Advanced Excel

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Updated: 23 September 2019

The Excel Window

The various parts of the Excel window were covered in the Using Microsoft Excel document, available from the OLLI website at https://olliatwvu.org/current-members/document-repository/

Quick Access Toolbar

Formula Bar

Ribbon

Column Header

Select All

Row Header

	A	B	C	D	E	F	G	H	I	J	K
1		January	February	March	April	May	June	July	August	September	
2	Electric	75	65	60	50	70	85	125	135	115	
3	Gas	25	25	25	25	25	25	25	25	25	
4	Water	100	100	100	100	100	100	100	100	100	
5	Rent	600	600	600	600	600	600	600	600	600	
6	Food	150									
7	Cell Phone	75	75	75	75	75	75	75	75	75	
8	Entertainment	50									
9	Total	1075	865	860	850	870	885	925	935	915	
10											
11											
12	Income	2500	2500	2500	2500	2500	2500	2500	2500	2500	
13											
14	Final Total	1425	1635	1640	1650	1630	1615	1575	1565	1585	
15											
16											

B9 =SUM(B2:B8)

New Budget   Old Budget

Ready   100%

Worksheet Scroll Buttons

Worksheet Tab

New Tab Button

Worksheet Views

Zoom

These first pages are for review and will not be discussed in detail in the class.

The Formula Bar

The Formula Bar is located between the ribbon and the column headers, and displays the formulas and/or data entered into the worksheet.

Cell Locator   Insert Function   Cell Contents

	A	B	C	D	E	F	
12							
13	Total	1343.97	1351.97	1358.97	1375.97	1409.97	

B13 — =SUM(B2:B11)
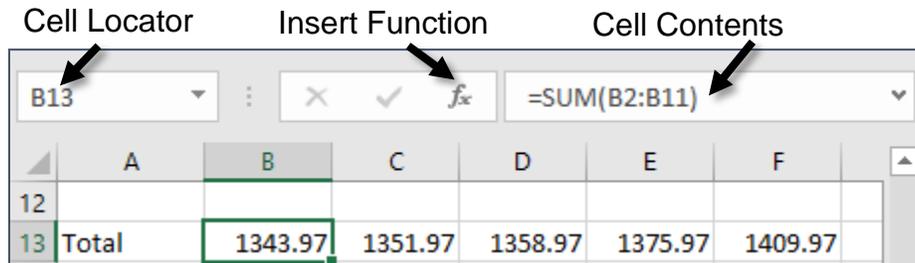
The Cell Locator tells you which cell is the active cell, or the first cell in a range of cells. The Insert Function button opens the function dialog box. As data or formulas are entered, other tools appear in the formula bar. The red **X** cancels your current action. The green √ enters the data into the cell.

AutoFill

Autofill does one of two things: copies the selected data or continues a series.

Fill Handle

The Fill Handle is located in the lower right corner of every cell. When you place your cursor in the lower right corner or a cell, the cursor changes to a solid, black plus sign.

January

Once the cursor changes, click and drag (up, down, right, or left) to continue a series. Excel displays a balloon showing the last value in the series.

January

March

Series Recognized by Excel	
Months of the Year	Jan, Feb, Mar...
	January, February, March...
Days of the Week	Monday, Tuesday, Wednesday...
	Mon, Tue, Wed...
Time	9:00, 10:00, 11:00...
Years	Jan 2007, Feb 2007, Mar 2007...
Dates	01/01/2007, 01/02/2007, 01/03/2007...
Numbers	1, 2, 3... 2, 4, 6... 10, 20, 30...

If you would like Excel to recognize a more complicated series of numbers, type in the first two items of that series in two separate cells, then select those cells and drag on the fill handle.

AutoFill Options

Once the Fill Handle is released, Excel provides Auto Fill options to allow you to select whether you want to create a series or just copy the cells.
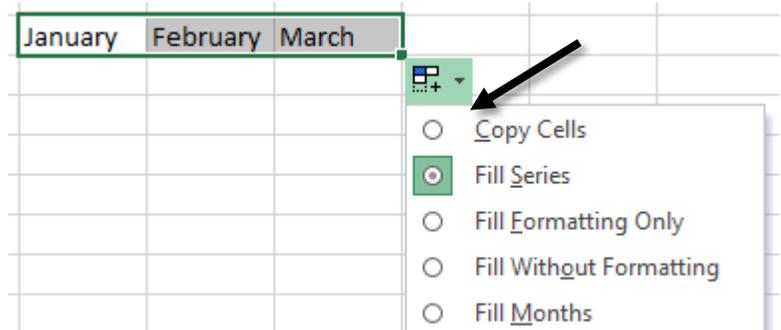
AutoSum

The AutoSum tool allows you to quickly apply frequently used, basic formulas to a row or column of numbers.

