or copy formulas down columns or across rows.

To do this, select the cells that you are using as your starter cells. Click the little box at the bottom right of the cell (your cursor will turn into a cross) and drag it down to fill in the rest of the series.

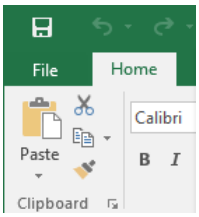
	A	B	C
1	**Month**	**Number**	**Formula**
2	January	1	4
3	February	2	8
4			

	A	B	C
1	**Month**	**Number**	**Formula**
2	January	1	4
3	February	2	8
4			
5			
6			
7		May	

You can also use Auto Fill to quickly copy a formula down a column by double-clicking the box at the bottom right of the cell after creating your formula.

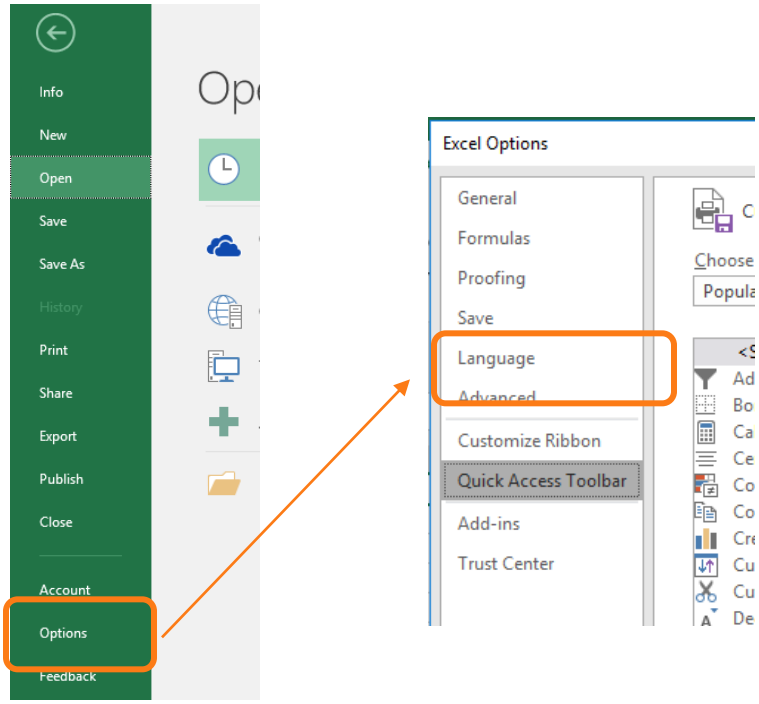
Customize the Quick Access Toolbar

The **Quick Access Toolbar** is located at the top of your Excel workbook, above the Ribbon. It provides quick access to your favorite Excel actions. The default functions are Save, Undo, and Redo.

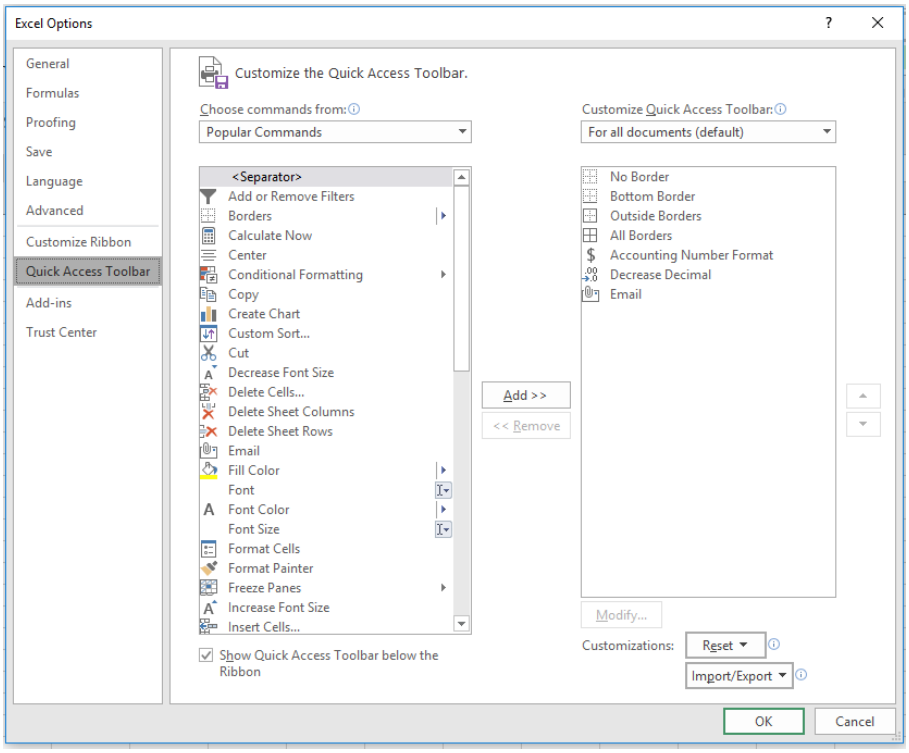


You can customize this to include your favorite actions to save you vast amounts of time:

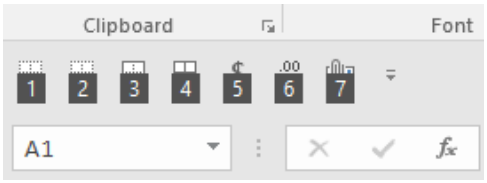
1. Go to the **File tab** and click on **Options** (located in the left-hand column). A new window will appear.
2. On the left-hand column, click **Quick Access Toolbar**.



3. You have the option to add any Excel action from any tab on the Ribbon. Use the **Add/Remove** button to customize your Toolbar. You can change the order of the icons using the toggle buttons on the far right.



As a bonus, your Quick Access Toolbar just became your own custom keyboard shortcuts. Now when you press the **Alt** key, you will see numbers above your Quick Access Toolbar actions. When you type the number, that action will be performed.



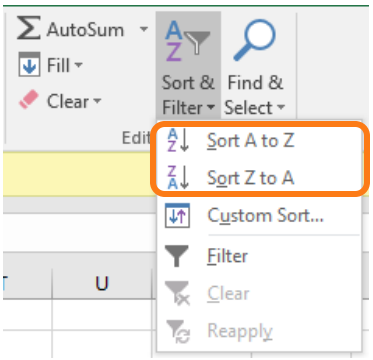
To maximize the utility of your Toolbar, we suggest you place the Toolbar below the Ribbon for ease of access. You can do this by checking the box labeled **Show Quick Access Toolbar below the Ribbon** at the bottom of the menu noted above.

WEEK 3: WORKING WITH YOUR DATA

Sorting and Filtering

Sorting Records on a Single Field

If you only want to sort your data list on one particular column, click the header of the column you want to sort and select the appropriate sort option on the Sort & Filter drop-down list:



There are three different sort options:

- **Sort A to Z** or **Sort Z to A** in a text field
- **Sort Smallest to Largest** or **Sort Largest to Smallest** in a number field
- **Sort Oldest to Newest** or **Sort Newest to Oldest** in a date field

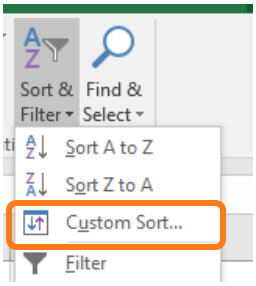
Excel then reorders all the records in the data list in accordance with the new ascending or descending order in the selected field. If you find that you've sorted the list in error, simply hit **Ctrl+Z** to undo the last option.

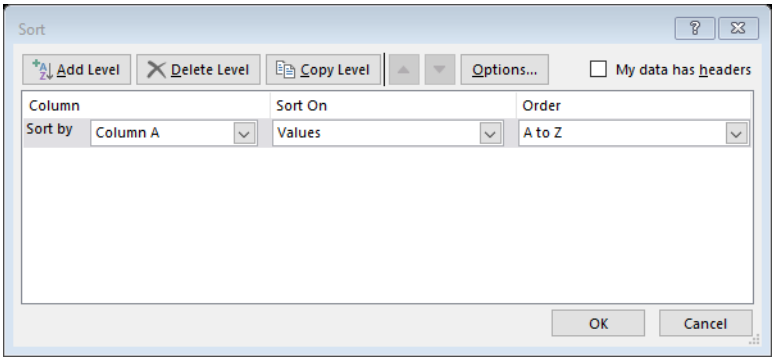
When you use the ascending sort order on a field in a data list that contains different kinds of entries, Excel places numbers (from smallest to largest) before text entries (in alphabetical order) and finally, blank cells. When you use the descending sort order, Excel arranges the different entries in reverse.

Custom Sort (Sorting Records on Multiple Fields)

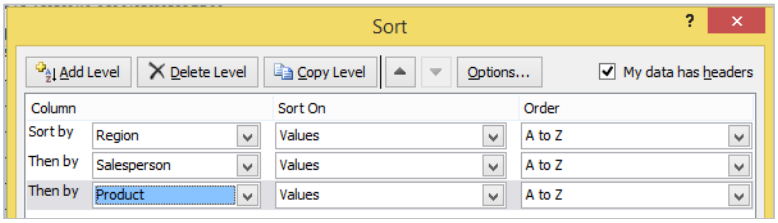
When you need to sort a list on more than one field (ex. sort Last Name in Ascending order and sort First Name column in Ascending order), you use **Custom Sort**:

1. Select the entire range of data you are sorting, including the header row.
2. Click the **Sort & Filter Data** button on the Home tab and then select **Custom Sort**.





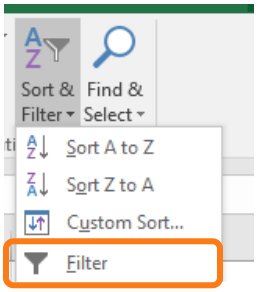
3. Click the name of the field you first want the records sorted by in the **Sort By** drop-down list. If you want the records arranged in descending order, remember also to click the descending sort option (Z to A, Smallest to Largest, or Oldest to Newest) in the **Order** drop-down list to the right.
4. If you want to sort on another level(s), click the **Add Level** button to insert another sort level. Click OK.



AutoFilter

If you want to filter your data to only see certain items, you can apply a column Filter. This will allow you to easily filter on one or more fields. It also provides an easier to way to sort your data.

To insert a filter, highlight the range of data you want the filter applied to, including the header. Click the **Sort & Filter Data** command button on the Home tab then select **Filter**.

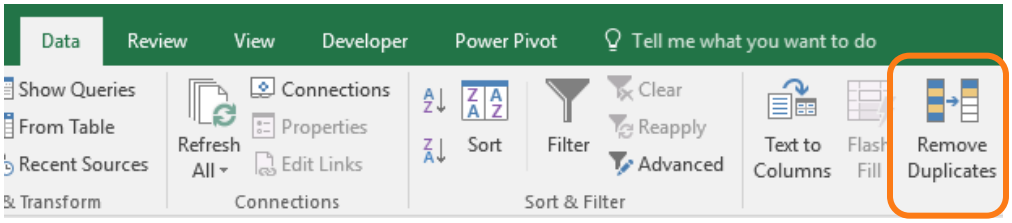


Small arrows will now appear on each column header. When you click on these arrows, it allows you to either filter or sort your data.

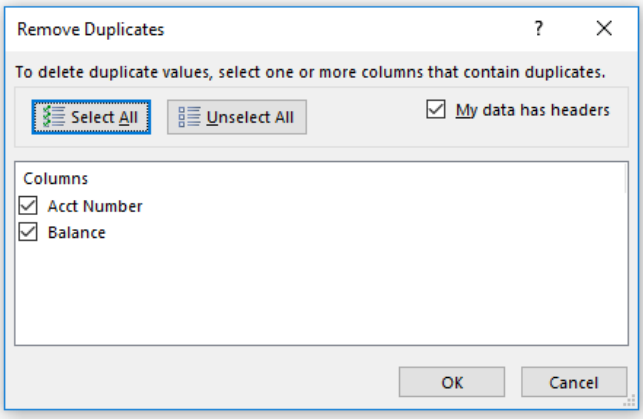
	A	B	C	D	E	F	G	H
2		2015 Sales Breakdown						
4		Region	Salesperson	Product	Units	Unit Price	Sales	Quarter
5		East	Bob	Gizmo	241	$234	$ 56,394	Q1
6		East	Donald	Gizmo	192	$234	$ 44,928	Q4
7		East	Bob	Widget	292	$432	$ 126,144	Q2
8		East	Amy	Gadget	110	$345	$ 37,950	Q4

Removing Duplicates

If you have a list of data that potentially have duplicate information, you can use **Remove Duplicates** to quickly get rid of the extra data. Remove Duplicates is found on the **Data tab**.



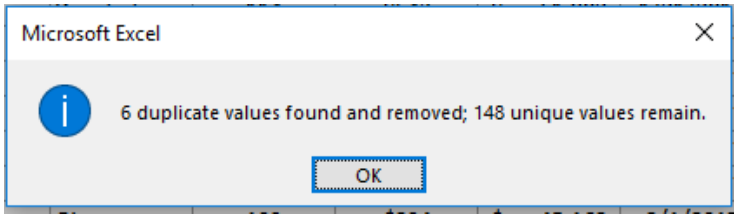
To remove the duplicate values, first select the entire data set you want to analyze, including header rows, and click the **Remove Duplicates** button on the **Data** tab. The following menu will appear.



On the form under **Columns**, there are checkboxes next to each of the headers ("Acct Number" and "Balance" in our example). The more boxes you check, the more precise the removal will be.

For examples, by checking off both the "Acct Number" and "Balance" boxes, Excel will only remove rows that are both duplicative in terms of the account number and account balance. If you only check off the "Acct Number" checkbox, Excel will remove all rows that just have duplicative account numbers even if the account balance is different.

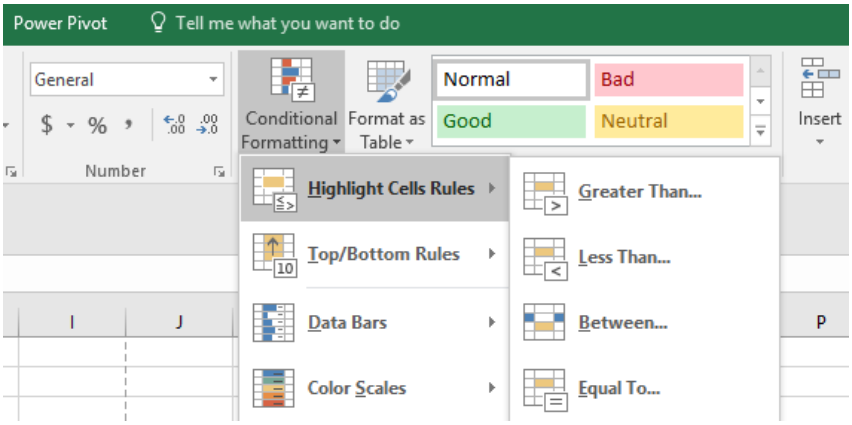
We highly recommend keeping all boxes checked. After you are done, click **OK**. A message box will appear indicating how many duplicates were found and removed, and how many values remain.



Conditional Formatting

Conditional Formatting allows you to automatically change the formatting of cells based on criteria you set. For instance, you can have all cells that are over a certain threshold be highlighted in yellow.

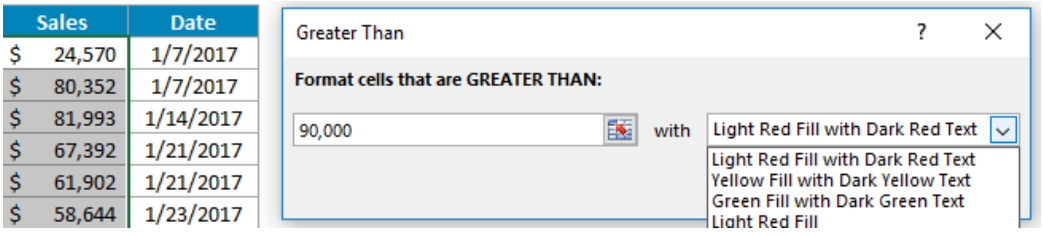
To apply Conditional Formatting to a group of data, first select the range you want the formatting to apply. Next, on the **Home tab** select **Conditional Formatting**. From here you can select the conditional formatting rule you want to apply to your data.



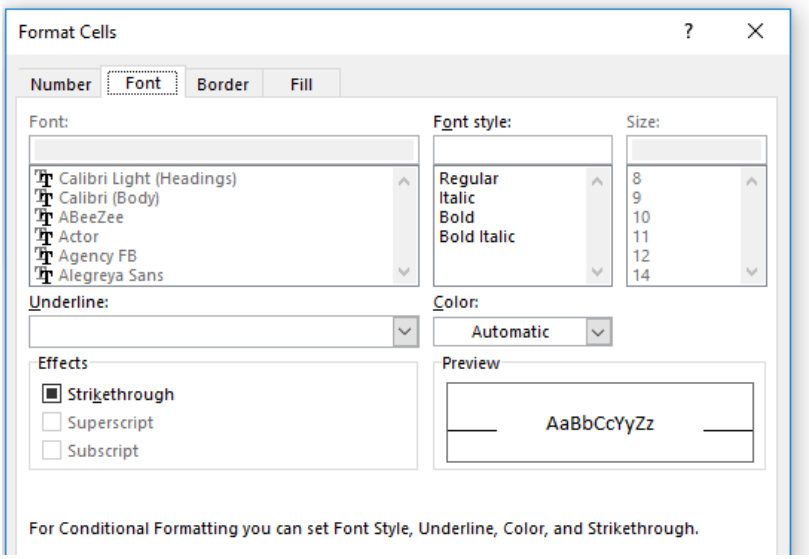
Highlight Cells Rules

When you select **Highlight Cell Rules,** a sub menu will appear. These options allow you to highlight cells based on some common qualifiers such as greater than, less than, etc.

Once you select a qualifier, a simple menu will appear. In the first box, insert the criteria. The drop-down box to the left allows you to format your cells to how you would like.



You can customize how you want your cells to be formatted by selecting **Custom Format** on the drop-down menu. You can change the font type, size, color, borders, etc.



Top/Bottom Rules

When you select **Top/Bottom Rules** a sub menu will appear. These options allow you to highlight the top and bottom performers in your data set. For example, you can highlight above average stock prices.

Note that even though the menu says Top 10 Items or Top 10%, you can easily change this to the top 5 or 100 items.

Data Bars

Data Bars imbeds a bar graph in your cell. The graphs assume that the lowest value in the range of cells is basically 0% and the highest value is 100%.

Unit Pric	Sales	Date
$234	$ 24,570	1/7/2017
$432	$ 80,352	1/7/2017
$543	$ 81,993	1/14/2017
$234	$ 67,392	1/21/2017
$543	$ 61,902	1/21/2017
$543	$ 58,644	1/23/2017
$432	$ 93,744	1/26/2017
$234	$ 60,138	1/27/2017
$432	$ 129,168	1/30/2017

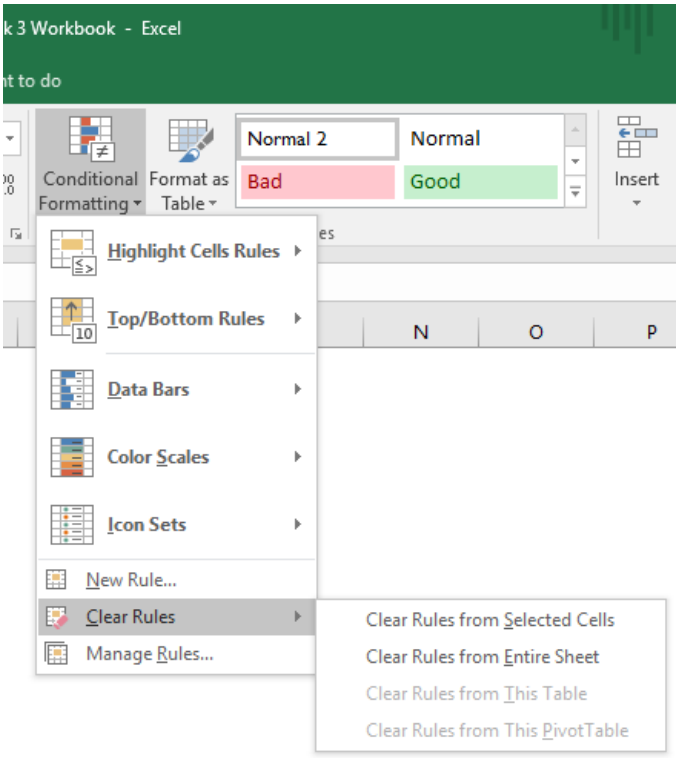
Color Scales

Color Scales options creates a "heat map" of your data. The highest values are shaded green (or red if you'd like) and lowest in red (or green) with different shades in between.