AutoSum Options

In addition to allowing you to quickly sum a range of cells, Excel has other formulas available from the AutoSum tool. These options are available from the menu beside the AutoFill button.

> **Sum**: Add all the numbers in the column together
> **Average**: Calculate the average of the numbers in the column
> **Count Numbers**: Count the number of cells that contain a number
> **Max**: Return the largest value in a range of cells
> **Min**: Return the smallest value in a range of cells

Using the AutoSum Tool Options
1. Place the cursor in the cell where the *result* should appear.
2. Select the **Home** tab and click the arrow beside the **AutoSum**.
3. From the menu, select the desired option.
4. Excel automatically selects a range. If it is correct, accept the formula.
5. If Excel choses the wrong range, click and drag with your mouse to select the correct range of cells, then accept the formula.
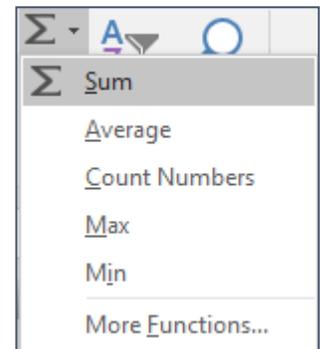
Paste Special

Paste link is used when you would like data from one worksheet to update second worksheet (even if they are in different workbooks). This command links two worksheets together, so that when data in the first worksheet is updated, those changes are reflected in the second worksheet.

Remember, that when copying from one Excel worksheet to another, the copied formula is what is pasted. But when copying from Excel to a different program, such as word, the value (or result of the formula) is what is appears in the document.
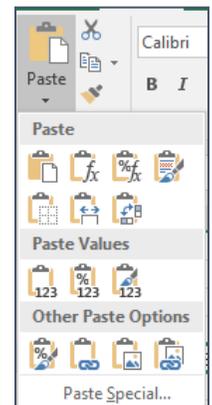
Paste Link

When a linked document is opened, Excel prompts you to update the links from the source data. This allows Excel to go to the source worksheet and look for any changes to the data.

Using Paste Link
1. Highlight and copy the source cell(s).
2. Move to the destination worksheet or workbook.
3. Place the cursor in the destination cell.
4. In the **Home** tab, click the arrow beneath **Paste**. From the menu, click the **Paste Link** button.

    OR

    Right click in the destination cell and choose **Paste Special**.
5. Click the **Paste Link** button.
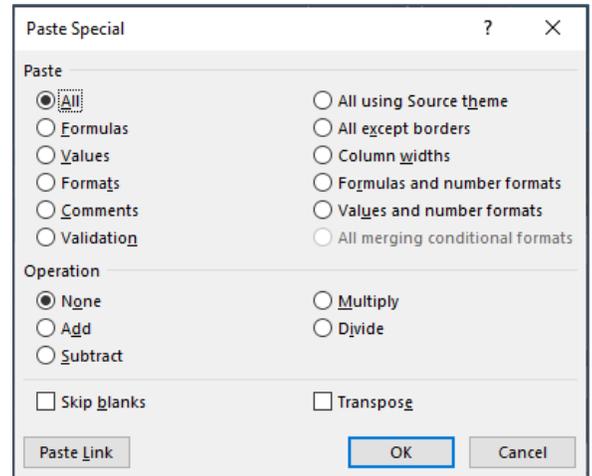
Transpose

Sometimes data is displayed in a manner that is rotated from what we want. Paste Special, Transpose allows us to flip that data from the vertical to the horizontal (or vice versa).

Transposing a Row (or Column)
1. Create a new worksheet or workbook for the data (if needed).
2. Highlight the cells to be transposed.
3. Copy the cells.
4. Place your cursor in the location in the new worksheet (or workbook) where the transposed cells will reside.
5. From the Home tab of the ribbon, click the triangle below **Paste**.
6. From the drop down menu, select **Paste Special**.
7. At the bottom of the Paste Special dialog box, place a check in the box beside **Transpose**.
8. Click **OK**.
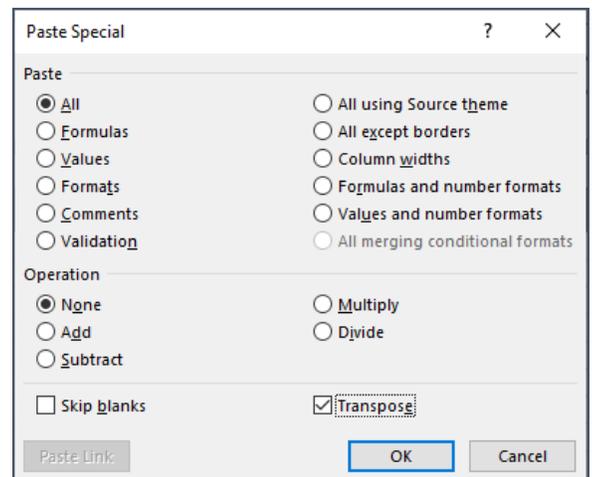
9. You now have a row (or column) of transposed data, to do with as you please.

Splitting Columns

Sometimes you will receive data in a format that is not useful for your needs. For example, first and last names might be in the same column instead of separate columns. The split columns command will do much of the heavy lifting for you in separating out that information, but you still need to go through the results once the process is complete.

Splitting a Column

1. Select the column to be split.
2. Select the **Data** tab. In the Data Tools section, click the **Text to Columns** button.
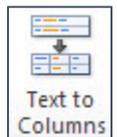
3. The Convert Text to Columns Wizard opens. Select **Delimited**, is the information is separated by a commas or spaces.
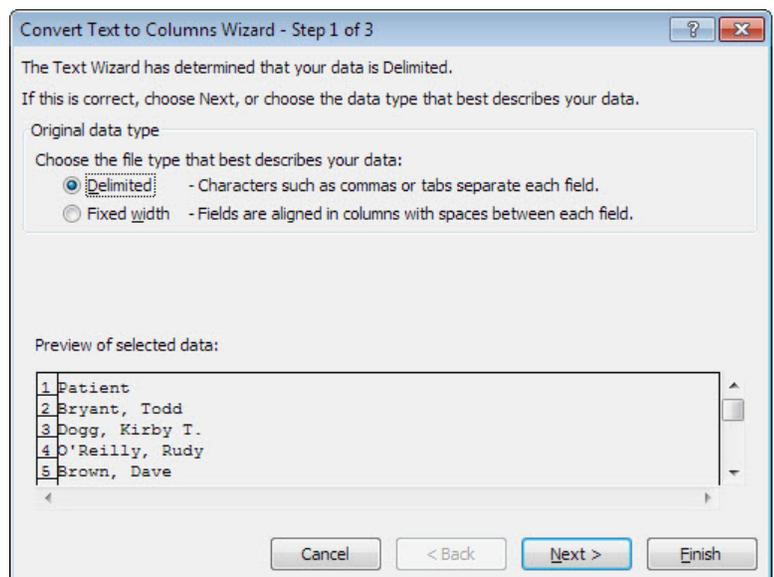
4. Click **Next**.

5. In the Delimiters section, select the option that describes how your information is listed. A preview of the data appears at the bottom of the dialog box.
6. Click **Next**.
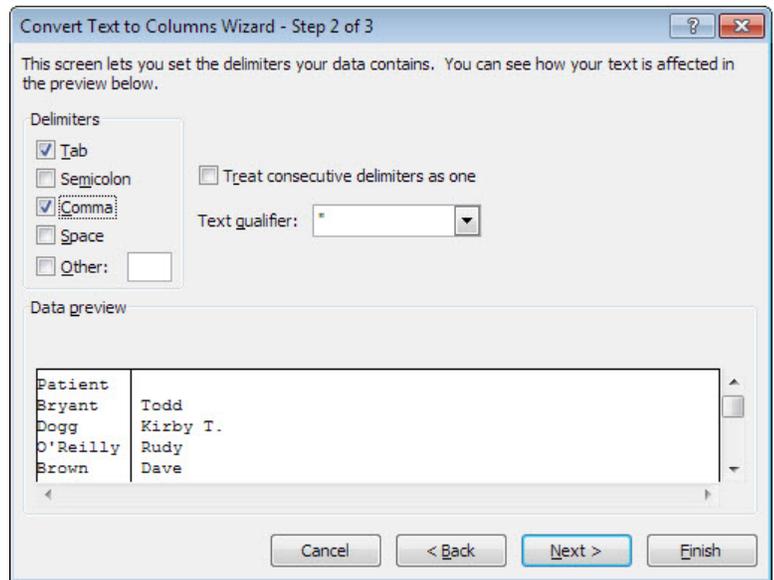
7. Select the column format.
8. Click **Finish**.
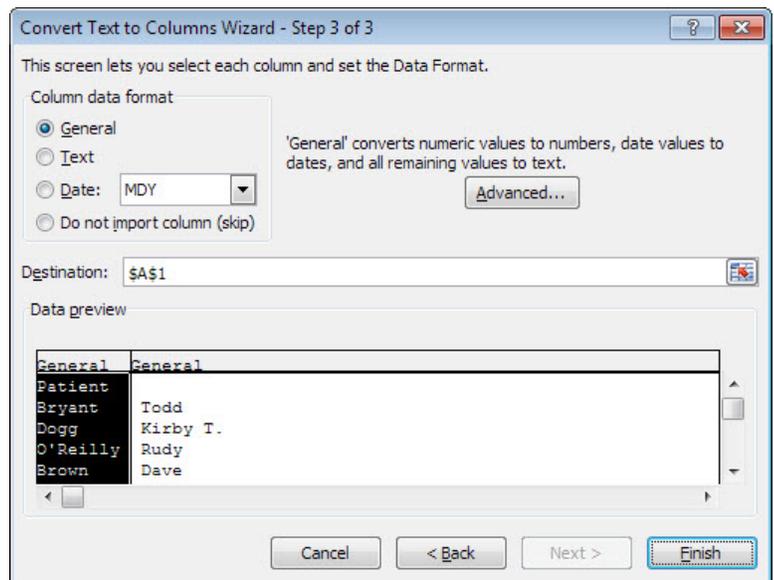
9. Excel asks if you want to replace the contents of the destination cells. Click **OK**.
10. The single column is now split into two columns. Create field names for the new columns.
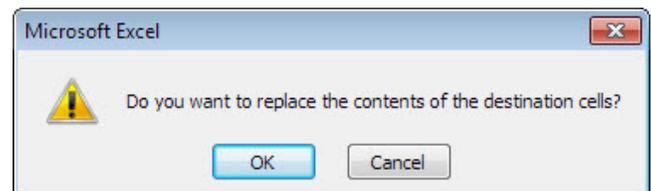
Conditional Formatting