Unit Pric	Sales	Date
$234	$ 24,570	1/7/2017
$432	$ 80,352	1/7/2017
$543	$ 81,993	1/14/2017
$234	$ 67,392	1/21/2017
$543	$ 61,902	1/21/2017
$543	$ 58,644	1/23/2017
$432	$ 93,744	1/26/2017
$234	$ 60,138	1/27/2017
$432	$ 129,168	1/30/2017

Delete Rules

If you need to delete the rules of a particular set of cells, first select the cells you want to modify. Now, go to **Conditional Formatting** on **Home tab** and select **Clear Rules**. You can either delete the rules of particular set of cells (that you've highlighted) or from the entire worksheet.



Alternatively, you can go to **Manage Rules** to delete your formatting.

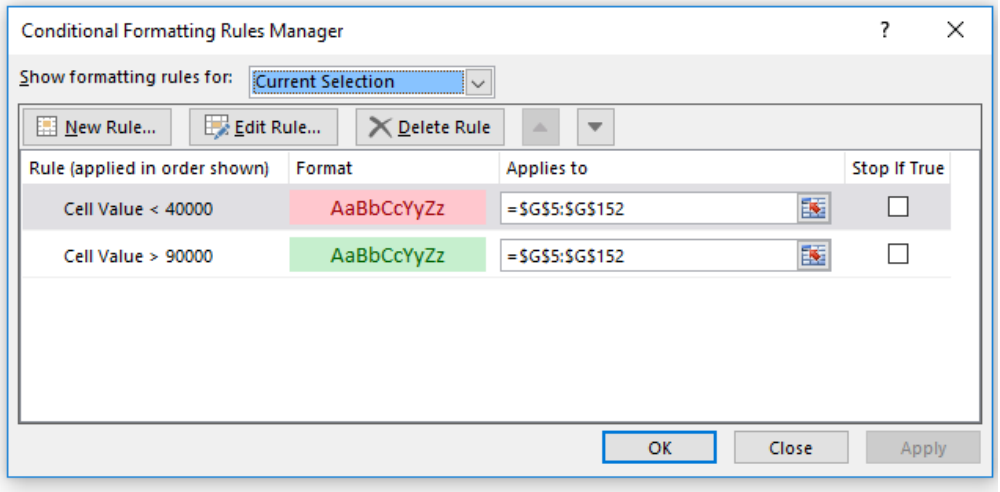
Manage Rules

If at any time you need to delete a formatting rule, change the data range, or change how you want the cells to be formatted, you can do this in the Manage Rules section.

First, highlight the range of cells that you want to modify. From there, go to **Conditional Formatting** on the **Home tab** and select **Manage Rules**.

A menu will appear showing the various rules you have applied to your selection. To delete a

rule, select the rule and click the **Delete Rule** button. To change the data set the rules apply to, change the cell reference under **Applies to**.

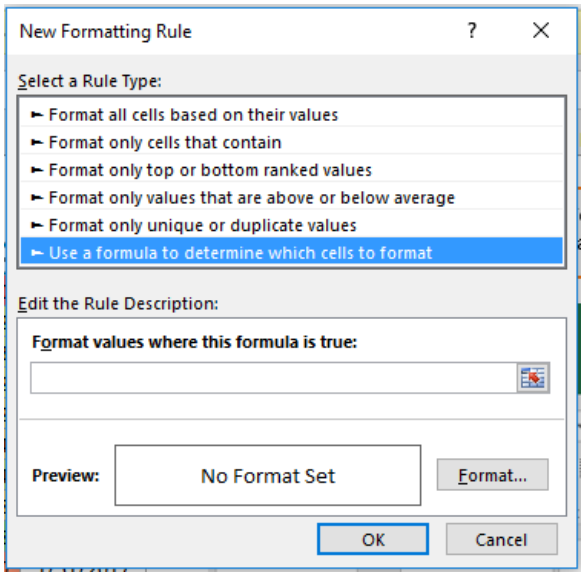


Advanced Conditional Formatting

Conditional formatting is a great way to quickly highlights important information in a spreadsheet. But sometimes the built-in formatting rules don't capture everything you want. Adding your own formula to a conditional formatting rule allows you to do things the built-in rules cannot do.

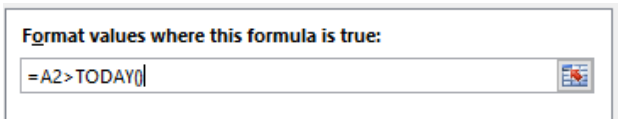
As an example, let's say you have a list of birthdays in cells A2:A6 and you want to highlight in green those birthdays that have yet to occur. You can use a formula to create this conditional formatting.

1. Select all the birthdays in cells A2:A6
2. Click **Home > Conditional formatting > New Rule**. A New Rule dialog box will open.



3. Select **Use a formula to determine which cells to format**

4. In the input section under **Format values where this formula is true** put the following formula: =A2>TODAY(). This is testing whether the birthday is after today's date.



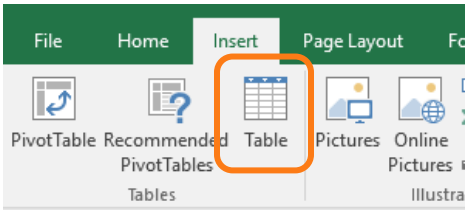
5. Click the Format button and choose how you want to format your cell. In our case, we'll color the text green. Then click **OK**.

Format List as a Table

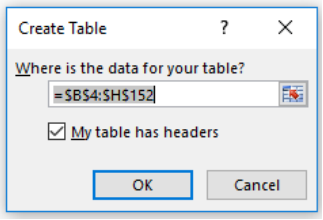
The **Table** feature allows you to both define an entire range of data as a table and format the data, all in one operation. Tables provide an easy way to filter and format your data, add additional data (while still retaining the formatting), and create a permanent header row.

To create a table:

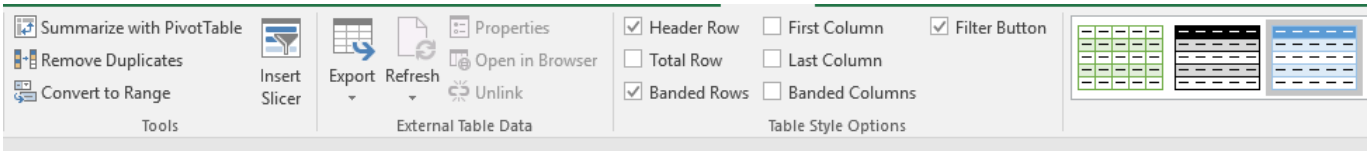
1. Highlight the entire data range including the header rows.
2. On the **Insert tab** on the Ribbon, select the **Table** command button.



3. A **Create Table** message box will appear ensuring you selected the appropriate range and to indicate whether or not you have headers (you should ALWAYS have headers). If you check the **My Table has headers** box, you are telling Excel that the top row is a header row.

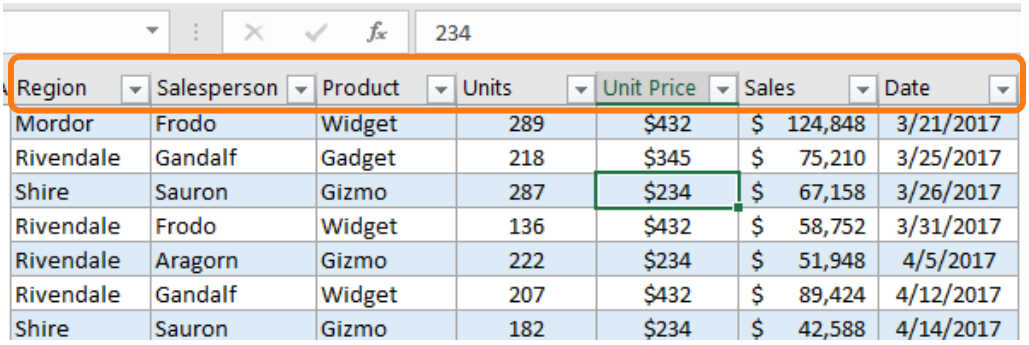


By default, Excel will reformat the header row, highlight every other row blue, and put filters on each column. You will also notice that a new tab on the Ribbon appears, the **Design tab**. From this tab, you can customize your table such as changing the color of rows, removing the filter buttons, and adding a total row.

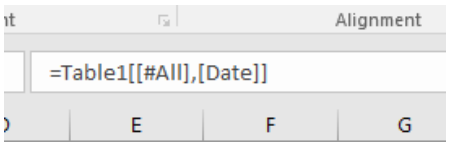


The table you created is very dynamic. If you add any information to the bottom of the data series, Excel will automatically format the cells the same as the rest of your table. It will also add this additional data to your filters. Also, if you insert rows and columns in the table, Excel will automatically update the new row/column with the appropriate formatting.

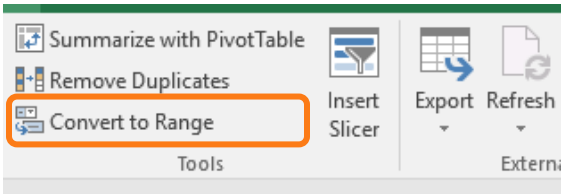
Another neat feature is that when you are in your table and scroll to a point where your header row is no longer visible, Excel will change the name of the column letter to the header row name.



The biggest downfall of a Table is that referencing a Table can cause your formula to look very confusing. When you reference Table, your formula will look like the below example instead of just =H:H or some other normal cell reference.



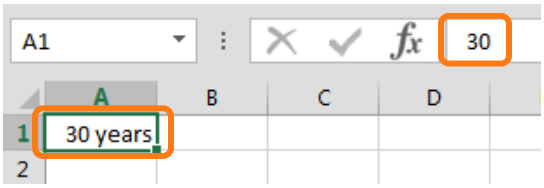
If you wish to convert the table back to a normal range (what it was before), you can do so by going to the **Design tab** on the Ribbon and selecting **Convert to Range**. Although the formatting will remain the same, the filters and table functions are now gone.



Create Custom Number/Date Formats

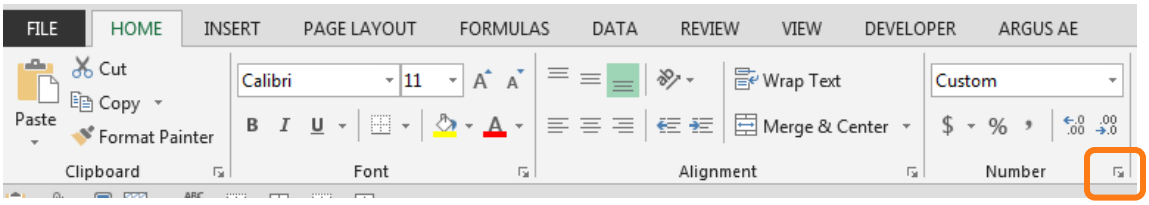
Excel has many options for displaying numbers such as percentages, currency, and dates. However, if these built-in formats do not meet your needs, you can custom-build a number format. Customizing a number format *does not affect the cell value*, it just modifies the appearance.

In the example below, we formatted the value in cell A1 to add "years" at the end of the value. However, when you look in the formula bar, you notice that the value is still "30", it just *appears* as "30 years".

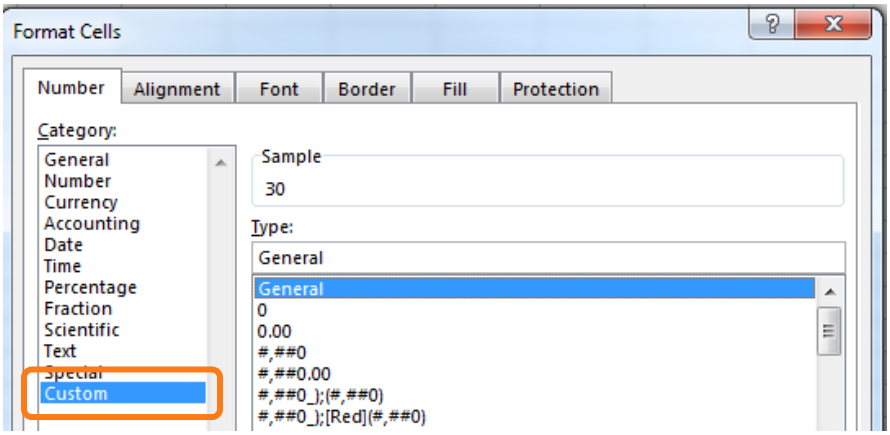


To customize your number format:

1. Open the **Format Cells** dialog box on the Home tab or use keyboard shortcut **Ctrl + 1**.



2. When the dialog box appears, under **Category** select **Custom**.



3. Under **Type** is where you will create your custom format. You can preview what the cell value will appear as under "Sample". It is usually best to start with a built-in format and modify it from there.

Here are a few basics when creating your formats:

- **###,0**: Adds commas to your value
- **0.00**: Adds decimals to your value
- **"your text here"**: Adds text to your value
- Dates are as follows:
  - **d =** day (ex. 4)
  - **dd =** day with leading zero (ex. 04)
  - **ddd = Short day of week** (ex. Wed)

- **dddd = long day of week** (ex. Wednesday)
- This syntax flows similarly to other parts of the date (m = month, y = year).

In our "30 years" example, here is how it would look:

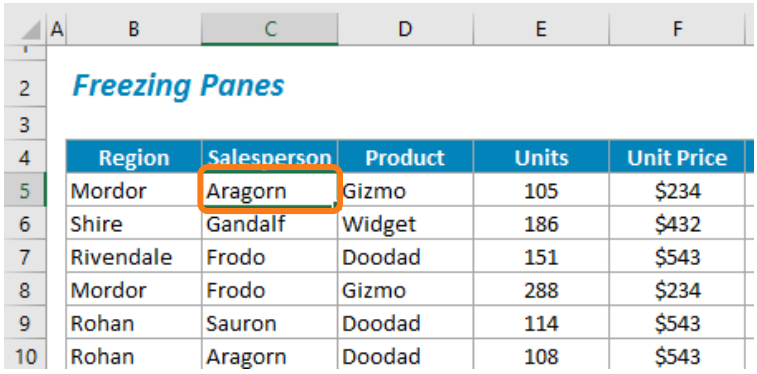
Working with Large Data Sets

Freezing Panes

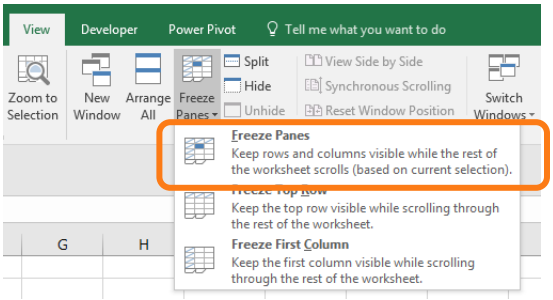
To keep an area of a worksheet visible while you scroll to another area of the worksheet, you can lock specific rows and/or columns in one area by Freezing Panes. For example, you might want to keep certain row and column headers visible as you scroll.

To use the **Freeze Panes** feature:

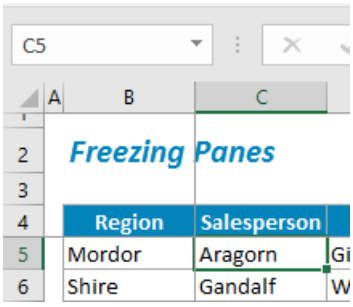
1. Click the cell that is located to the immediate *left* of the column(s) that you want to freeze and/or immediately *beneath* the row(s) that you want to freeze. In the example below, we want to freeze everything above row 5 and to the left of column C. Therefore, we will select cell C5.



2. On the View tab, click the **Freeze Panes** button followed by **Freeze Panes** on the button's drop-down menu.



3. A solid line will now appear indicating which rows/columns are frozen.

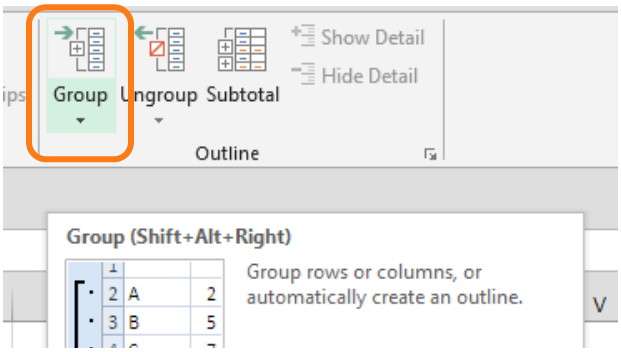


To get rid of the freezed panes, on the **View tab** click **Freeze Panes** and then **Unfreeze Panes**.

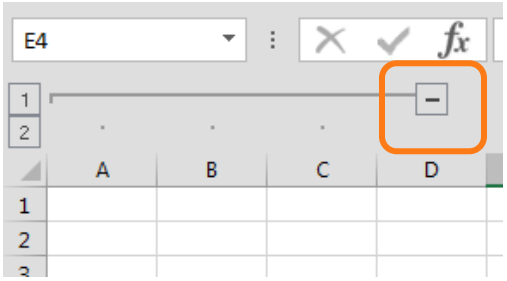
Grouping Rows and Columns

Worksheets with a lot of data can look overwhelming and become difficult to read. Using the **Group** functionality organizes your data into groups, allowing you to easily show and hide different sections of your worksheet. This is different from **Hiding/Unhiding** rows and columns which can be cumbersome and cause people to miss the hidden data (unless that is your purpose for hiding the rows/columns).

To group rows or columns, select the rows or columns you want to group. Then, on the Ribbon select **Data** and then click the **Group** icon.



The selected rows or columns will now be grouped. You can click the "-" or "+" sign at the top/side of the column/row to show and hide your section.



To ungroup data, select the grouped rows or columns then click the **Ungroup** command on the **Data tab**.

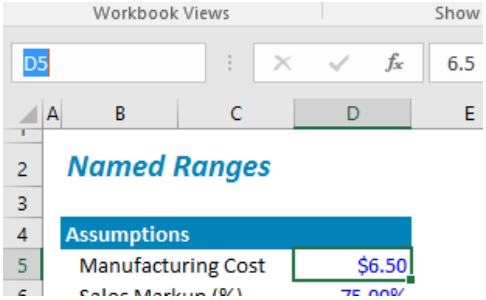
Naming Ranges

Naming a Range of Data

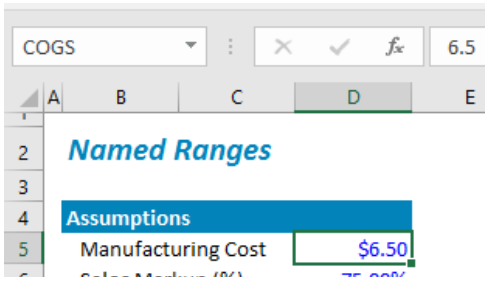
Naming a cell is one of the easiest ways to reference a cell that you use on a regular basis (ex. a cell that you refer to in a formula calculation). This will especially be true when we are using VLOOKUP or INDEX/MATCH. Additionally, naming cells makes formulas much more comprehensible.

To name a cell range:

1. Select the cell(s) that you intend to name.
2. Click the **Name box** on the Formula bar. Excel automatically highlights the address of the active cell in the selected range.



3. Type the range name in the Name box and then press Enter (don't just select another cell).



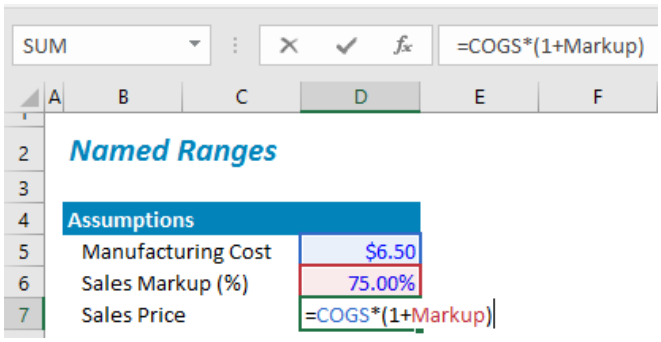
When picking a name for your range, the name *must* be unique to the workbook, not contain any special characters (ex. $, &, etc.) and not have any spaces. If you want to add a "space", separate the words with an underscore (ex. Prod_Cost). Additionally, you want your name to be very descriptive while also being concise.

Referencing a Named Range

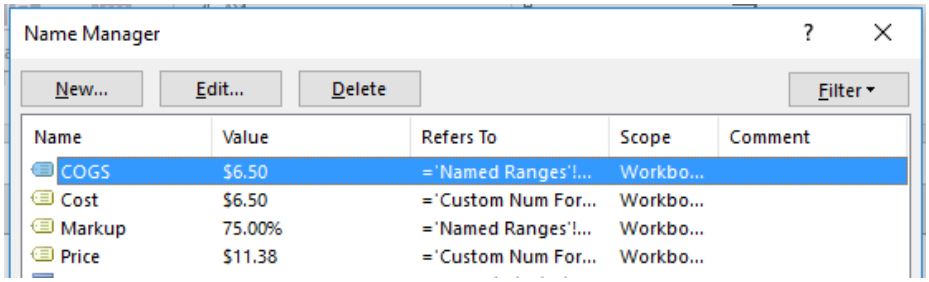
After you've assigned a name to a range, you can now reference that cell in any formula by typing in the cell reference name. For example, consider the following formula that calculates the sale price of an item that uses standard cell references:

=D5(1+D6)*

Now consider the following formula that performs the same calculation but, this time, with the use of range names:



You can change/delete a range name by going to the **Formula tab** and selecting **Name Manager**. A Name Manager dialog box will appear listing all the range names in your workbook.



Naming an Entire Column

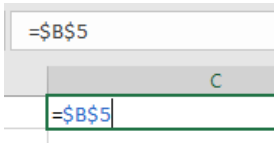
To name an entire column, select the entire column by hitting **Ctrl + Spacebar**. From here, name the column like you would a normal range by changing the name in the Name Box. Naming an entire column is especially useful when we use the SUMIFS and COUNTIFS formulas.

WEEK 4: INTERMEDIATE FOMULAS

Absolute Cell References

There may be times when you do not want a cell reference to change when copying cells down a column or across a row. By default, all cells are **Relative References**. This means that as you copy a formula, the cell references will change based on where you paste the formula. **Absolute References** on the other hand, do not change when copied. Therefore, you use an absolute reference to keep a cell, range, or row/column constant.

When a cell includes an absolute reference, there are $ to the left of the column or row referenced. For instance, B5 is a normal cell reference whereas $B$5 is an absolute cell reference.



To get an absolute cell reference, hit the **F4** key on your keyboard. If you keep hitting F4, it will cycle through the different variations of locking the formula.

$A$2 = The column and the row do not change when copied, the entire range is fixed.

A$2 = The row does not change when copied.

$A2 = The column does not change when copied.

Conditional and Lookup Formulas

IF Formula

The **IF** function will return a value based on whether a given condition is TRUE or FALSE. It is a simple IF, THEN, ELSE operation.

For example, IF cell A1 is greater than B1, THEN you want C1 to show "Original". ELSE if it is not true, you want C1 to show "Duplicate".

The IF function uses the following syntax:

=IF (*logical_test*, *value_if_true*, *value_if_false*)

The ***logical_test*** argument is required and is the condition you want to test. To test a condition, you need to use a comparison operator:

- Greater than (>)
- Greater than or equal to (>=)
- Less than (<)

- Less than or equal to (<=)
- Equal to (=)
- Not equal to (<>).

For example, if you want to test whether cell A1 is larger than B1, you would put A1>B1. You are not limited to testing cell references. You can test fixed numbers (A2>10) or text strings (A2= "John Doe").

The ***value_if_true*** argument is required and is the value or text that will appear if the logical test is true.

For instance, if A1 is greater than B1 you can have the cell return the text "Original". You can also have the formula return a fixed value (10) or a formula (D2*E2).

The ***value_if_false*** argument is required and is value or text that will appear if your test is false (i.e. A2 is NOT larger than B2). Once again, the formula can return text, a fixed value, or a formula. In our example, we'll put "Old Property".

Let's use an example. Let's suppose on a test, the teacher had an extra credit question. However, she stipulates that you can only get the extra credit if you missed less than 2 days of class. If you missed 2+ days of class, you would not get the extra credit.

	A	B	C
1	**Test Scores**	**Extra Credit**	**Days Missed**
2	91%	3%	1
3	98%	5%	1
4	82%	4%	2
5	80%	6%	3
6	77%	2%	1
7	100%	1%	2
8	85%	4%	2
9	92%	7%	0
10	86%	1%	0
11	77%	7%	1
12	93%	7%	3

The calculate this in column D, we would use the formula:

=IF(C3<2, A2+B2, A2)

	A	B	C	D
1	**Test Scores**	**Extra Credit**	**Days Missed**	**Final Score**
2	91%	3%		=IF(C2<2,A2+B2,A2)
3	98%	5%	1	103%

You can have the IF statement return a blank cell by putting two quotation marks ("") in the *value_if_true* or *value_if_false* part of the formula.

VLOOKUP Formula

The **VLOOKUP** function searches vertically (top to bottom) the leftmost column of a lookup table until it locates a value that matches or exceeds the one you are looking up. Think of the

VLOOKUP as a phone book. You want to look up a person's phone number so you open the phone book, look up their last name, and then go over and find their number. The VLOOKUP does the exact same thing.

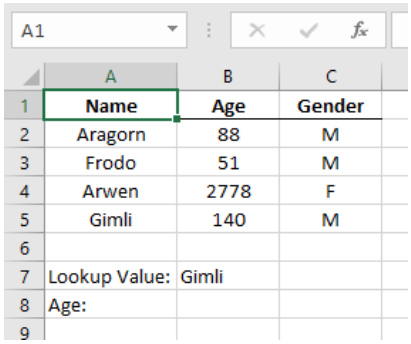
The VLOOKUP function uses the following syntax:

=VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])

The ***lookup_value*** argument is the value that you want to look up in the *first column* of the lookup table (for example you want to lookup "Gimli").

The ***table_array*** is the lookup table's cell range. This is the *entire* table (i.e. phone book).

In the example below, cell B7 has the *lookup_value* (Gimli) and cells A2:C5 is the *table_array* (the phone book where we want to look up Gimli).

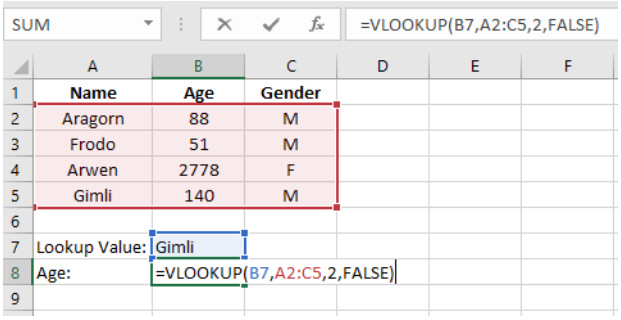


The ***col_index_num*** argument is the column number in the table from which the matching value must be returned. The first column is 1. In the above example, Name is column 1, Age is column 2, and Gender is column 3.

The not-so-optional ***range_lookup*** argument is either TRUE or FALSE. This tells Excel whether you want Excel to find an exact (FALSE) or approximate (TRUE) match. When you specify TRUE or omit the *range_lookup* argument, Excel finds an approximate match. When you specify FALSE as the *range_lookup* argument, Excel finds only exact matches. Unless it is a special situation, you should put FALSE 99% of the time.

The reason is, if your lookup values (Name in our example), is not in alphabetical or numerical order and you do not choose the FALSE option, the VLOOKUP will not return accurate results.

Putting this together, the formula =VLOOKUP(A1,C2:E5, 2, FALSE) will return Gimli's age which is 140.



IFERROR Formula

At times, your formula will return an error, not because the formula is wrong, but because there is no value to return. This is especially common with VLOOKUP and INDEX + MATCH formulas. The most common formulas are

- **#DIV/0** – Indicates you are dividing by zero which is not allowed in math (or in Excel)
- **#NA** – Indicates no value is available. For example, you are looking up a value in your VLOOKUP and there is not value to lookup in the lookup table.

Using the **IFERROR** will replace any error with any value, formula, or text that you'd like. We recommend either having the formula return a zero or a blank "".

The IFERROR function uses the following syntax:

=IFERROR(value, value_if_error)

The ***value*** argument is your normal a formula. For instance, if you have a VLOOKUP formula, you would keep this as the *value* argument.

The ***value_if_error*** argument is the value you want to return if the formula returns an error.

Conditional List Formulas

SUMIFS

The **SUMIFS** function adds all numbers in a range of cells that meet one or more criteria. The syntax for the SUMIFS function is as follows:

=SUMIFS(sum_range, criteria_range1, criteria1, [criteria_range2], [criteria2])

The ***sum_range*** argument is required and is the range of cells you want to sum.

The ***criteria_range1*** argument is required and is the range of cells that you want to apply criteria1 against.

The ***criteria1*** argument is required and is the criteria used to determine which cells to add. You can add additional criteria and criteria ranges in the subsequent arguments.

In the example below, you can add the total number of cars (criteria 1) that Adam (criteria 2) sold using the formula:

=SUMIFS(A2:A6, B2:B6, "Car", C2:C6, "Adam") which returns the value 6

	A	B	C
1	**Units Sold**	**Product**	**Salesperson**
2	3	Car	Adam
3	5	Bike	Breanna
4	3	Car	Adam
5	5	Car	Charles

COUNTIFS

The **COUNTIFS** function counts the number of cells in a range that meets one or more criteria. The syntax for the COUNTIFS function is as follows:

=COUNTIFS(criteria_range1, criteria1, [criteria_range2], [criteria2], ...)

The ***criteria_range1*** argument is required and is the range of cells that you want to test *criteria1* against.

The ***criteria1*** argument is the criteria used to determine which cells to count. You can add additional criteria and criteria ranges in the subsequent arguments.

In the example below, you can count the total number of times Adam (criteria 1) received a passing grade (criteria 2) using the formula:

=COUNTIFS(A2:A6, "Adam", C2:C6, "Y") which returns the value 2

	A	B	C
1	**Student**	**Grade**	**Passed (Y/N)**
2	Adam	A	Y
3	Adam	B	Y
4	Adam	F	N
5	Beth	A	Y
6	Beth	A	Y
7	Beth	D	N

AVERAGEIFS

The **AVERAGEIFS** function averages all numbers in a range of cells that meet one or more criteria. The syntax for the AVERAGEIFS function is as follows:

=AVERAGEIFS(average_range, criteria_range1, criteria1, [criteria_range2], [criteria2])

The ***average_range*** is the range of cells you want to average.

The ***criteria_range1*** is the range of cells that you want to apply criteria1 against.

The ***criteria1*** is the criteria used to determine which cells to add. You can add additional criteria and criteria ranges in the subsequent arguments.

In the example below, you can average the car units sold using the formula:

=AVERAGEIFS(C2:C12, B2:C12, "Gizmo") which returns the value $1,680

	A	B	C
1	**Date**	**Product**	**Sales**
2	01/02/17	Gizmo	$2,159
3	02/13/17	Gizmo	$1,073
4	04/25/17	Widget	$1,330
5	05/09/17	Gizmo	$2,906
6	06/10/17	Gizmo	$2,964
7	07/01/17	Widget	$1,112
8	08/13/17	Gizmo	$1,148
9	09/09/17	Gizmo	$2,230
10	10/23/17	Gizmo	$2,507
11	11/03/17	Gizmo	$2,120
12	12/17/17	Widget	$1,711

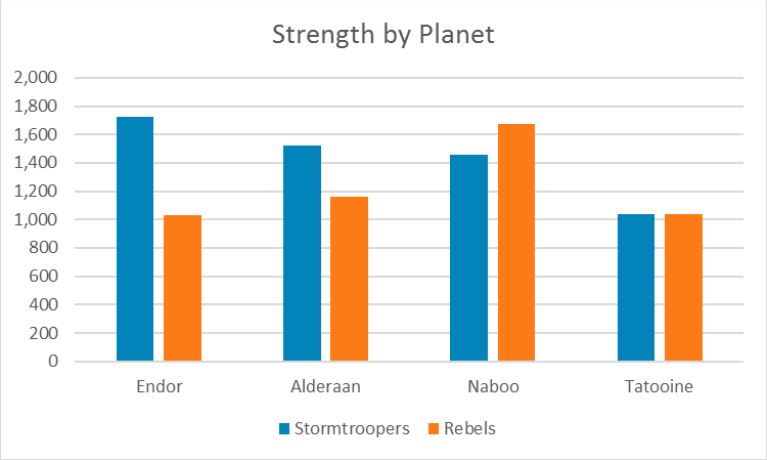
WEEK 5: CHARTS AND GRAPHS

The Different Charts in Excel

There are many different types of charts in Excel, although you will likely use just three basic charts: column, line, and pie. If you can understand these charts and how to modify them, you can work with any chart.

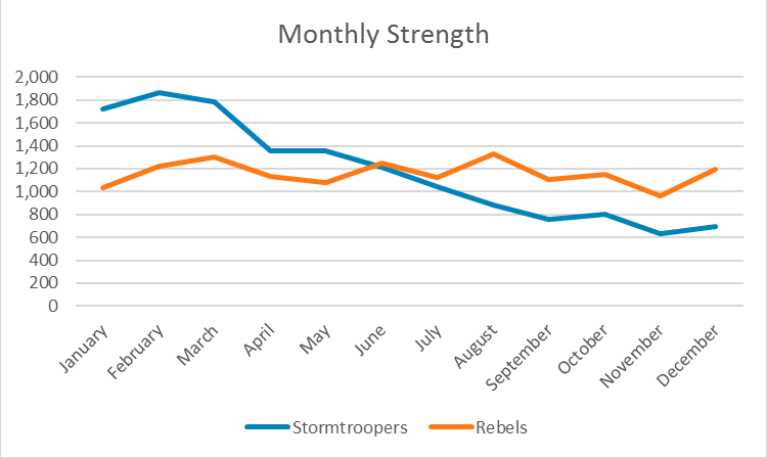
Column Chart

A **column chart** is used to compare items between different groups. You can also compare an over time, although a line chart is really best for a comparison over time (time series).



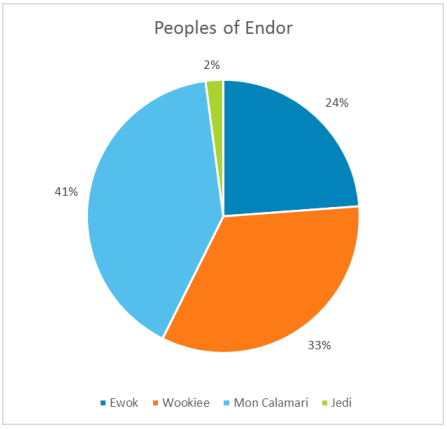
Line Chart

A **line chart** is almost identical to the column chart except the layout is a line instead of a bar. This makes spotting trends much easier to read.



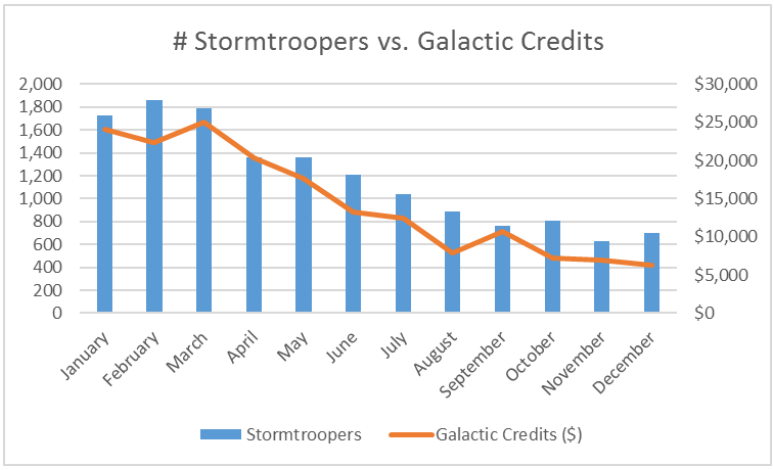
Pie Chart

A **pie chart** is used to compare parts of a whole. For example, what percent of the total does x product represent? Pie charts, unlike the other charts, do not show changes over time.



Combo Chart

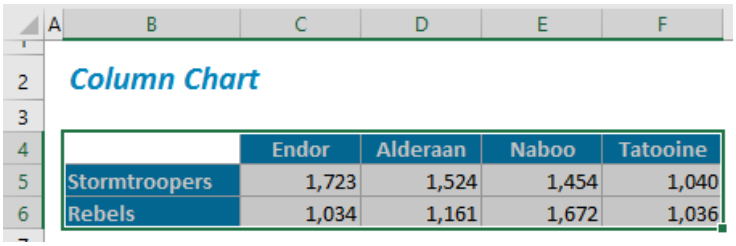
Combo charts combine any two charts and places these charts on two separate axes. This is fantastic if you are comparing two different items that have vastly different units. Usually you will combine a column chart with a line chart.



Inserting a Chart

Excel makes it very easy to create a new chart in your worksheet:

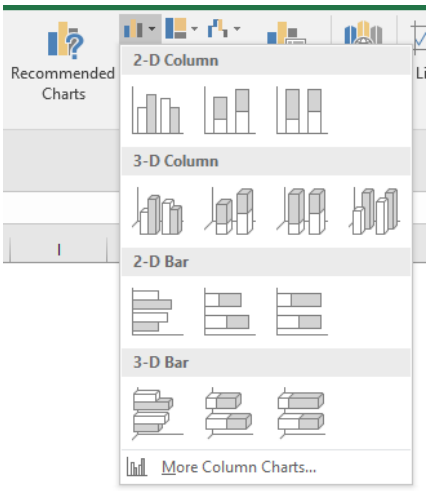
1. Select the range of cells containing the data that you want to plot, including the column and row headings. The labels in the top row of selected data become category labels in the chart. In other words, they appear along the x-axis in most charts. The labels in the first selected column on the left are used to name the data series in the chart. Excel assigns values to appear along the y-axis based on the data in those data series.



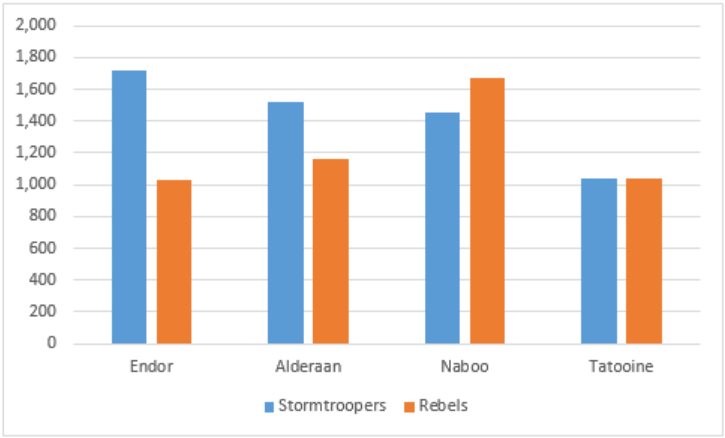
Column Chart

	Endor	Alderaan	Naboo	Tatooine
Stormtroopers	1,723	1,524	1,454	1,040
Rebels	1,034	1,161	1,672	1,036

2. On the **Insert tab**, click the button for the type of chart you want to create (Column, Line, Pie, Bar, Area, etc.). Excel then opens the drop-down gallery for the type of chart you selected. This gallery contains thumbnails for all the subtypes available under that chart type.



3. Click the thumbnail of the subtype of the chart you want to create on the chart button's drop-down gallery.



All charts that you create are linked to the worksheet from where the data comes. This means that if you modify any of the values in your data, your chart will automatically be redrawn to reflect the change

If you want to quickly see how a chart is going to look, click the **Change Chart Type** command button and then click the type of chart you want to try in the Navigation pane on the left followed by the thumbnail of the subtype of chart in the gallery on the right before you click **OK**.

Customizing a Chart and Adding Chart Elements

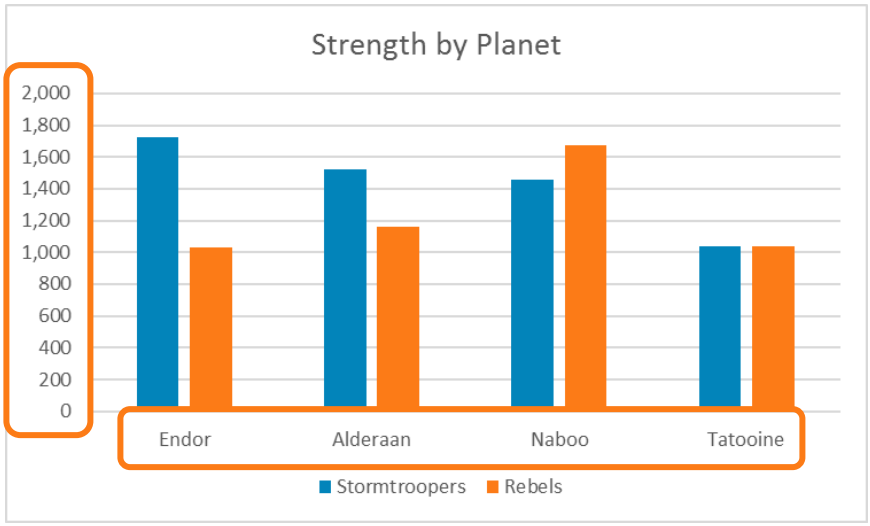
Chart Tools Tabs

When you create a new chart, or click on an existing chart, two new tabs will open on the Ribbon: **Design** and **Format**.