Conditional Formatting in Excel allows you to highlight cells that meet specific conditions. For example, you can turn the text of all cells that have a negative value red, or you can highlight all cells that contain the duplicate text.
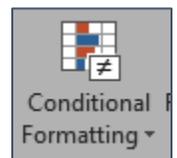
Conditional formatting is useful not just because it makes specific data stand out, but because you can filter on formatting, which allows you to quickly find specific records. An example of when you might do this would be when searching for duplicate records.

Formatting Duplicates
1. Highlight the column(s) that you think contain duplicate values.
2. On the Home tab of the ribbon, click the **Conditional Formatting** button.
3. From the first drop down menu, select **Highlight Cells Rules**.
4. From the next drop down menu, select **Duplicate Values**.
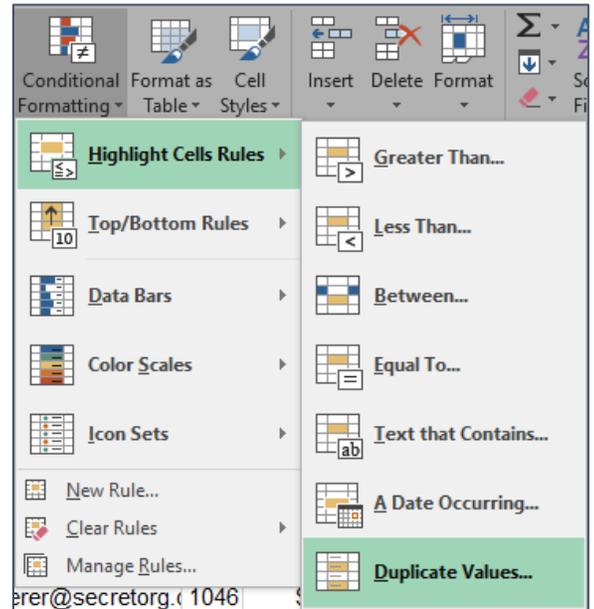
5. A dialog box opens. You can select the default options (Light Red Fill with Dark Red Text), you can select another formatting option, or you can choose your own Custom Format. You also have the option here to select for unique values, rather than duplicates, which is helpful in finding typos.
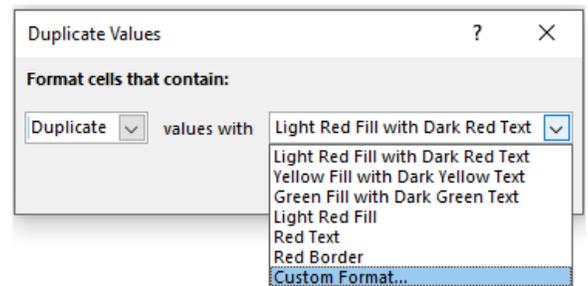
6. The duplicate values are formatted in the manner you selected.

	A	B	C
1	**Last Name**	**First Name**	**Prefix**
15	Droid	Aretoodeetw	Mr.
16	Droid	Ceethreepee	Mr.
17	Duck	Donald	Mr.
18	Emerson	Michael	Mr.
19	Emerson	Sam	Mr.
20	Fett	Boba	Mr.
21	Frog	Allen	Mr.
22	Frog	Edgar	Mr.
23	Frye	Kaylee	Ms.
24	Grimm	Ben	Mr.
25	Hook	Abraham	Captain
26	Houlihan	Margaret	Ms.
27	Hunnycut	BJ	Dr.
28	Hut	Jabba	Mr.
29	Kahn	Ghingas	Mr.
30	Kahn	Kubla	Mr.
31	Kenobi	Ben	Master

Formatting for Selected Values

1. Highlight the column(s) that you want to format.
2. On the Home tab of the ribbon, click the **Conditional Formatting** button.
3. From the first drop down menu, select **Highlight Cells Rules**.
4. From the second menu select **Greater Than** or **Less Than**.