- **Design Tab**: From the Design tab, you can add the various chart elements (for example you can add a Chart Title, Axis Title, Legend, etc.), change the Chart Type, modify the layout with some predefined templates (Chart Layouts), or move the chart to a new worksheet (Move Chart).
- **Format Tab**: You can change the coloring of your chart and the chart elements from the Format tab. To change the color or, for instance, one of the bars in your Column Chart, click on that bar and from the Format tab you can change the Shape Fill color, Shape Outline color and make the bar have a drop shadow or 3-D (Shape Effects).

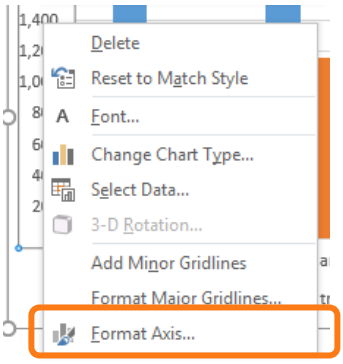
Formatting the Axis

The axis is the scale used to plot the data for your chart. The x-axis is known as the horizontal axis and the y-axis is known as the vertical axis.

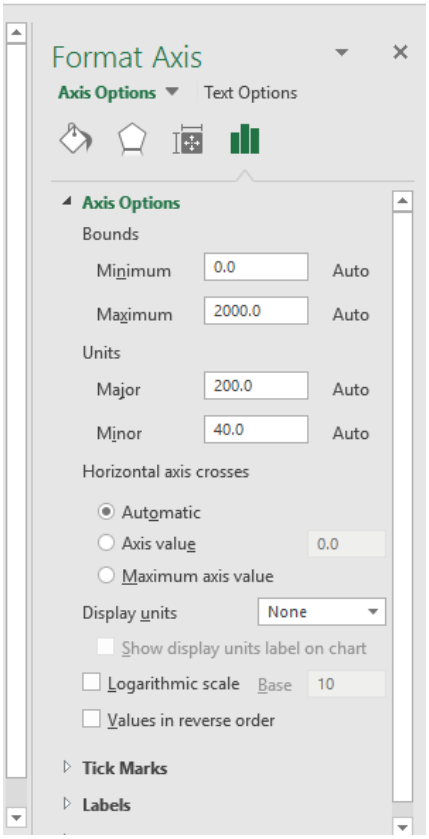


When you create a chart, Excel sets up the horizontal and vertical axes for you automatically which you can then adjust.

To modify the axis, click the axis you wish to modify, right-click and select **Format Axis**.



A Format Axis dialog box will open on the right-side of the screen.



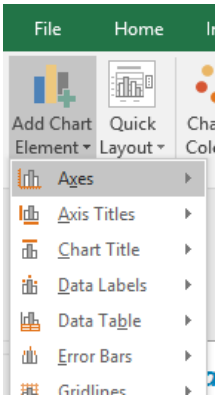
You can modify:

- **Minimum** to determine the point where the axis begins.
- **Maximum** to determine the highest point displayed on the vertical axis.
- **Major Unit** to modify the spacing between the major vertical tick marks.

You can also modify the Tick Marks, Labels, and Number format of your axis. The default number is the same number as your data is formatted.

Add Chart Elements

You can add and modify the items on your chart by going to the **Design** tab and then clicking on the **Add Chart Element**.

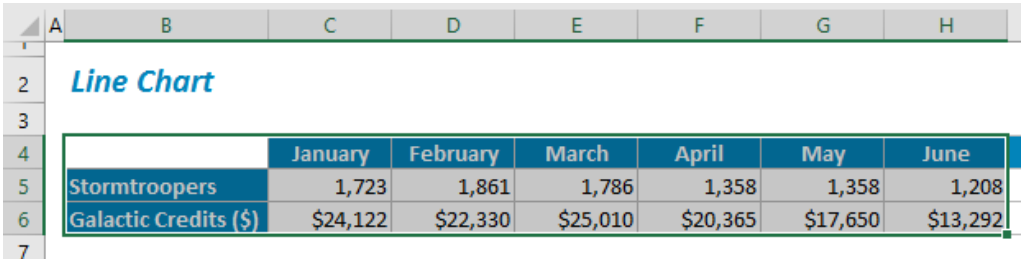


When you select each of these items, you can change where elements are located on the graph or add elements that are currently there.

Creating a Combo Chart

A **combo chart** combines any two charts on two separate axes. Usually you will combine a column chart with a line chart. The combo chart allows for qualities of the bar chart and line charts to be visualized.

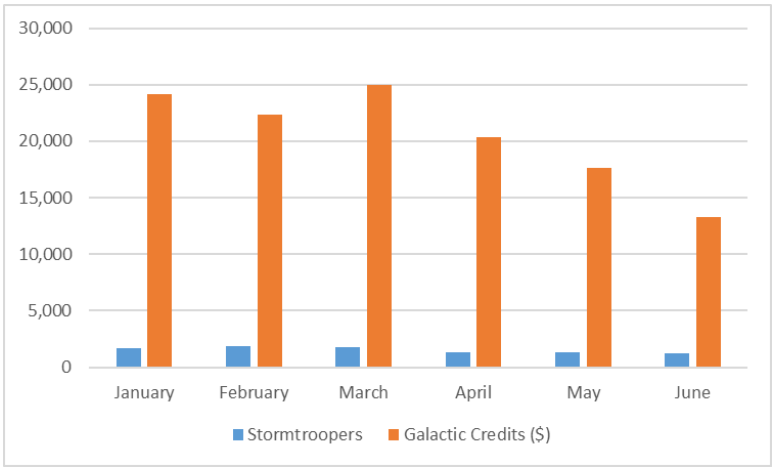
To create a combo chart, select the data you want to present on your graph. Select both sets of data. In our example, we want to plot both the number of Stormtroopers and the amount of Galactic Credits. These both have very different units so plotting them on separate axes makes sense.



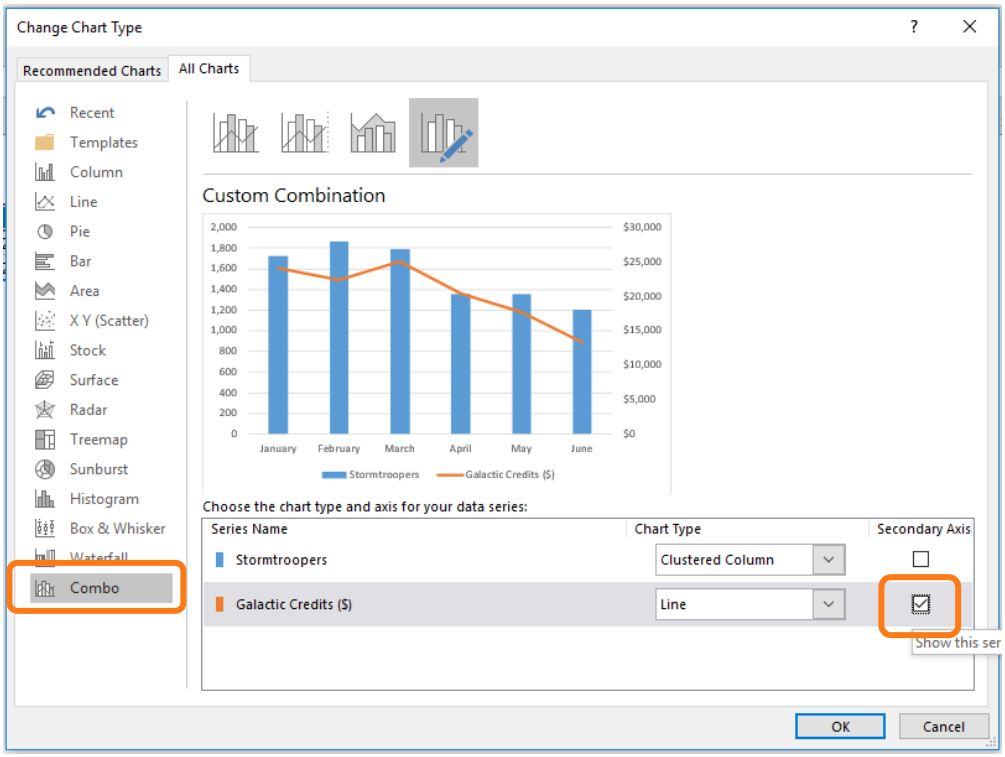
Line Chart

	January	February	March	April	May	June
Stormtroopers	1,723	1,861	1,786	1,358	1,358	1,208
Galactic Credits ($)	$24,122	$22,330	$25,010	$20,365	$17,650	$13,292

Insert the main type of chart you want. For instance, in our example we will insert a column chart.



Now click on the **Design** tab and click on **Change Chart Type**. Select **Combo** from the list on the left and then in the Choose the chart type box, select which set of data you'd like to be on the secondary axis. You can also change the Chart Type.

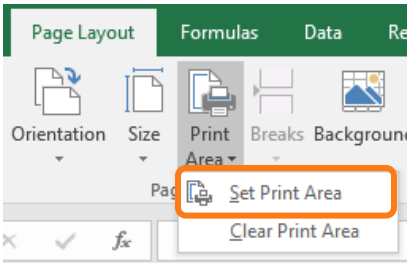


Printing an Excel Worksheet

Setting a Print Range

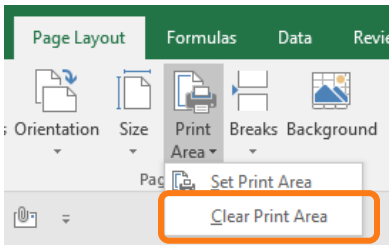
If you only want to print a specific section on a worksheet, you can define a **Print Range** that includes just that selection. To create a custom Print Range:

1. Select the data on the sheet you want to isolate for printing.
2. On the **Page Layout** tab on the Ribbon, click **Print Area,** then **Set Print Area**.



3. After you define the Print Area, Excel will only print this cell section anytime you print the worksheet.

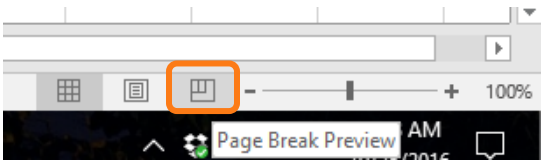
To clear the Print Area (and therefore go back to the printing defaults Excel establishes), click then **Clear Print Area** on the Page Layout tab.



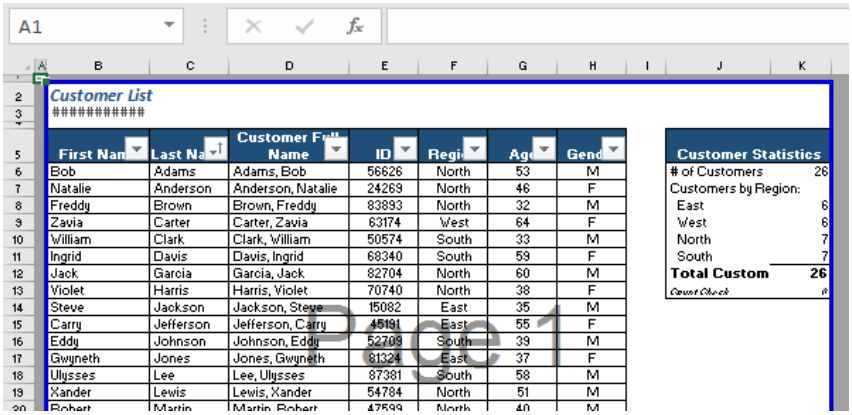
Using Page Breaks

Page Breaks allow you to customize which page your information appears on when printing. Excel will automatically split your information into different pages based on the default settings (which is not always ideal for your information).

The **Page Break Preview** enables you to spot page break problems in an instant as well as fix them. To get to the Page Break Preview, click the Page Break Preview button (the third one in the cluster of three to the left of the Zoom slider) on the Status bar or click **View Page Break Preview** on the Ribbon.



Your worksheet in Page Break Preview will now look like this:



Page Break Preview mode shows your worksheet data at a reduced magnification with the page numbers displayed in large light type and the page breaks shown by heavy lines between the columns and rows of the worksheet.

To change the page breaks, position the mouse pointer somewhere on the heavy lines. When the pointer changes to a double-headed arrow, drag the page indicator to the desired column or row and release the mouse button.

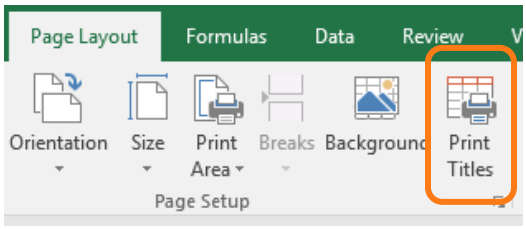
The first time you choose this command, Excel displays a **Welcome to Page Break Preview** dialog box. To prevent this dialog box from reappearing each time you use Page Break

Preview, click the **Do Not Show This Dialog Again** check box before you close the Welcome to Page Break Preview alert dialog box. Click OK or press Enter to get rid of the Welcome to Page Break Preview alert dialog box.

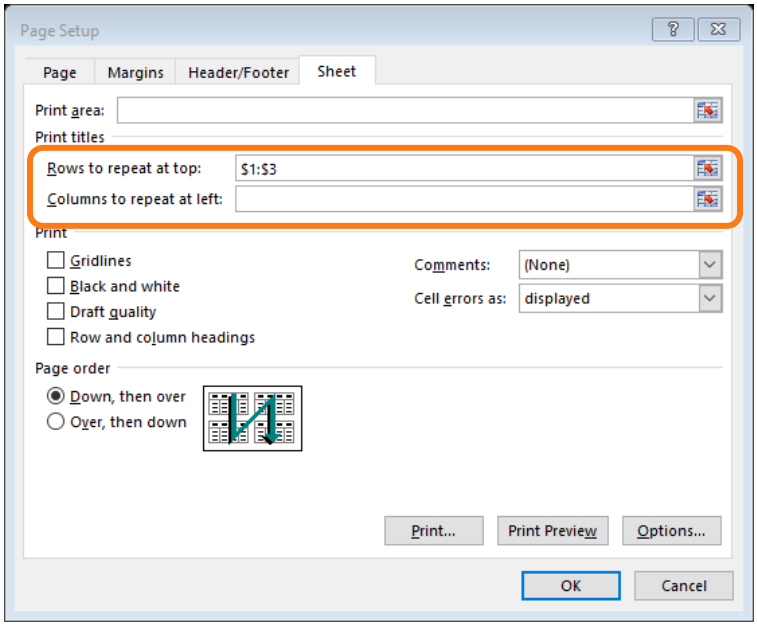
Repeating Rows or Columns

If your data spills onto more than one page, you may want to have certain rows or columns repeat on every page. For instance, you may want to have the header row repeat on every page so that when someone is looking at a print out, they can understand the data.

To have rows or columns repeat, click on the **Print Titles** button on the **Page Layout tab**.



When the dialog box appears, select which rows and/or columns you want to repeat.



WEEK 6: DATE FORMULAS AND MANIPULATING DATA

Date Functions

EDATE

The **EDATE** (for Elapsed Date) function calculates a future or past date that is x number of many months ahead or behind the date that you specify as its *start_date*. You can use the EDATE function to quickly determine the particular date at a particular interval in the future or past (for example, three months ahead or one month ago).

The EDATE function has the following syntax:

=EDATE(start_date, months)

The ***start_date*** argument is the date that you want to use as the beginning date.

The ***months*** argument is a positive (for future dates) or negative (for past dates) integer that represents the number of months ahead or months past to calculate.

For example, suppose cell A1 has the date 1/15/2018. When you enter the following EDATE function in cell B1:

=EDATE(A1,1)

Then Excel would return the date 2/15/18.

EOMONTH

The **EOMONTH** (for End of Month) function calculates the last day of the month that is x number of months ahead or behind the date that you specify as its *start_date*. You can use the EOMONTH function to quickly determine the end of the month at a set interval in the future or past.

The syntax on EOMONTH is the same as EDATE.

For example, suppose cell A1 has the date 1/15/18 and you enter the following EOMONTH function in cell B1:

=EOMONTH(A1,1)

Then Excel would return the date 2/28/18.

TODAY

To get the current date, use the **TODAY** function. The TODAY function takes no arguments and is always entered as follows:

=TODAY()

Excel will return today's date formatted as follows: 7/23/2010. This formula will update daily so it should only be used to see the current date.

YEAR

The **YEAR** function returns the year of a specified date.

For example, suppose cell A1 has the date 1/15/18 and you enter the following YEAR function in cell B1:

=YEAR(A1)

Excel would return the year 2018 in cell B1.

MONTH

The **MONTH** function returns the month (as a number) of a specified date.

For example, suppose cell A1 has the date 1/15/18 and you enter the following MONTH function in cell B1:

=MONTH(A1)

Excel would return the number 1 (i.e. month 1) in cell B1.

DAY

The **DAY** function returns the day of a specified date.

For example, suppose cell A1 has the date 1/15/18 and you enter the following DAY function in cell B1:

=DAY(A1)

Excel returns the day 15 in cell B1.

DATE

The **DATE** function allows you to piece together a date. The DATE function uses the following syntax:

=DATE(year, month, day)

The ***year*** argument is a four-digit value of a year.

The ***month*** argument is a one or two-digit value of the month from 1 to 12.

The ***day*** argument is a one or two-digit value of the day from 1 to 31.

For example, the below formula would return the date 1/15/18:

=DATE(2018, 1, 15)

Alternatively, you can combine the YEAR, MONTH, and DAY functions to piece together your date.

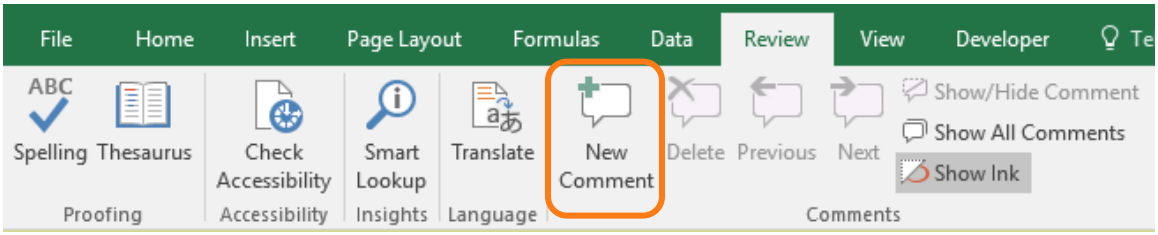
Adding Cell Comments

There are two ways to insert a comment into a cell: **Cell Comment** and an **Input Message**.

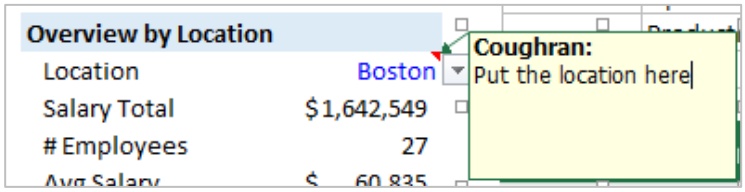
Cell Comment

Once inserted, a cell comment can only be viewed when you *hover* over the cell with your mouse. Simply selecting the cell will not reveal the comment.

To insert a comment, first select the cell where you want the comment inserted. Next, click on the **New Comment** icon on the **Review tab**.



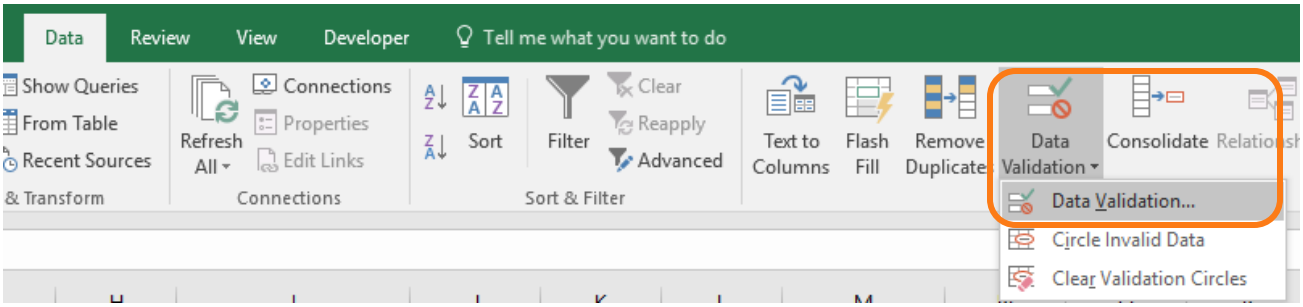
A yellow box will appear next to your cell along with a small, red triangle at the top right corner of the cell. You can change the text in the comment box. To delete the comment, click on **Delete** on the **Review tab**.