5. Enter the number above or below which you want to highlight values.
6. You can select the default options (Light Red Fill with Dark Red Text), you can select another formatting option, or you can choose your own Custom Format.
7. Click **OK**.
8. The cells meeting your conditions are formatted as you designated.
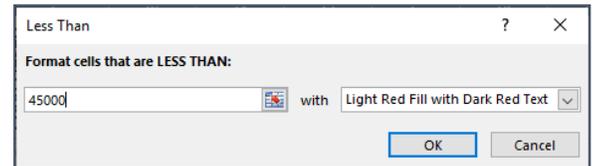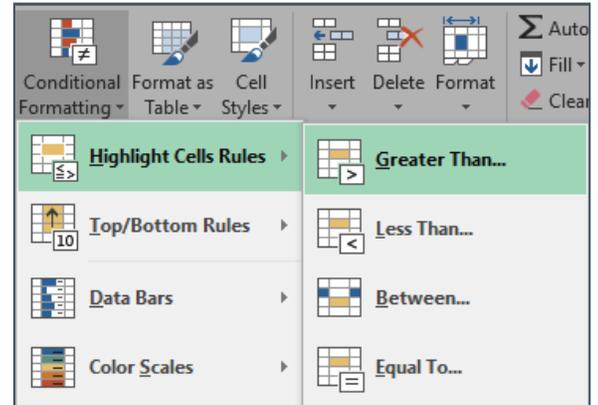
	Virginia	Maryland	Pennsylvania	Ohio	Kentucky	No Border	Mean household income
Calhoun						X	$45,519
Clay						X	$42,030
Doddridge						X	$49,426
Fayette						X	$47,160
Gilmer						X	$48,947
Grant	VA	MD					$48,349
Greenbrier	VA						$50,972
Hampshire	VA	MD					$38,812
Hancock			PA	OH			$54,177

Filtering on Formatting

Once you have used conditional formatting to find the records of interest, you can filter to temporarily limit your database to those desired records.

Filtering on Formatting

1. Select the **Data** tab.
2. In the Sort & Filter section, click the **Filter** button.

3. Arrows appear next to the Field Names.
4. To look at records that meet a specific criteria, click the triangle beside the Field Name.
5. Select the option for **Filter by Color**. From the sub menu, select the desired option.
6.
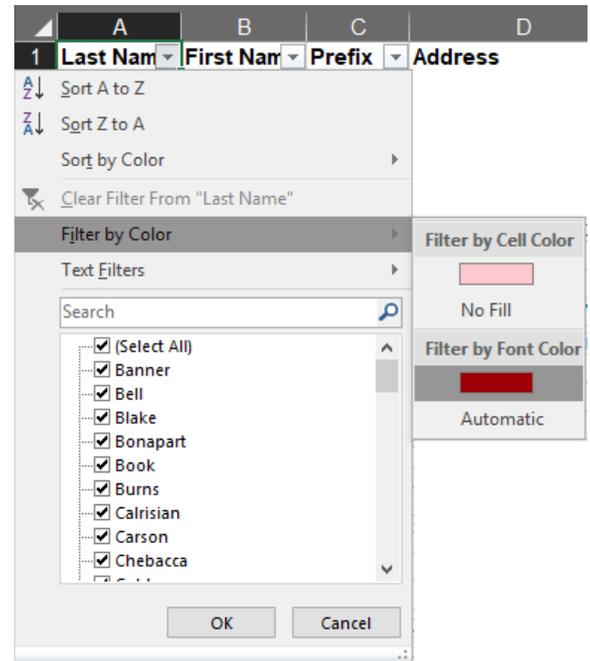
7. The Filter returns only matching records.