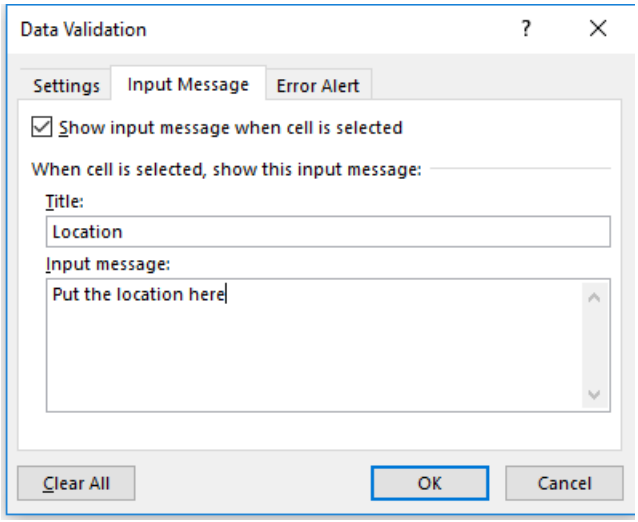
Input Message

In contrast to a Comment, an input message can only be accessed by *selecting* a cell with the comment. Also, there is no indication which cells have comments.

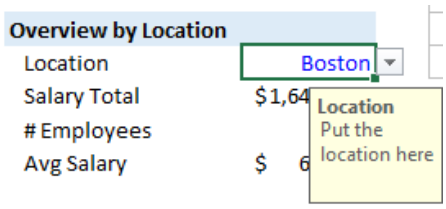
To insert a message, first select the cells(s) where you want the input message inserted. Next, click on **Data Validation** on the **Data tab**.



When the dialog box appears, click on the **Input Message tab**. From here, you can change the title and message. When done, click **OK**.



Now when you click on the cell with the message, a message like this appears.



Note that when you copy a cell with an input message, the input message is also copied.

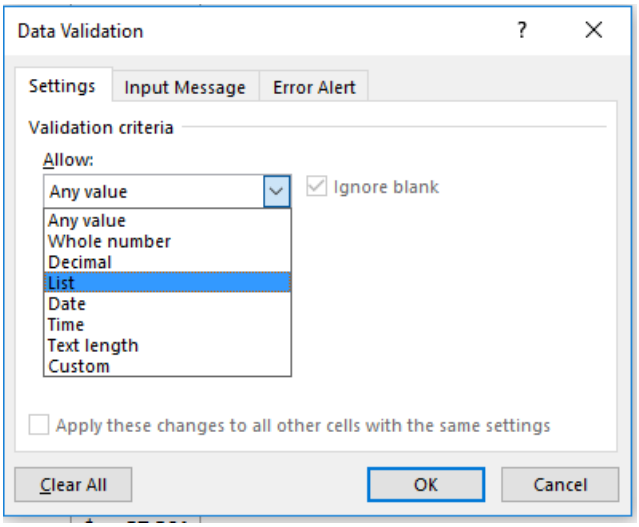
Data Validation

The **Data Validation** feature in Excel can go a long way in preventing incorrect entries in your spreadsheets. When you use Data Validation in a cell, you indicate what type of data entry is allowed in the cell. When you have a data validation rule, only certain values will be permitted to be placed in that range.

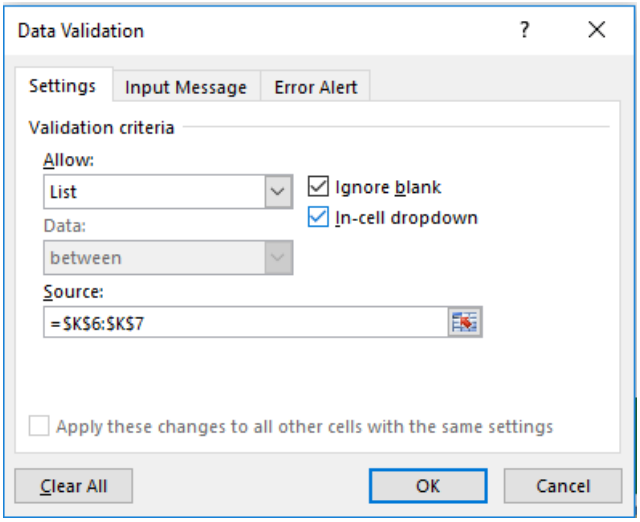
One of the more powerful and common ways to restrict entries is to create a drop-down list. The drop-down list is a list compiled from cells elsewhere in the workbook.

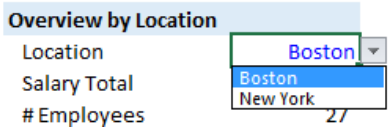
To create a drop-down list:

1. Create a list of entries you want your drop-down list to display in a single column (ex. in cells H1:H5)
2. Select the cell(s) where you want the drop-down list to appear.
3. On the **Data tab** click **Data Validation**. A Data Validation dialog box will appear.



4. Under the **Settings** tab, select the **Allow** box and click **List**.
5. Click the Source section. You can either directly select the range where your list is or you can manually insert a list by typing out the list separated by commas (ex. Yes, No, Maybe).



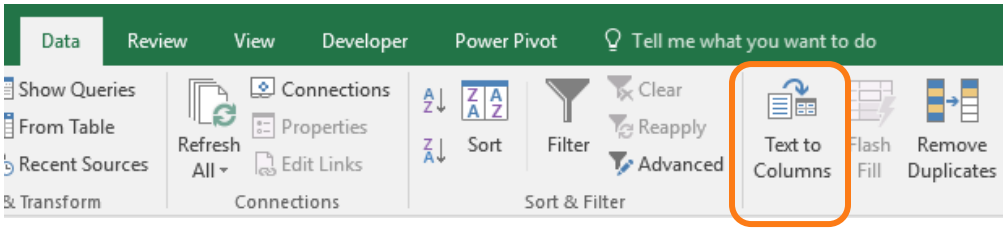


To delete a drop-down list, select the cell with the list. Click the **Data tab** and then **Data Validation**. In the Data Validation dialog box, click the **Settings tab**, and under **Allow**, select **Any Value**.

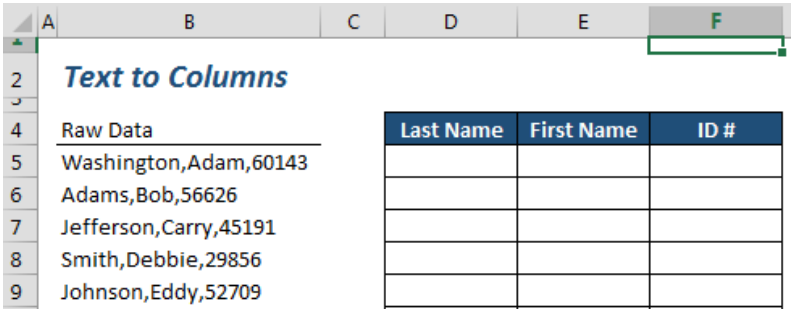
It is best to place the list of inputs on a separate sheet in the workbook and then protect that sheet. This will keep users from changing the list of inputs. Alternatively, you can place it on the same sheet but hide the column.

Text to Columns

Text to Columns (found on the **Data tab** on the Ribbon) can be used to separate data that is contained in single column into multiple columns.

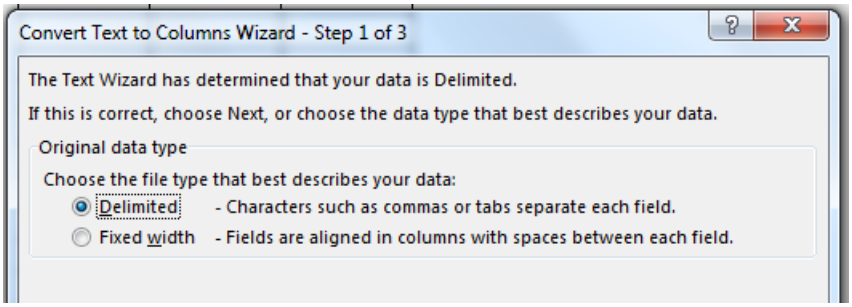


For example, if your raw data dump puts the employee's last name, first name, and ID number all in one cell, you can use **Text to Columns** to separate the data.

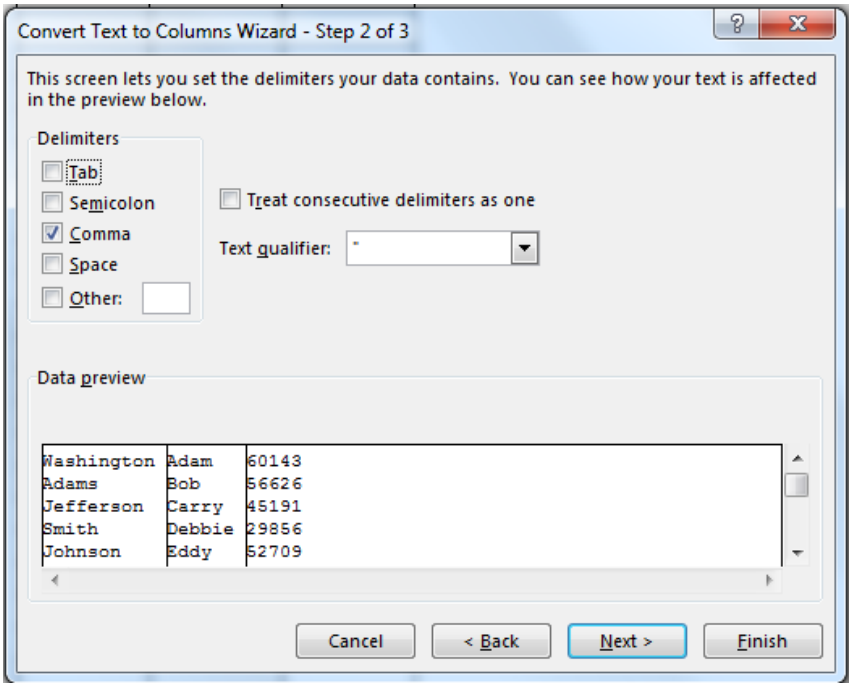


Select the cells that contains the text you want to separate and then click the **Text to Columns** command. A wizard dialog box will open to help you through the process.

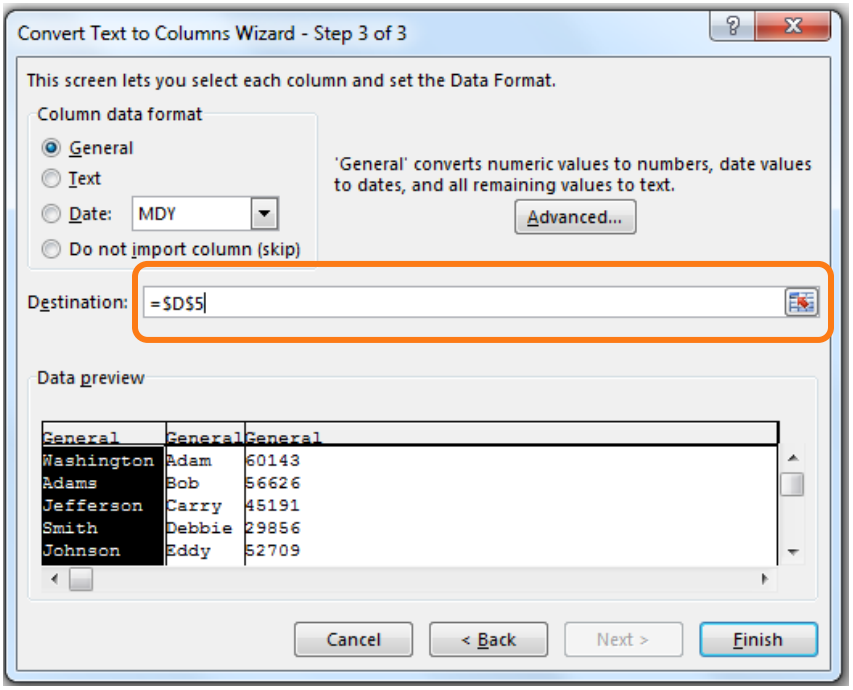
In step 1 of the wizard, select whether the text is Delimited or Fixed Width. **Delimited** text is text that has some character, such as a comma, tab, or space, separating each group of words that you want placed into its own column. **Fixed-width** text describes text where each group is a set number of characters. We'll only walk through Delimited as that is the most common. After selecting the data type, click Next.



In the next screen, you will provide details on how you want the text separated. Check the boxes that describe how your text is separated. In our example, the text is separated by a comma. You will note that under Data preview you can see how Excel will separate your data before you finish. Once it is separated as desired, click **Next**.



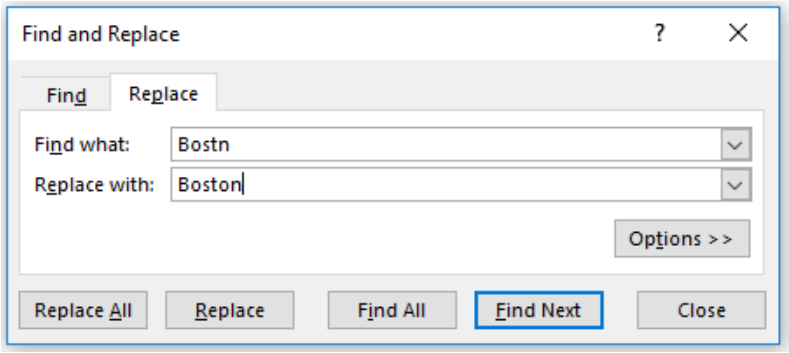
In the final step, you will tell Excel where you want to place the separated text under **Destination**. Once you have selected the destination, click **Finish**.



Find & Replace

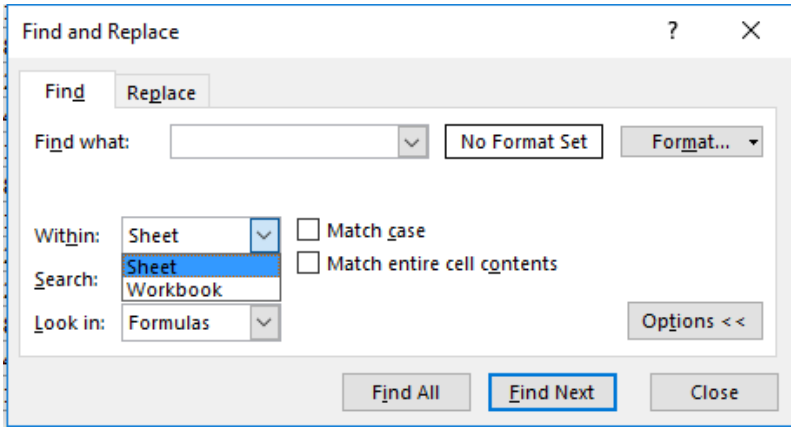
The **Find & Replace** function allows you to quickly search and entire range, sheet, or workbook for a particular value and replace it with a different value. You can replace either text, number, or even portions of a formula.

To access the Find & Replace, hit **Ctrl + F** on your keyboard. A dialog box will appear. Select the **Replace tab**.



Next to **Find what**, insert what you want Excel to find. Next to **Replace with**, insert what you want Excel to replace the found item with. Next, click Replace All.

Be careful when using this function. If you want to replace the items in the *entire sheet*, make sure you only have one cell selected. If you only want to replace the contents of *certain cells*, select those cells first before coming to this menu. If you want to replace the items in the entire workbook, click on Options and from the Within menu, select Workbook.



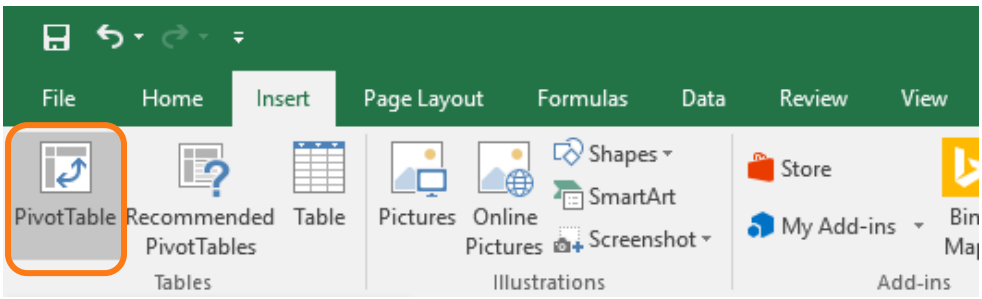
WEEK 7: PIVOTTABLES AND PIVOTCHARTS

PivotTables

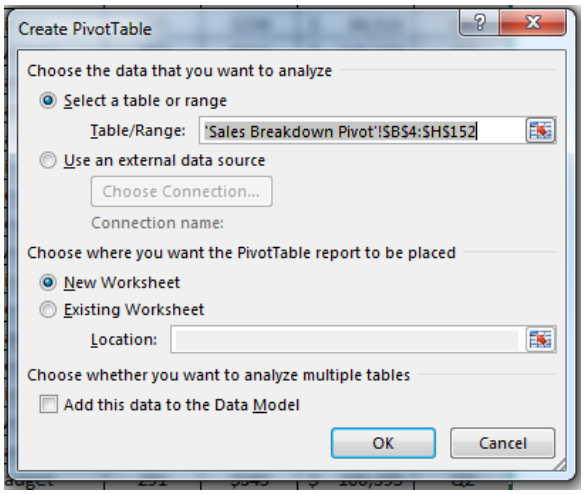
Creating a PivotTable

The **PivotTable** function in Excel is one of the most powerful data analyzing tools in Excel. PivotTables help you automatically summarize, analyze, explore, and present your data with a few clicks. To create a PivotTable:

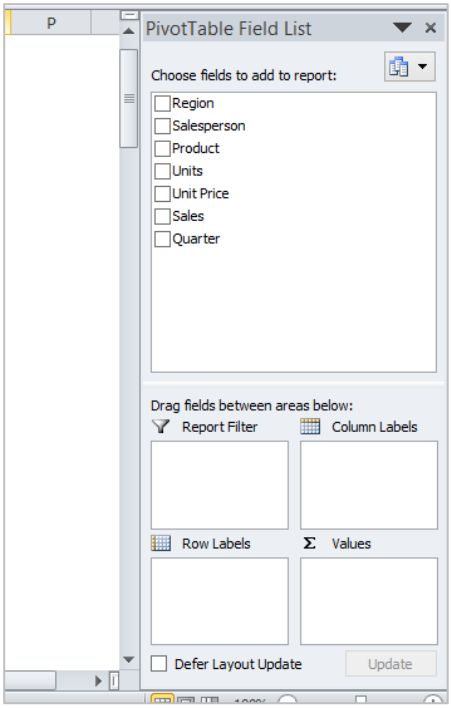
1. Make sure your data has column headings, that there are not blank rows, and that your data is completely cleaned up (remove all duplicates, all data present, etc.).
2. Click any cell in the range of cells or table.
3. On the **Insert tab**, click the **PivotTable** command button.



4. A **Create PivotTable dialog box** will appear. You have the option to change the selected table or range and to either put the PivotTable in a new worksheet or in an existing worksheet.

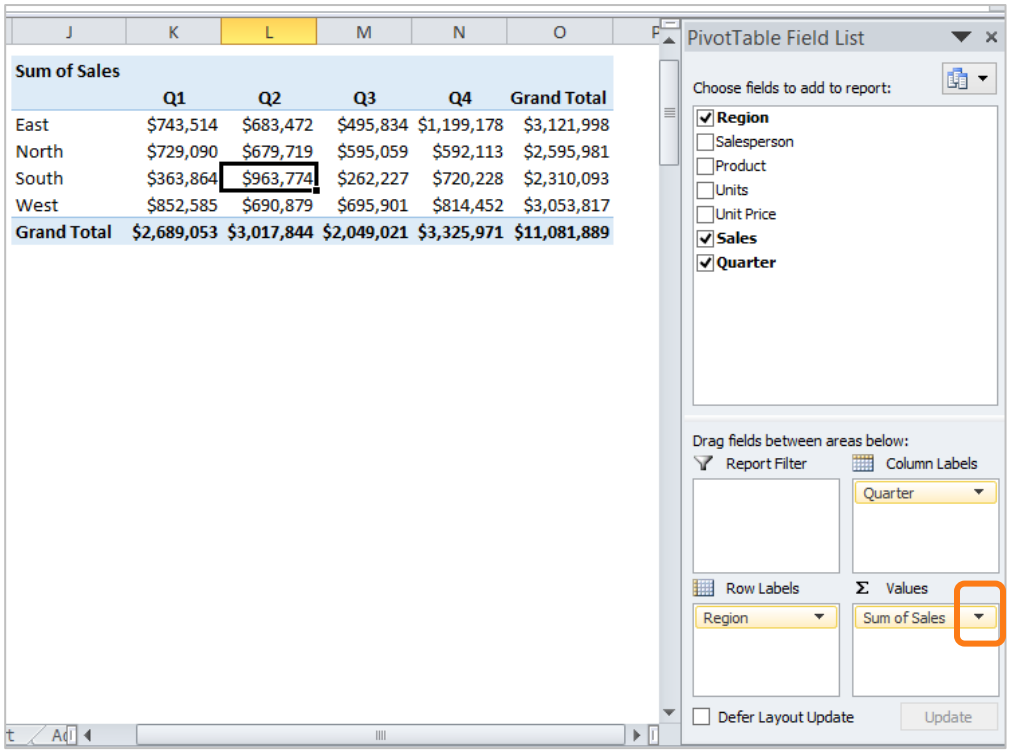


5. A new **PivotTable Field List** will appear on the left-side of the screen. It is from here that you will create and modify your PivotTable.