	A	B	C	D
1	Last Name	First Name	Prefix	Address
15	Droid	Aretoodeetw	Mr.	23 Lightsaber Way
16	Droid	Ceethreepee	Mr.	23 Lightsaber Way
18	Emerson	Michael	Mr.	25 Santa Clara Drive
19	Emerson	Sam	Mr.	25 Santa Clara Drive
21	Frog	Allen	Mr.	483 Gary Street
22	Frog	Edgar	Mr.	483 Gary Street
29	Kahn	Ghingas	Mr.	369 Golden Horde Ave
30	Kahn	Kubla	Mr.	329 Xanadu Blvd
50	Roberts	Buttercup	Princess	41 Rous Street
51	Roberts	Westey	Mr.	38 Pirate Drive
58	Storm	Jonathan	Mr.	1005 Baxter Building
59	Storm	Susan	Ms.	1001 Baxter Building
61	Tam	River	Ms.	42 Miranda Pl
62	Tam	Simon	Mr.	8389 Arial Street
65	Washburn	Hoban	Mr.	37 Firefly Rd
66	Washburn	Zoe	Mrs.	37 Firefly Rd

Relative vs Absolute Cell References

In Excel, when you copy a cell, the formula contained in that cell is copied, rather than the values. The cells referenced in these formulas are relative when they are pasted—Column A becomes Column B etc. But there are times when you will need to refer to a specific cell as a formula is copied, in which case you will need to use an absolute cell reference.

The dollar sign is used to keep a cell reference stable when it is copied across a worksheet.

For example, $A$16 will keep referring to cell A16 even as a cell is copied across rows or down columns.

In the example at right, the formula to determine if we are over or under budget will always refer to our designated budget amount in cell A16.

To keep the row constant, the $ is added before the row number. To keep the column constant, the $ is added before the cell letter.

	A	B	C
7	Cell Phone	$105.00	$105.00
8	Entertainment	$150.00	$75.00
9	Total	$1,167.00	$1,355.00
10			
11	Income	$2,500.00	$2,500.00
12	Leftover	$1,333.00	$1,145.00
13	Over / Under Budget	=B9-$A$16	-$145.00
14			
15	Budget		
16	$1,500.00		

The reason the absolute reference is important is because no one wants to write out complicated formulas every single time they need to do a calculation, so we use copy or auto-fill and then tell Excel, "No! Don't change this aspect of the formula!"

You can see in the example on the right that the formula, copied from the cell to the left, continues to reference the cell total for the selected column and the number in the cell: A16..

	A	B	C
7	Cell Phone	$105.00	$105.00
8	Entertainment	$150.00	$75.00
9	Total	$1,167.00	$1,355.00
10			
11	Income	$2,500.00	$2,500.00
12	Leftover	$1,333.00	$1,145.00
13	Over / Under Budget	-$333.00	=C9-$A16
14			
15	Budget		
16	$1,500.00		

In a different example we see cell D3 is referred to regardless of where the formula is copied in the worksheet.

SUM			✕ ✓ fx	=$D$3			
	A	B	C	D	E	F	G
1			Annual Accrual	Sick Leave Accrual	Annual Leave Limit		
2			9.6	7.2	115.2		
3			4.8	3.6			
4	Date	Accrue	Used	Annual Total	Sick Accrue	Sick Used	Sick Total
20	6/12/2019			41.65			268.05
21	6/13/2019			41.65			268.05
22	6/14/2019			41.65			268.05
23	6/15/2019	4.8		46.45	=$D$3		271.65
24	6/16/2019			46.45			271.65

Functions

The Formulas tab contains the insert function button, as well as buttons for different categories of functions.
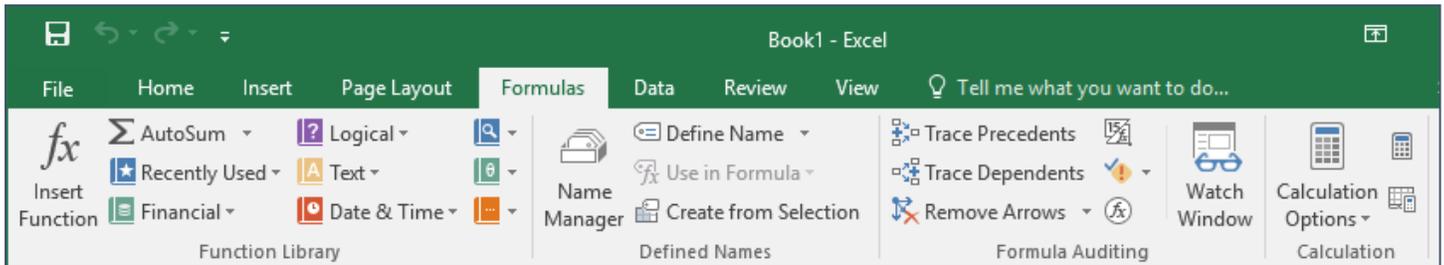
Searching for a Function
1. Select the cell where the result of the function should appear.
2. Select the **Formulas** tab and click the **Insert Function** button.
   OR
   In the Formula Bar, click the **Insert Function** button.
3. In the Insert Function dialog box, in the **Search for a function** text area, type a description of what you want to do.
4. Click **Go**.
5. Select a function and click **OK**.
6. Insert the selected function into your worksheet.

Inserting a Function from the Ribbon
1. Select the cell where the result should appear.
2. Select the **Formulas** tab. The Function Library section category buttons.
3. Click the button for the desired category.
4. Select the desired function from the menu.
5. Create the function.

Cleaning Up Your Data

If you are dealing with data imported from another source, your data might be a mess and unsuited for a database; there are many ways to do this.

Please note that it can get extremely complicated to pull data from irregular text. You may need to use a combination of different functions to get the end result you want.

Text to Columns: Splits data from a single cell (or column) into multiple cells (or columns)
TRIM: Strips leading, trailing and extra spaces from the text
RIGHT: Extracts a designated number of characters from the right of the text string
LEFT: Extracts a designated number of characters from the left of the text string

RIGHT and LEFT

The formulas LEFT and RIGHT remove characters that are at the start or end of the cell. For example, if you have City, State, and Zip in a single cell, you can use RIGHT to pull the zip code out of the cell, by designating the last five characters in the cell.

=RIGHT(A2,5)

The above formula tells Excel to give us back the first five characters from the right side, in this case, the zip code.

	B2 ⋮ × ✓ ƒx	=RIGHT(A2,5)
	A	B
1	Address	Zip
2	375 Radiation Drive Parsons WV 24385	24385
3	57 Grapevine Way Weston WV 26745	26745
4	847 Mash Street Morgantown WV 26514	26514
5	894 Champ Elaysis Paris WV 82975	
6	954 Haven Way Star City WV 26501	
7	721 Mash Street Morgantown WV 26508	
8	36 Democracy Blvd Cloud City PA 49756	
9	81 Alamo Ave Morgantown WV 26505	
10	17 Wookie Way Mos Eisley WV 26758	
11	1 Vera Drive Clarksburg WV 26706	

You can even use the two commands in combination.

=LEFT(RIGHT(C2,8),2)

In this example we are taking eight characters from the right, and then only two of the remaining characters from the left.

It's confusing I know, but looking at the examples and playing with your own data will help it eventually make sense.
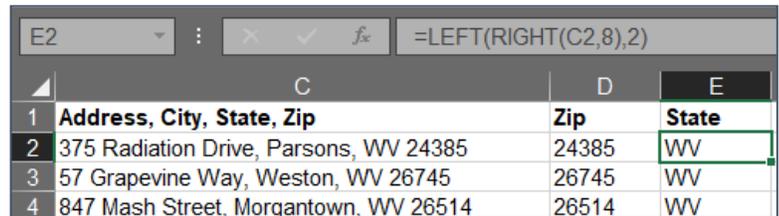
	E2 ⋮ × ✓ ƒx	=LEFT(RIGHT(C2,8),2)	
	C	D	E
1	Address, City, State, Zip	Zip	State
2	375 Radiation Drive, Parsons, WV 24385	24385	WV
3	57 Grapevine Way, Weston, WV 26745	26745	WV
4	847 Mash Street, Morgantown, WV 26514	26514	WV

TRIM

TRIM is used to remove spaces from a cell. Extra spaces are most frequently a problem when data is copied and pasted from another source, such as a Word document. Leading spaces (spaces at the start of a cell) will keep your data from sorting and filtering correctly, and will force numbers to display as text.

In the example at right, the numbers have a leading space, so they are not formatted as numbers. You can tell this at a glance because they are aligned to the right of the cell, instead of the left of the cell.

Using the TRIM function strips the extra spaces, and the cell contents are formatted as numbers.

=TRIM(I2)

	J2 ⋮ × ✓ ƒx	=TRIM(I2)		
	G	H	I	J
1			Text	Trim
2			24385	24385
3			26745	
4			26514	
5			82975	
6			26501	
7			26508	
8			49756	
9			26505	

COUNT Statements

Count statements return the number of cells in which certain conditions are met. This gets confusing because there are different kinds of count statements.

> **COUNT()**: Count cells that contain numbers.
> **COUNTA()**: Count cells that are not empty
> **COUNTBLANK()**: Count cells that are blank.
> **COUNTIF()**: Count cells that meets a specified criteria.

The count statement I use most frequently is **COUNTA()**

In the example on the right, I have a list of WV counties, and any states that border them.

From this list, I want to count the number of counties that border each state.

In the cell where I want my total to appear, I enter the formula.

> **=COUNTA(E2:E56)**

In English, this formula says count the number of cells that are not empty, in the range of cells E2 through E56.