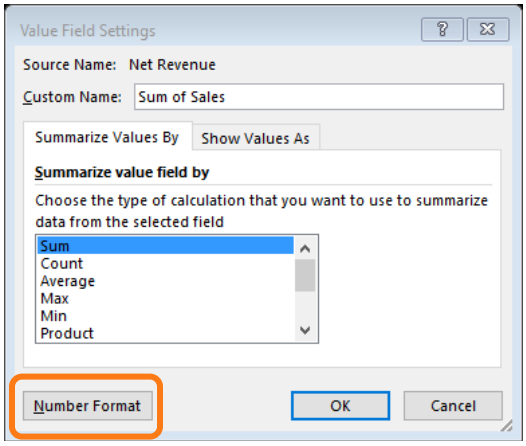
6. You can very easily zero in on your data and arrange it the way you want. To do so, click and drag the field in the **Choose fields to add to report** section to the appropriate section below.

   On the example below, we select Quarter as the Column Labels, Region as the Row Labels and Sales as the Values. This will create a table breaking out sales by region for each quarter.



7. You can add multiple layers to your PivotTable by dragging fields below or above the **Row Labels** or **Column Labels**. However, we recommend you only have one field in the Column area. Two to Three is the optimal number of fields in the Row area.
8. By default, (for most people's Excel) the Values section will sum your data. You can change this by clicking on the field arrow under the Values section (see the above picture).

   A dialog box will appear. Select the **Value Field Settings** option. Under the **Summarize Values By** tab, you can change how you want the pivot table calculate your data.

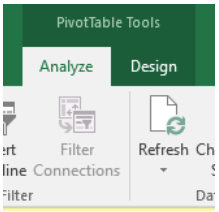


Number Formatting in a PivotTable

By default, your data will be completely unformatted. Do NOT try to update your values on the Home tab. The reason is, when you update your PivotTable or move things around, your numbers will revert back to be unformatted. Instead, click on the **Number Format** button as shown in the picture above.

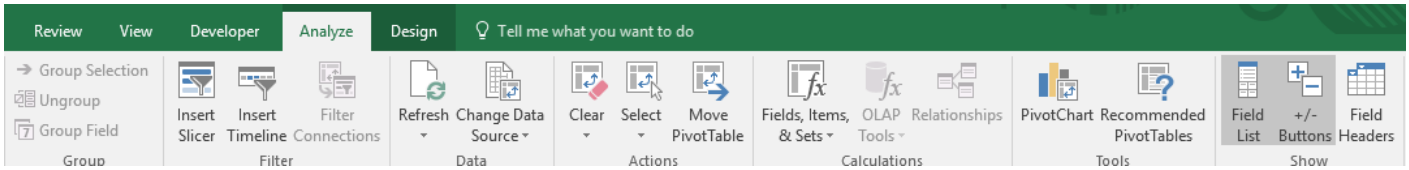
New Tabs

As soon as you create or select a PivotTable, two new tabs will be shown on the Ribbon, the **Analyze and Design** tabs.



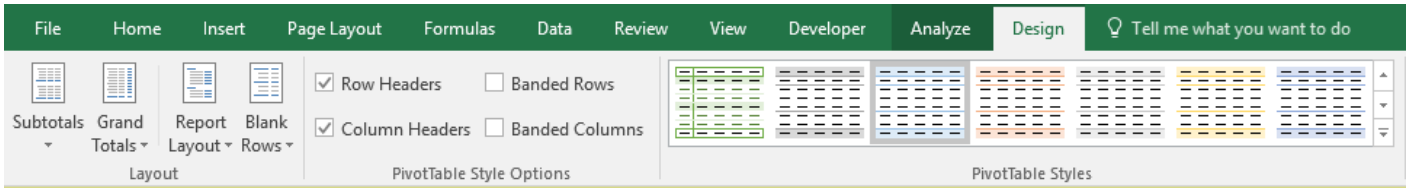
These tabs will allow you to insert a **Slicer**, **Refresh** you PivotTables, add a **PivotChart**, and change the design of your PivotTables.

Analyze Tab



- **Insert Slicer** – Slicers are a great way to slice and dice your data. We cover this more in-depth below.
- **Refresh** – After you create your pivot table, you may need to change your source data. Unlike a chart that automatically updates after you change your source data, a PivotTable will not. *You must manually refresh your PivotChart every time you update you source data!* To update, go to the **Analyze** tab and click the **Refresh** command button.
- **Move PivotTable –** Move your PivotTable to a new sheet or to an existing sheet.
- **Fields, Items, & Sets** – You can add a customized Calculated Field to your PivotTable. We go over this below.
- **PivotChart –** Create a PivotChart from your PivotTable. We go over then in depth below.
- **Field List / +- Buttons / Field Headers** – The Field List button will add or remove the PivotTables Fields box from the right-side of your screen. The Field Headers should (in our opinion) always be removed by clicking the Field Headers button. This gets rid of the in-PivotTable ability to filter. You should use Slicers instead. Doing this will clean up your PivotTable.

Design Tab



- **Subtotals** – Change the position of the subtotals or remove subtotals. We recommend you always put subtotals as the bottom of a group to make the table easier to read.
- **Grand Totals** – Add or remove grand totals from your rows and columns.
- **Report Layout –** We think the default layout is perfect. Feel free to play with these to see different default options.
- **Blank Rows –** Add a blank row after each line will make your PivotTable easier to read.

The various check boxes will allow you to change the view of your PivotTable. We think the default settings are perfect so don't recommend changing this too much.
You can

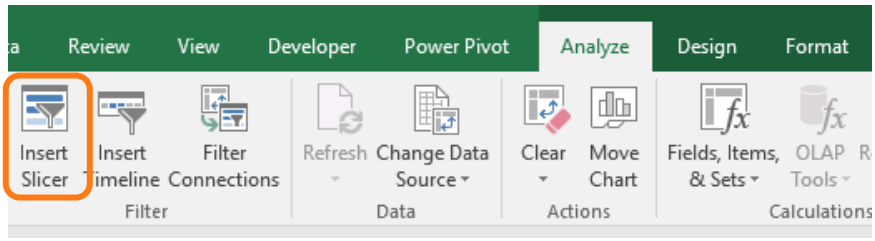
You can also change the PivotTable Style to a different color scheme or create your own custom style by clicking on the New PivotTable Style option.

Adding Slicers

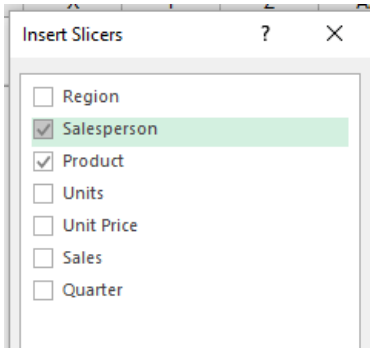
In Microsoft Excel 2010 and above, you can use slicers to quickly and easily filter your PivotTable or PivotChart. In addition to quick filtering, slicers also show you which items are being filtered which makes it easy to understand what exactly is shown in a filtered report.

You can create a Slicer(s) by:

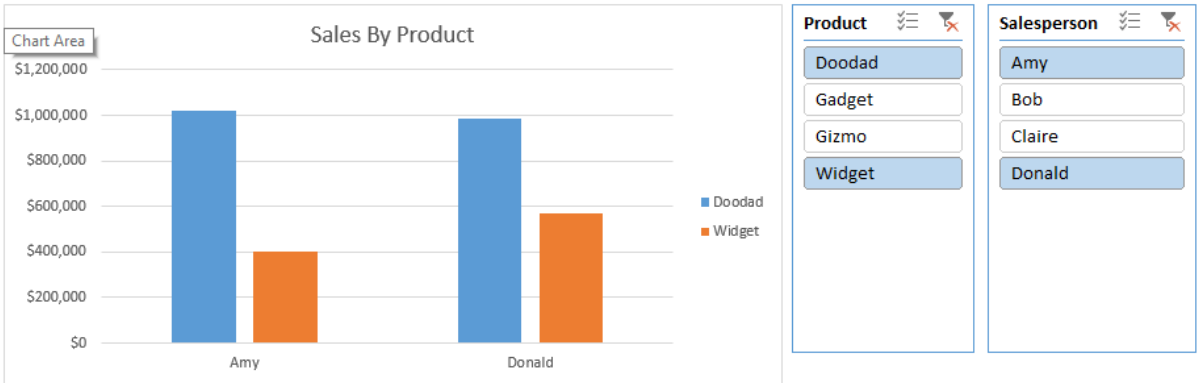
1. Click anywhere in your PivotTable or PivotChart.
2. Under the **Analyst tab** within your PivotChart Tools, select **Insert Slicer**.



3. In the Insert Slicers dialog box, select which fields you want to be able to filter on and click **OK**.



4. Your Slicer(s) will now appear. You can move the Slicer(s) around or resize them. To filter your data, click one or more of the buttons on the Slicer. To select multiple buttons, hold down the Ctrl button while clicking the buttons.



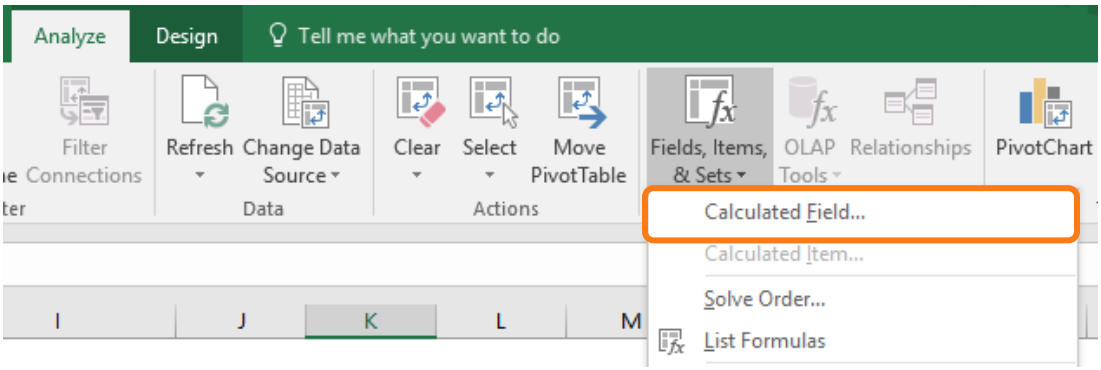
5. You can delete a Slicer by clicking on it and pushing the Delete key on your keyboard.

Creating a Calculated Field

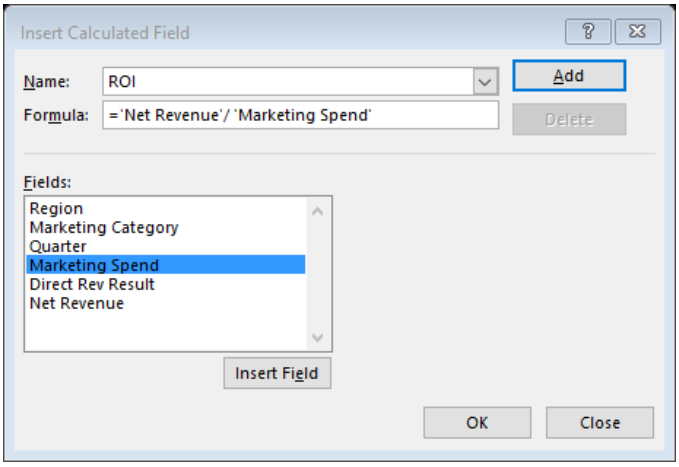
A **Calculated Field** allows you to create a new field in your PivotTable Fields that performs a calculation on the sum of other pivot fields. For example, in the example below, we have three value fields: Marketing Spend, Direct Rev Result, and Net Revenue. Let's say that we want our PivotTable to calculate the ROI (return on investment) of our marketing efforts. ROI is calculated by taking the Net Revenue divided by Marketing Spend.

To create the custom field:

1. Go to the **Analyze tab**, click on **Fields, Items & Sets** and select **Calculated Field** from the drop down.



2. The below dialog box will appear. The first thing you should do is give your field a proper name that accurately tells the user what the field is calculating.
3. You will create a formula using the existing Fields. To add a field to a formula, double click on the field name. In our example, we are going to divide the Net Revenue by Marketing Spend. Beyond simple operators, you can also use more advanced formulas like IFERROR. However, the formula cannot reference a certain cell.



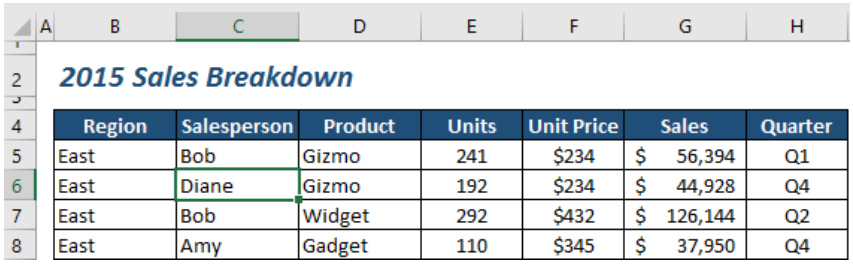
4. Click **OK**. Your new field will now appear as one of your **PivotTable Fields** to add to your PivotTable.

PivotCharts

A **PivotChart** is a visual representation of a PivotTable and the two of them are connected to each other. A PivotChart can help you make sense of your PivotTable. PivotCharts look exactly like the standard charts and graphs in Excel but the PivotChart is 100x (in our best estimate) more user friendly, dynamic, and powerful. There are two ways to create a PivotChart.

Create PivotChart without creating a PivotTable first

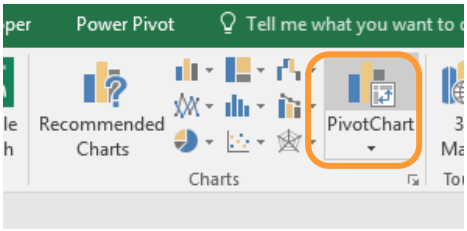
1. Click anywhere in your data set.



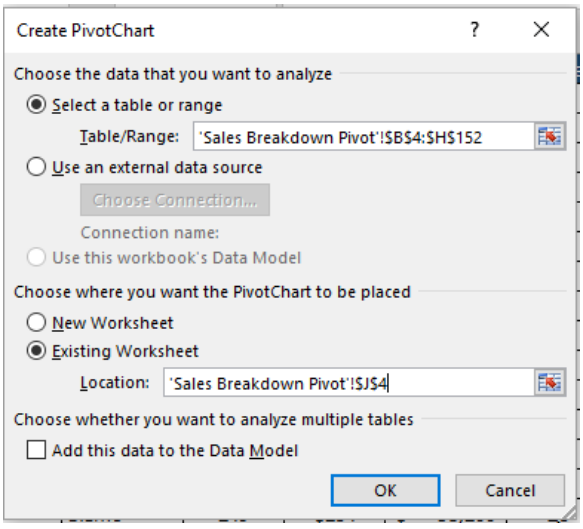
2015 Sales Breakdown

Region	Salesperson	Product	Units	Unit Price	Sales	Quarter
East	Bob	Gizmo	241	$234	$ 56,394	Q1
East	Diane	Gizmo	192	$234	$ 44,928	Q4
East	Bob	Widget	292	$432	$ 126,144	Q2
East	Amy	Gadget	110	$345	$ 37,950	Q4

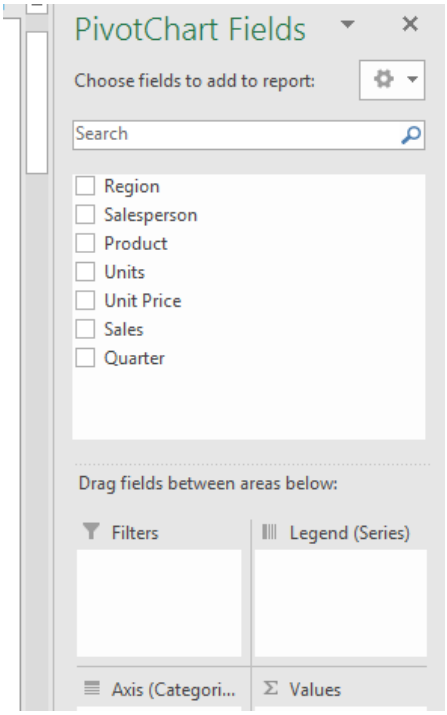
2. On the **Insert tab**, in the Charts group, click **PivotChart**. In older versions of Excel, this will be housed under PivotCharts on the left-side.



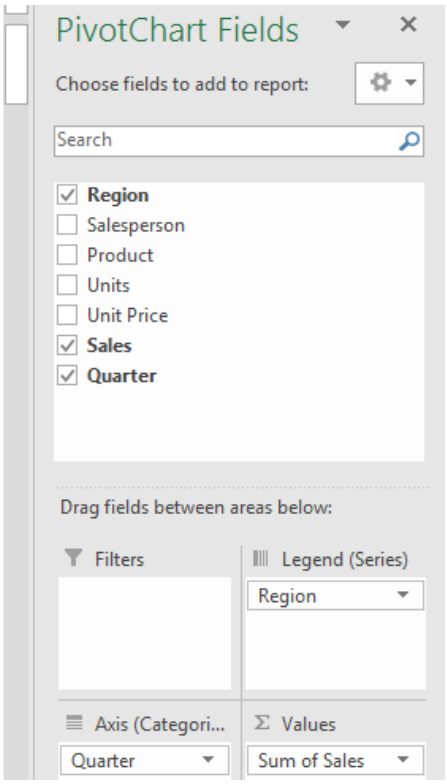
3. Once the dialog box appears, ensure that Excel properly selected all your data. You can also choose to have the PivotTable put on a new sheet or on an existing worksheet. Once are you are done, click **OK**.



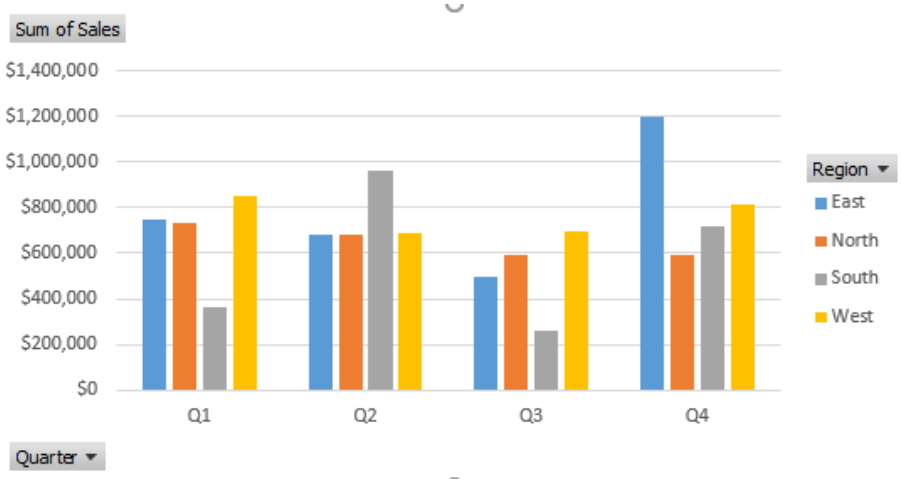
4. A **PivotChart Fields** list will appear on the right side of the screen. This list is identical to the PivotTable Field List when you created a PivotTable.



5. Exactly like a PivotTable, you can start dragging and dropping your fields to create the graph you want.



6. As you drag and drop your fields, your graph will start to come to life.

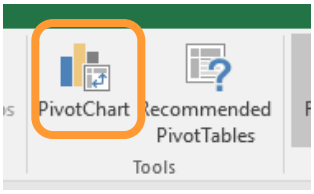


Once you get your field settings complete, you can modify the chart in the exact same way you modify a standard chart in Excel.

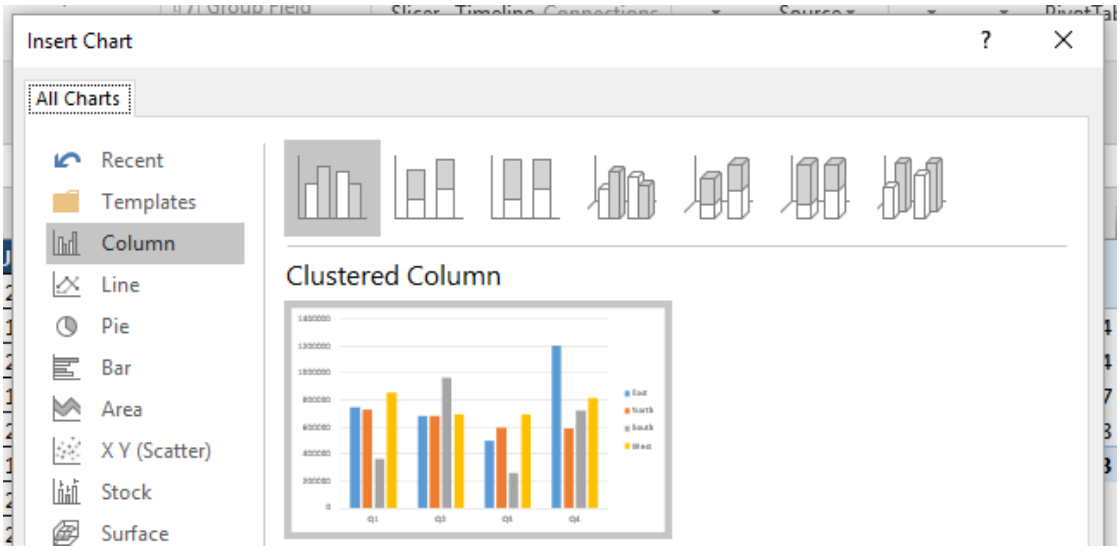
Create PivotChart with existing PivotTable

If you already have a PivotTable, you can base a PivotChart on that PivotTable.

1. Click anywhere in the PivotTable to show the PivotTable Tools on the ribbon.



2. In the Insert Chart dialog box, click the chart type you want.



3. After you create you chart, you can follow the steps above to modify the chart to your liking.

Form Controls (Spin Buttons)

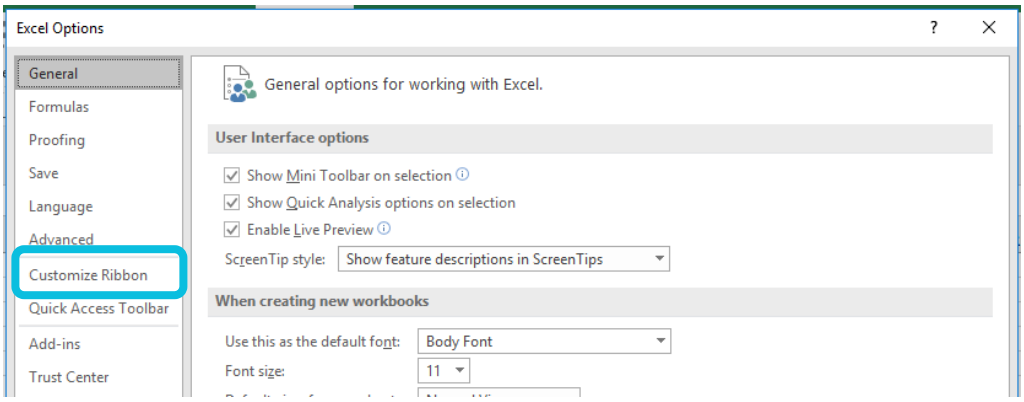
Spin buttons (one of the **Form Controls**) allow you to quickly, and in an entertainingly way, change a value in a cell by clicking on the button.

Let's say you have the following set of data and you want an easy way to change the Loan Amount assumption in cell B2:

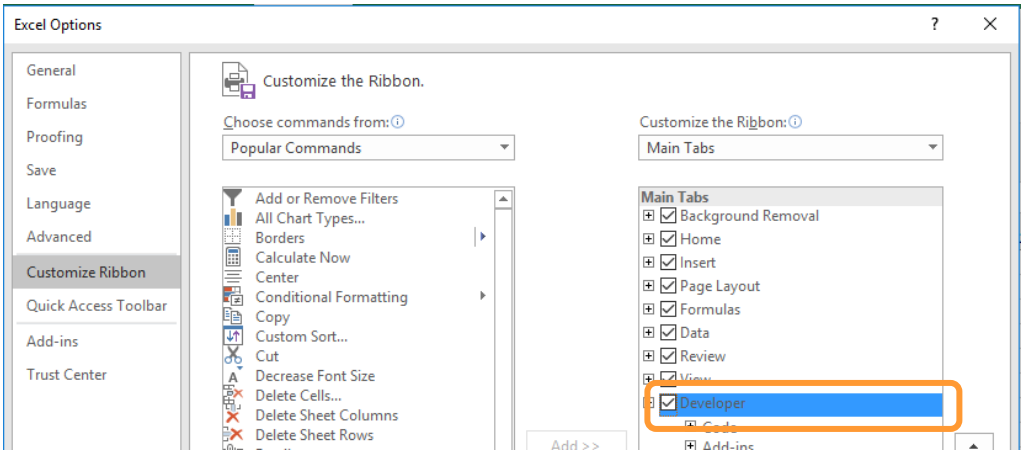
	A	B
1	Customer Name:	Gwyn Quincy
2	Loan Amount:	$8,000
3	Interest Rate:	4.50%
4	**Mthly Payment:**	**$238**
5		

To create a spin button, follow these steps:

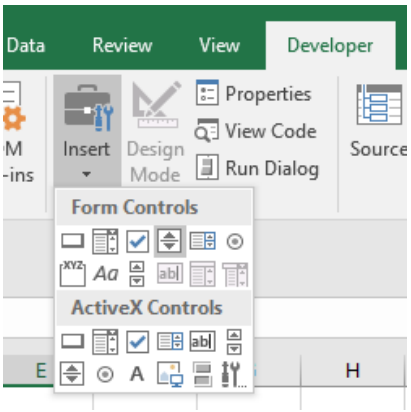
1. Activate the **Developer tab**
    a. Click the **File tab** and then click **Options**.



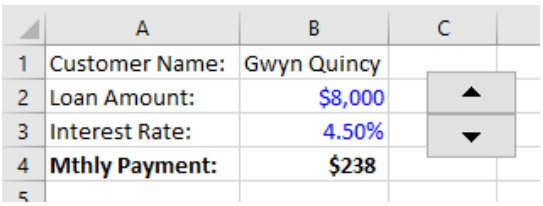
    b. Under **Customize Ribbon**, in the right-side box, check the **Developer checkbox**



2. On the **Developer tab**, in the Controls group, select the **Insert**, and then under **Form Controls**, select the **Spin Button**.

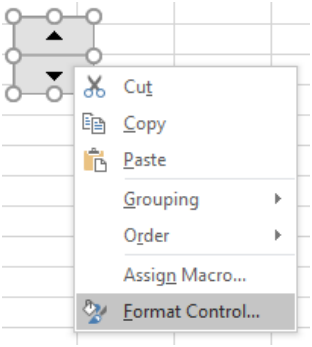


3. Draw on your worksheet the area where you would like the spin button to be.



Now we need to link our spin button to cell B2. To do that:

1. Right click on the spin button and select **Format Control**.



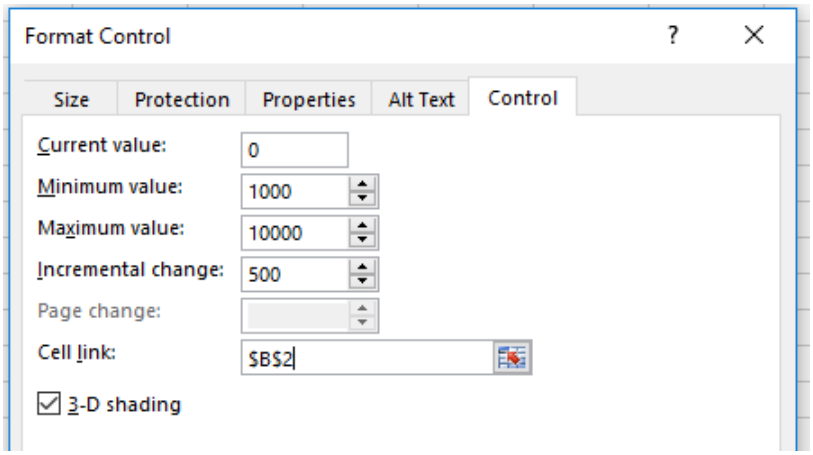
a. In the **Current value** box, you enter the initial value of the spin button. You can leave this as 0.

b. In the **Minimum value** box, enter the lowest value that a user can get by clicking the bottom arrow in the spin button.

c. In the **Maximum value** box, enter the highest value that a user can get by clicking the top arrow in the spin button.

d. In the **Incremental change** box, enter the amount that the value increases or decreases when the arrows are clicked.

e. In the **Cell link** box, enter a cell reference that contains the current position of the spin button.



Now, when you click the spin button, the value in the linked cell will increase and decrease with the button.

WEEK 8: TEXT/STATISTICAL FORMULAS & PROTECTING YOUR DATA

Text Based Formulas

RIGHT / LEFT

The **RIGHT** function returns the last character(s) in a text string, based on the number of characters you specify, while the **LEFT** function returns the first character(s) in a text string.

The syntax for both function is as follows:

=RIGHT(text, [number_of_characters])

=LEFT(text, [number_of_characters])

The ***text*** argument is the string that you wish to extract from.

The ***number_of_characters*** argument is the number of characters that you wish to extract starting from the right-most character (RIGHT function) or left-most character (LEFT function).

Let's assume that cell A1 contains the text "Guacamole". The RIGHT and LEFT formulas below would return the following:

=RIGHT(A1, 4) would return "mole"

=LEFT(A1, 4) would return "Guac"

MID

The **MID** function is similar to the RIGHT/LEFT functions except it returns the middle character(s) in a text string based on the number of characters you specify.

The MID syntax is as follows:

=MID(text, start_num, num_chars)

The ***text*** argument is the text you want to extract from.

The ***start_num*** argument is the location of the first character to extract.

The ***num_chars*** argument is the number of characters to extract.

For example, if you have the text "The Quick Brown Fox" in cell A1 and wanted to extract "Quick", you would use the following formula:

=MID(A1,5,6)

You use 5 as the *start_num* since "Q" is the 5th character in the string (spaces count as a character). You use 6 as the *num_chars* since there are six characters in the word "Quick".

LEN

The **LEN** function counts the number of characters in a text string.

The syntax for the function is as follows:

=LEN(text)

If you have "Bob Adams" in cell A1, then =LEN(A1) would return the value 9 (spaces count as a character). LEN is not very useful by itself and is most effective when combined with RIGHT or LEFT.

Combining LEN + RIGHT/LEFT

If cell A1 contains a string which includes an employee number, first name, and last name (ex. "498585 Bob Adams") and you want to quickly separate out the first and last name, you can use the following formula:

=RIGHT(A1, LEN(A1)-7)

This would return the text "Bob Adams". What this formula is doing is saying, starting from the RIGHT of the text in cell A1, extract all the characters (*LEN(A1)*) and then go back 7 characters (to account for the 6-digit employee number and the space).

CONCATENATE

You can combine texts from different cells into one using the **CONCATENATE** function. To do this, use the following syntax:

=CONCATENATE(cell1, cell2, [...])

You can add text by putting "" around the desired text. For example, you could add spaces by inserting a " ", a comma by inserting a ", " and so forth.

Let's assume that cell A1 contains the text "Bob" and cell B1 contains the text "Smith". To combine the two with the last name, comma space, and then first name, we would use the following formula:

=CONCATENATE(B1, ", ", A1) would generate "Smith, Bob"

Statistical Formulas

MIN

The **MIN** function takes the smallest value out of the range of cells selected within a data set.

=MIN (number1, [number2],…)

Using the MIN formula, you can set a ceiling to a set of values. For instance, let's say a SUM formula is supposed to return negative numbers. However, you want to make sure that the smallest number is zero (in other words, not positive numbers). You could set up a MIN function that says:

=MIN(SUM(A1:A10,0)

This formula is saying, keep the smallest number between the sum of A1:A10 and zero. So, if the SUM returns -10, the MIN formula will return -10. However, if the SUM formula returns a +13, the MIN formula will return a 0.

MAX

The **MAX** function takes the largest value out of the range of cells selected within a data set.

=MAX (number1, [number2],…)

The MAX function works exactly like the MIN function except in reverse. With the MAX function, you are able to set a floor to a set of values.

LARGE / SMALL

The **LARGE** and **SMALL** formulas perform almost identical functions. The LARGE will find the *x* number of largest numbers in a data set while the SMALL will find the *x* number of smallest numbers.

=LARGE (array, k)

=SMALL(array, k)

The ***array*** argument is the range from which you want to pull the largest/smallest values.

The ***k*** argument is the position you want to return (ex. Put 1 for the largest number, 2 for the 2nd largest value, etc.)

Rounding Formulas

ROUND

You use the **ROUND** function to round up or down fractional values. The ROUND function actually changes the way Excel stores the number in the cell that contains the function, unlike when applying a number format to a cell, which affects only the number's display. To use ROUND, use the following syntax:

=ROUND(number, num_digits)

The ***number*** argument is the value that you want to round

The ***num_digits*** argument is the number of digits you want to round to.

Entering a 0 (zero) will round the number to the nearest integer. Entering a positive number will round the number to that many decimals. Entering a negative number will round the number to the left of decimal point.

For example, if B2 contains the value *123,456.789* then we can round it as follows:

=ROUND(B2,0) will return 123,457

=ROUND(B2,1) will return 123,456.8

=ROUND(B2,-1) will return 123,460

ROUNDUP

The **ROUNDUP** formula works almost exactly the same way as the ROUND formula; however, this formula always rounds a number up. The arguments for ROUNDUP are the same as ROUND.

=ROUNDUP (number, num_digits)

ROUNDDOWN

The ROUNDDOWN formula also works almost exactly the same way as the ROUND formula; however, this formula always rounds a number down. The arguments for ROUNDDOWN are the same as ROUND.

=ROUNDDOWN (number, num_digits)

Protecting Worksheets and Workbooks

Protecting Worksheets

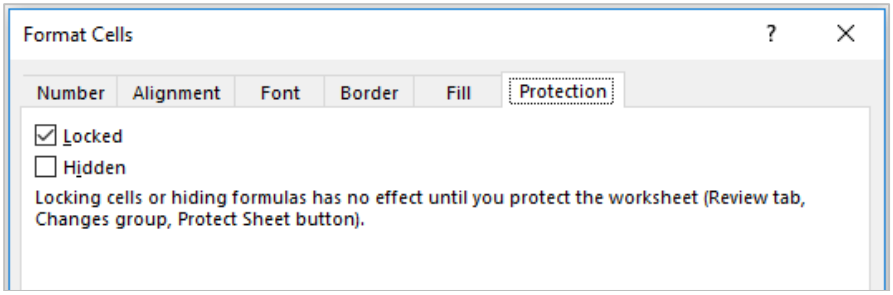
After you have your worksheet the way you want it, you can use the Protection feature to keep it that way. To keep the formulas and text in a spreadsheet safe from any unwarranted changes, you need to protect the worksheet.

Before you start using the **Protect Sheet** function, you need to understand how protection works in Excel. All cells in the workbook can have one of two different protection formats:

- ***Locked*** – When you protect your sheet, the cell *cannot* be modified.
- ***Unlocked*** (done by unchecking Locked) **–** When you protect your worksheet, this cell *can* be modified.

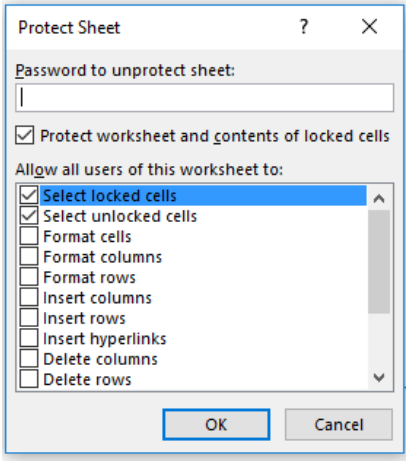
Be default, all cells in a workbook are Locked. However, this means nothing until you protect your sheet. At that time, the user is prevented from making any editing changes to all locked cells.

You can change the protection format of a cell by pressing **Ctrl + 1** and then going to the **Protection** tab.



When setting up your own spreadsheet, unlock all the cells where users need to input new data and keep locked all the cells that contain information that should never change. To unlock a cell, just uncheck the Locked checkbox.

To protect the worksheet, go to the **Review tab** and click the **Protect Sheet** command button. If you leave the **Password** box blank, the worksheet will still be locked but there will be no password to unlock it. If you put a password, you will then be required to put it in twice. Don't forget the password as it is not possible to recover it.

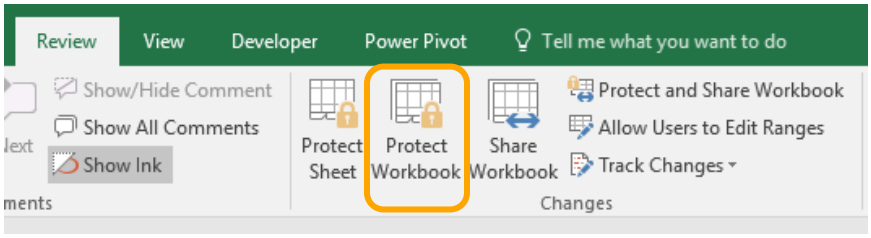


Note that even if you protect your worksheet, someone can still delete the worksheet. Use Protect Workbook in conjunction with Protect Sheet to avoid this.

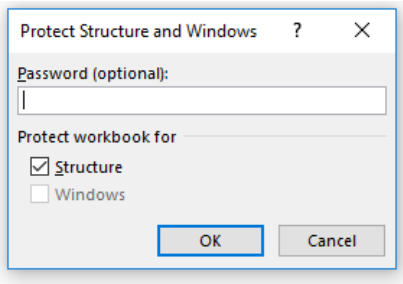
Protecting a Workbook

Protecting your workbook preserves the overall integrity of your workbook. When you protect your workbook, people will not be able to add/delete/hide worksheets. However, unless individual sheets are protected, users can still freely modify individual worksheets as they desire.

To protect your workbook, go to the **Review** tab and select **Protect Workbook**.



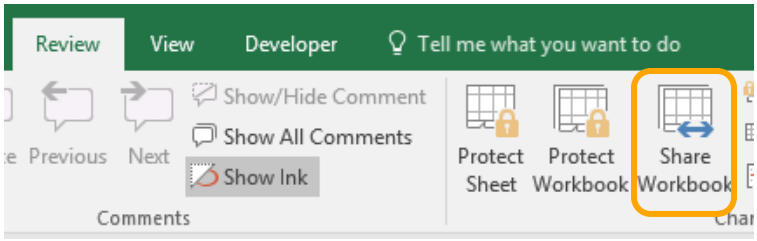
Just as with **Protect Sheet**, you will be required to put in a password twice. Don't forget the password as it is not possible to recover it.



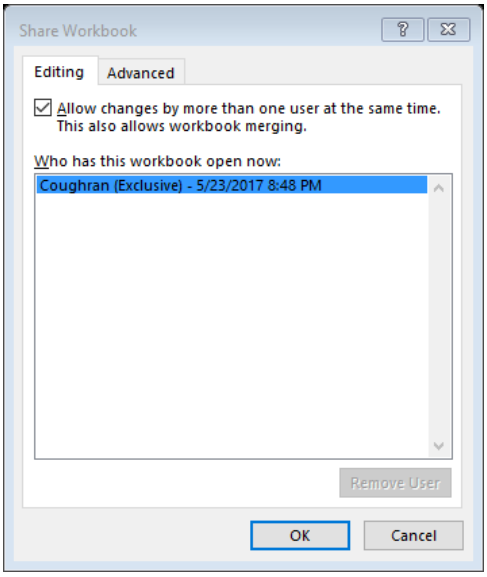
Sharing a Workbook

You can set up your workbook so that multiple users can be in the document at the same time making changes. This is especially helpful when two different users need to update different portions of the spreadsheet.

To allow this, go to the Review tab and click the **Share Workbook** command button.



A Share Workbook dialog box will appear. Click the **Allow changes by more than one user at a time** check box.



You need to save the workbook before this change can take effect. To reverse the sharing option, simply uncheck the box and save the workbook.

WEEK 9: ADVANCED FORMULAS & SCENARIO ANALYSIS

Advanced Conditional & Lookup Formulas

Nested IF Statements

You can nest multiple (up to 7) IF statements into a single formula. But truth be told, if you have more than 2 or three nests, there is probably a better formula. Nested IF statements are helpful if you need two or more conditions to be met.

Let's say you need to test whether something is Okay, Bad, or Very Bad. A nested IF statement would look like this:

=IF(A1>0, "Okay", IF (A1<-1000, "Very Bad", "Bad"))

Let's break down the parts:

=IF(A1>=0, "Okay": If cell A1 is greater than zero, then put "Okay" in the cell.

, IF (D3<-1000, "Very Bad": This is where the nest begins. If the first statement is false, then you want to test another assumption. In this case, you now want to see if A1 is less than ($1,000). If so, then put "Very Bad".

," Bad"): Finally, if the first and second statements are false, then put "Bad". In other words, if A1 falls between ($1) and ($999).

Nested IF statements are easy once you understand the general concept. Another way to look at nested statements is like this:
=IF This statement is true, then return this value, otherwise IF (This statement is true, then return this value, otherwise return this value)).

INDEX

The **INDEX** function returns a value from within a table or range, similar to a VLOOKUP formula. The INDEX formula triangulates, using a row and column number, on a particular cell within a range.

The syntax of the INDEX function is as follows:

=INDEX(array, [row_num], [col_num])

The ***array*** argument is a range of cells that you want Excel to use in the lookup.

The ***row_num*** argument is the row number where the lookup cell is located.

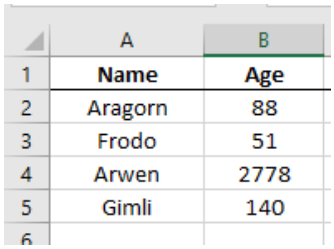
The ***col_num*** argument is the column number where the lookup cell is located.

If this range contains only one row or column, the *row_num* or *col_num* arguments are optional. If the range has more than one row or more than one column, and you specify both the *row_num* and the *col_num* arguments, Excel returns the value in the *array* argument that

is located at the intersection of the *row_num* argument and the *col_num* argument.

For example, if cells A2:A5 lists names and cells B2:B5 lists ages, you can input the following formula to lookup Arwen's age:

> *=INDEX(A2:B5, 3, 2) which will return the value at the intersection of the third row and second column in the range A2:B5, which is 2,778.*



	A	B
1	**Name**	**Age**
2	Aragorn	88
3	Frodo	51
4	Arwen	2778
5	Gimli	140
6		

MATCH

The **MATCH** function searches for a specified item in a single column or row of cells, and then returns the relative position of that item in the range.

For example, if the range A1:A3 contains the values 5, 25, and 38 respectively, then the formula *=MATCH(25,A1:A3,0)* would return the number 2, because 25 is the second item in the range.

The syntax of the MATCH function is as follows:

> *=MATCH(lookup_value, lookup_array, [match_type])*

The ***lookup_value*** argument is the value you want to look up.

The *lookup_array* is the cell range or array containing the values that you want to match.

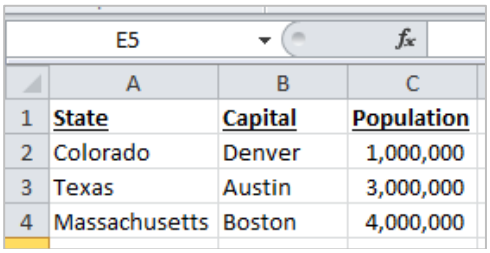
The sort-of optional ***match_type*** argument is the number 1, 0, or –1, which specifies how Excel matches the value specified by the *lookup_value* argument. 99% of the time you will want to put 0 for an exact match.

INDEX + MATCH

INDEX and **MATCH** by themselves are not the most useful of formulas. But when you combine them together, it is one of the most powerful formulas in Excel and will outshine any VLOOKUP formula.

The VLOOKUP formula can be very limiting. For instance, it can only lookup values contained within the first column of a data range. What if you had to look up a value in a middle column? Additionally, if you insert a column in your VLOOKUP lookup table, the entire VLOOKUP formula will blow up. This is where the combined INDEX/MATCH comes into play.

To combine INDEX and MATCH, we will use the MATCH formula to automatically return the row and column number for the INDEX formula. This is best explained with an example. The table below shows the State, Capital, and State Population.



We can find the population of Massachusetts's capital using just an INDEX formula:

> *=INDEX($A$2:$C$4,3,3) Massachusetts is in the 3rd row of the range and Population is in the 3rd column.*

However, we can use MATCH to find both Massachusetts and Population:

> *=MATCH("Massachusetts", $A$2:$A$4,0) = 3*
>
> *=MATCH("Population", $A$1:$C$1,0) = 3*

We can now combine all the formulas in to one:

> *=INDEX($A$2:$C$4, MATCH("Massachusetts", $A$2:$A$4,0), MATCH("Population", $A$1:$C$1,0))*

Using INDEX + MATCH definitely takes practice and will initially be slower than VLOOKUP. However, after using it three or four times, you will have the formula mastered.

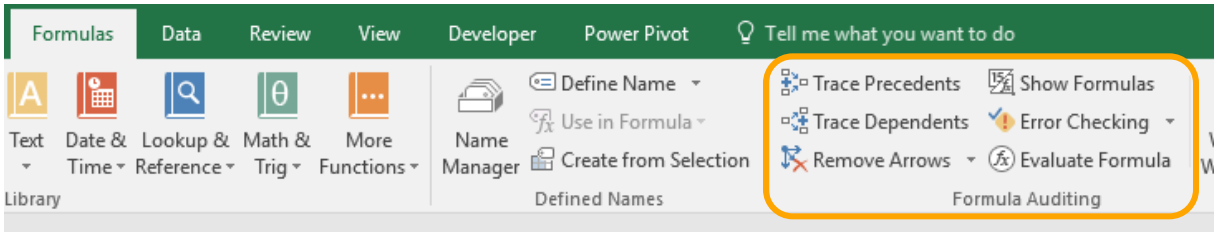
Auditing a Worksheet and Formula

Trace Precedents / Dependents

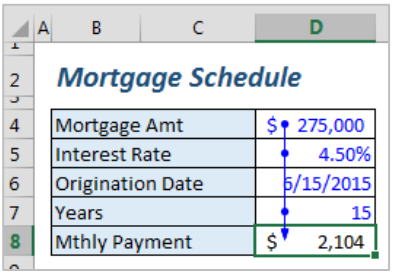
At times, it is useful to be able to track where a cell is used throughout the spreadsheet. This can be helpful in tracking down an error or to see if you can delete a cell without causing an error.

Excel offers very effective formula-auditing tools that trace the cell's relationships. You can test formulas to see which cells, called **precedents**, directly feed the formulas and which cells, called **dependents**, depend on the results of the formulas.

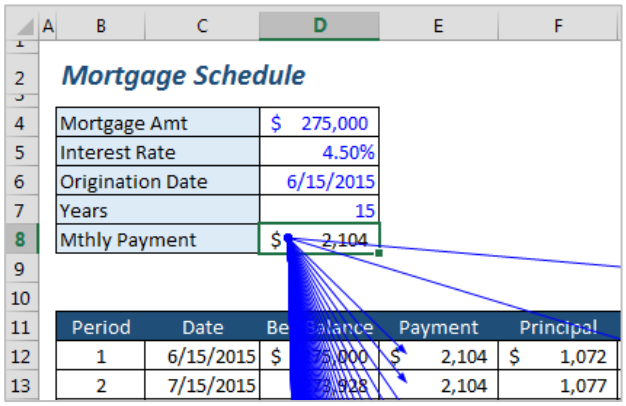
The formula-auditing tools are found in the **Formulas tab** and includes the following tools:



- **Trace Precedents:** When you click this button, Excel draws arrows to the cells (*direct precedents*) that are referred to in the formula inside the selected cell. When you click this button again, Excel adds "tracer" arrows that show the cells (the so-called indirect precedents) that are referred to in the formulas in the direct precedents.



- **Trace Dependents:** When you click this button, Excel draws arrows from the selected cell to the cells (*direct dependents*) that use, or depend on, the results of the formula. When you click this button again, Excel adds tracer arrows identifying the cells (*indirect dependents*) that refer to formulas found in the direct dependents.



- **Remove Arrows:** Clicking this button removes all the arrows drawn, no matter what button or pull-down command you used to put them there.

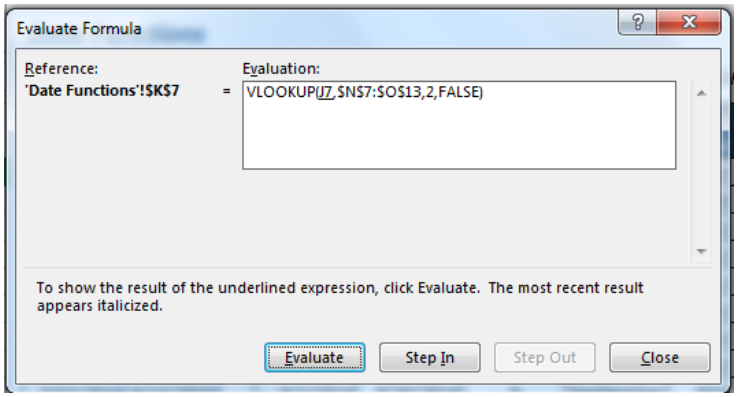
Evaluate Formulas

Another way to audit a formula is to step through the calculation to see the current value returned by each part of the calculation. This is helpful for complicated calculations or to isolate an error.

To evaluate a formula step-by-step:

1. Click the cell you want evaluate

2. Click the **Evaluate Formula** command button on the **Formulas tab**. This opens the Evaluate Formula dialog box with an Evaluation list box that displays the contents of the entire formula that's in the current cell.



3. When you click the **Evaluate button**, Excel will evaluate the first expression or term in the formula (shown underlined in the Evaluation list box) and show it with the calculated value. After you evaluate the first expression in the formula, Excel underlines the next expression or term in the formula.
4. When you finish evaluating all the expressions and terms of the current formula, you can close the Evaluate Formula window by clicking Close.

Single and Multi-Variable Data Tables

Data Tables enable you to see how changing one or two variables affect a certain metric or value. For example, you may want to know what happens to net income if revenue increase by 5%, 7.5%, 10% and so on.

Data tables provide a shortcut for calculating multiple results in one operation and a way to view and compare the results of all the different variations together on your worksheet.

Single-variable data table

We will create a one-variable data table using an example. In this example, we are going to figure out what our mortgage payment would be at different interest rates. Cells B1:B4 are input cells and cell B5 is the mortgage payment based on a formula using the inputs in cells B1:B4. To create the data table:

1. Put a list of different interest rates in Cells D3:D7. Excel will use these rates as substitutes for the interest rate in cell B2 once we create the data table.

	A	B	C	D	E
1	Mortgage Amt	$ 275,000		Interest	Payment
2	Interest Rate	4.50%			
3	Origination Date	6/15/2015		4.15%	
4	Years	15		4.30%	
5	Mthly Payment	$ 2,104		4.45%	
6				4.60%	
7				4.75%	

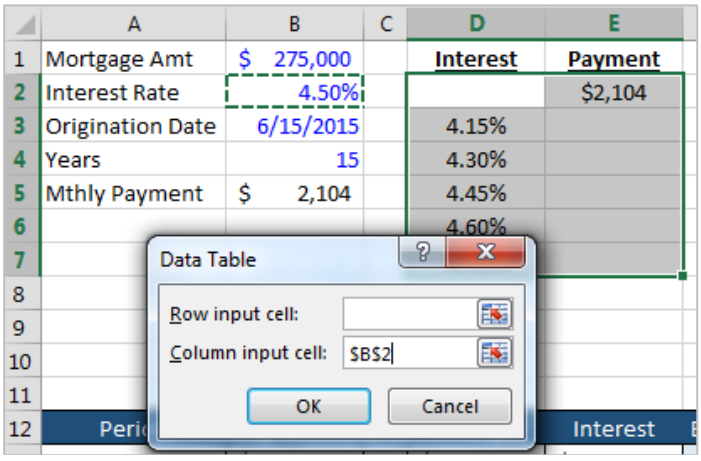
2. In cell E2 we will reference the payment formula in B5. This reference must be one row up and to the right of the substitute value list you just created.

	A	B	C	D	E
1	Mortgage Amt	$ 275,000		Interest	Payment
2	Interest Rate	4.50%			=B5
3	Origination Date	6/15/2015		4.15%	
4	Years	15		4.30%	
5	Mthly Payment	$ 2,104		4.45%	
6				4.60%	
7				4.75%	

3. Select the entire data table range, including the cell reference to the payment formula.

	A	B	C	D	E
1	Mortgage Amt	$ 275,000		Interest	Payment
2	Interest Rate	4.50%			$2,104
3	Origination Date	6/15/2015		4.15%	
4	Years	15		4.30%	
5	Mthly Payment	$ 2,104		4.45%	
6				4.60%	
7				4.75%	

4. On the **Data** tab click the **What-If Analysis** command button and then click **Data Table**. A Data Table dialog box will appear. Since this is a single variable data table, only the column input cell will be populated. The column input cell is the interest rate in cell B2.



5. After you click Ok, your data table will be populated.

	A	B	C	D	E
1	Mortgage Amt	$ 275,000		Interest	Payment
2	Interest Rate	4.50%			$2,104
3	Origination Date	6/15/2015		4.15%	$2,055
4	Years	15		4.30%	$2,076
5	Mthly Payment	$ 2,104		4.45%	$2,097
6				4.60%	$2,118
7				4.75%	$2,139

Multi-variable data table

Like the one-variable data table, we'll create a two-variable data table using an example. In this example, we are going to figure out what our mortgage payment would be at different interest rates and different mortgage amounts. To create the data table:

1. Put a list of different interest rates in cells E2:I2 and a list of different mortgage amounts in cells D3:D7. Excel will use these rates as substitutes for the interest rate in cell B2 and mortgage amount in cell B1 once we create the data table.

	A	B	C	D	E	F	G	H	I
1	Mortgage Amt	$ 275,000			Interest Rate				
2	Interest Rate	4.50%			4.20%	4.35%	4.50%	4.65%	4.80%
3	Origination Date	6/15/2015	Mortgage Amt	$215,000					
4	Years	15		$220,000					
5	Mthly Payment	$ 2,104		$225,000					
6				$230,000					
7				$235,000					

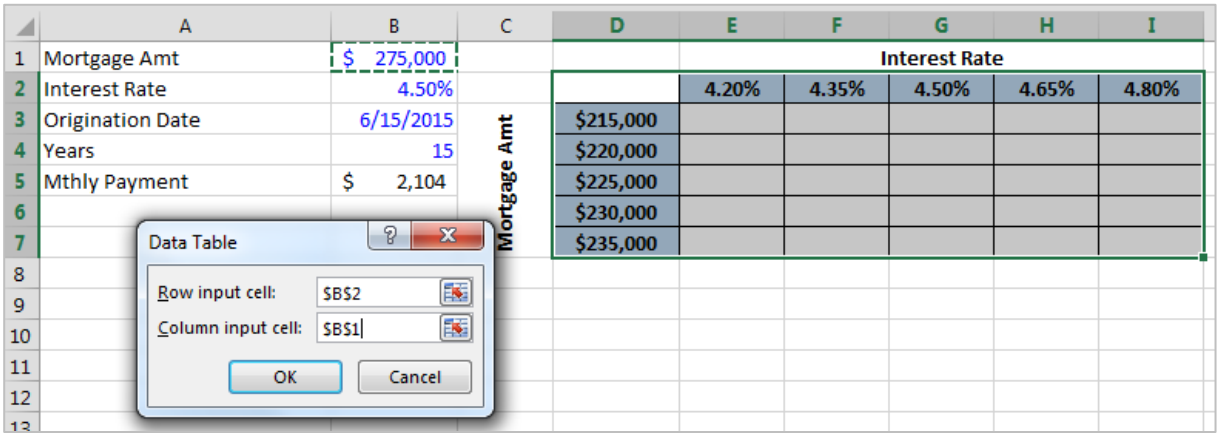
2. In cell D2 we will reference the payment formula in B5. This reference must be in the top right corner of the data table.

	A	B	C	D	E	F	G	H	I
1	Mortgage Amt	$ 275,000			Interest Rate				
2	Interest Rate	4.50%		=B5	4.20%	4.35%	4.50%	4.65%	4.80%
3	Origination Date	6/15/2015	Mortgage Amt	$215,000					
4	Years	15		$220,000					
5	Mthly Payment	$ 2,104		$225,000					
6				$230,000					
7				$235,000					

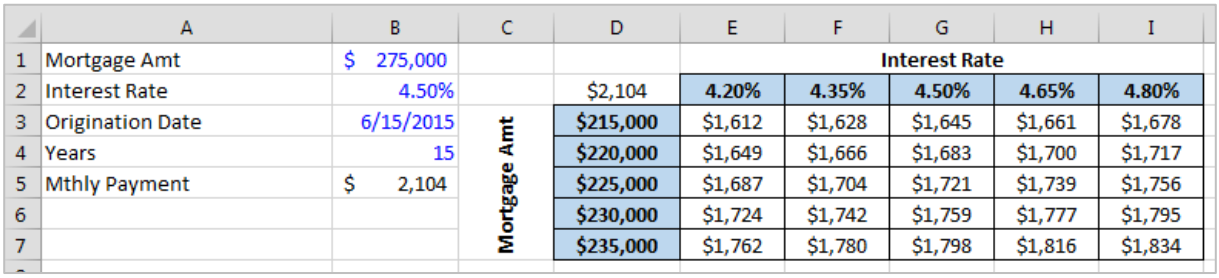
3. Select the entire data table range, including the cell reference to the payment formula.

	A	B	C	D	E	F	G	H	I
1	Mortgage Amt	$ 275,000			Interest Rate				
2	Interest Rate	4.50%			4.20%	4.35%	4.50%	4.65%	4.80%
3	Origination Date	6/15/2015	Mortgage Amt	$215,000					
4	Years	15		$220,000					
5	Mthly Payment	$ 2,104		$225,000					
6				$230,000					
7				$235,000					

4. On the **Data** tab click the **What-If Analysis** command button and then click **Data Table**. A Data Table dialog box will appear. The row input cell is the interest rate in cell B2. The column input cell is the mortgage amount in cell B1.



5. After you click Ok your data table will be populated.

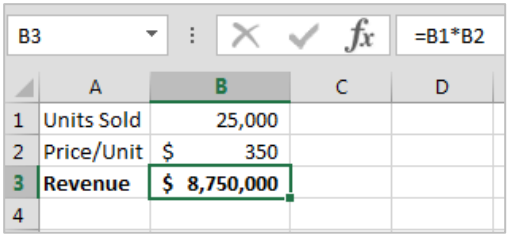


Goal Seek

Goal Seek enables you to find out what it takes to reach a predetermined objective, such as how many units you need to sell to reach $10 million in revenue this year. Excel can help you find the input values necessary to achieve those results.

To use the Goal Seek command:

1. Select the cell whose value you want to change. When you use Goal Seek, you must select a cell that already contains a formula. In our example, we'll select cell B3 because that contains the revenue formula.

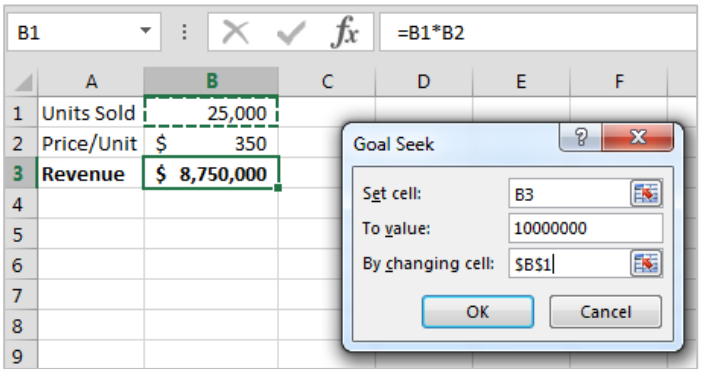
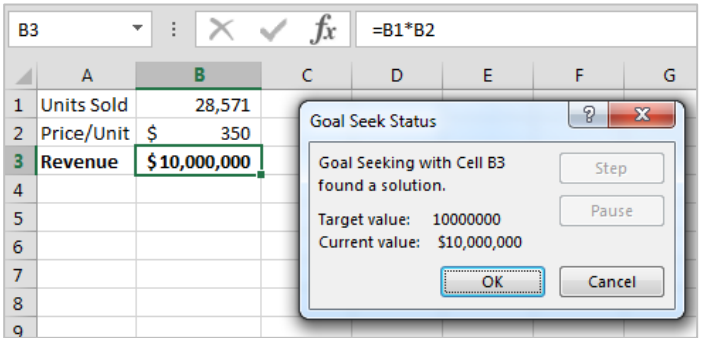


2. From the **Data** tab, click the **What-If Analysis** command, then select **Goal Seek** from the drop-down menu. A Goal Seek dialog box will appear with three fields:

a. **Set Cell**: The cell that will contain the desired result. In our example, B3.

b. **To Value**: The desired result. In our example that is $10,000,000

c. **By changing cell**: The cell that Excel should change to get to your desired result. In our example that will be B1 (Units Sold).



3. Click OK. A Goal Seek Status dialog box will appear and tell you if Goal Seek was able to find a solution.