The end result of that formula is we learn that 15 WV counties share a border with OH.

| E57 | ⋮ | ✓ | fx | =COUNTA(E2:E56) | |

	A	B	C	D	E	F	G	H
1	County	VA	MD	PA	OH	KY	No Borde	Intersta
40	Preston		MD	PA				I68
41	Putnam				OH			I64
42	Raleigh						X	I64/77
43	Randolph	VA						
44	Ritchie						X	
45	Roane						X	I79
46	Summers	VA						I64
47	Taylor						X	
48	Tucker		MD					
49	Tyler				OH			
50	Upshur						X	
51	Wayne				OH	KY		I64
52	Webster						X	
53	Wetzel			PA	OH			
54	Wirt				OH			
55	Wood				OH			I77
56	Wyoming						X	
57	Counts	14	9	8	15	2	20	

IF Statements

If statements allow you to place caveats in your formulas.

In the example to the right you can count up to 12 miles in a single week towards your goal.

> **=IF(J3<=12, J3, 12)**

This formula says, if the amount walked (J3) is less than or equal to twelve, enter the amount walked. If the amount is MORE than twelve, then just enter 12.

| K3 | ⋮ | ✓ | fx | =IF(J3<=12, J3, 12) | |

	F	G	H	I	J	K
1						
2	Thursday	Friday	Saturday	Sunday	Total	Counted #
3	8	2	10	2	34.00	12.00
4	2	2	1	1	9.00	9.00
5	2	0	1	0	19.00	12.00
6	5.5	5.5	8	9	43.50	12.00

You can make more complicated IF statements, such as this spreadsheet where I wanted to know which counties in WV were above and below the US median income.

=IF(B2<=$E$2,"below","above")

If the income amount (B2) is greater than or equal to the US median income (E2) enter "below" but if it's higher enter "above".

| C2 | | f_x | =IF(B2<=$E$2, "below", "above") |

	A	B	C	D	E	F
1	County	Mean household income	Compared to US Income	1 1/2 times below	US Median Income	Below US Median
2	Barbour	$46,623.00	below	above	$61,372.00	Barbour
3	Berkeley	$68,405.00	above	above	$40,914.67	
4	Boone	$52,638.00	below	above		Boone
5	Braxton	$46,606.00	below	above		Braxton
6	Brooke	$55,881.00	below	above		Brooke
7	Cabell	$55,743.00	below	above		Cabell
8	Calhoun	$45,519.00	below	above		Calhoun

=IF(C2="below", A2, "")

If the text in the cell (C2) is "below" enter the contents of the county name (cell A2) however, if it says anything else, leave the cell blank.

| F2 | | f_x | =IF(C2="below",A2, "") |

	A	B	C	D	E	F
1	County	Mean household income	Compared to US Income	1 1/2 times below	Above US Median	Below US Median
2	Barbour	$46,623.00	below	above		Barbour
3	Berkeley	$68,405.00	above	above	Berkeley	
4	Boone	$52,638.00	below	above		Boone
5	Braxton	$46,606.00	below	above		Braxton
6	Brooke	$55,881.00	below	above		Brooke
7	Cabell	$55,743.00	below	above		Cabell

You can combine formulas here as well.

=IF(COUNTA(B2:F2)=0,"N","")

This formula (shown in the example on the right) says to count the number of cells in the row that are not blank. If the count is equal to zero, enter N into the cell. If the count is not equal to zero, leave the cell empty.

| G2 | | f_x | =IF(COUNTA(B2:F2)=0,"N","") |

	A	B	C	D	E	F	G	H	I
	County	Virginia	Maryland	Pennsylvania	Ohio	Kentucky	No Border	Interstate	Food Desert (20 miles)
1	County								
2	Barbour						N		Food Desert
3	Berkeley	VA	MD						
4	Boone			PA	OH				
5	Braxton						N	I79	
6	Brooke				OH				
7	Cabell				OH			I64	
8	Calhoun						N		
9	Clay						N	I79	
10	Doddridge						N		
11	Fayette						N	I64/77	Food Desert
12	Gilmer						N		Food Desert
13	Grant	VA	MD						

Date Calculations

Date calculations are confusing because Excel treats dates as numbers that make no logical sense to humans.

Dates are displayed as the number of days since January 1, 1900. This means that Excel cannot deal with dates BEFORE 1900. Just in case you were trying to do some historical calculations.

The examples at right calculate age as of the current date. The formula NOW() displays the current date and time, while the formula TODAY() returns just the current date.

To calculate current age in years, we use the formula

=((TODAY())-A2)/365.25

This formula subtracts the given date from today's date, and then divides the result by 365.25 to gives us the number of years, rather than days that have passed.

Confusing? Yup. But not hard to do once you understand what's going on.

Time Calculations

Time calculations are relatively straight-forward—unless you are attempting to calculate time that spans from one day to the next.

If you are going to be calculating times that span across days, make sure your date format is the date AND the time using the formula NOW().

The examples at the right shows a running total for time.

First, the amount of time that has passed is calculated by subtracting the later time from the earlier time.

=E342-D342

Once you get that, you can add the previous day's time to today's time, using the mathematic orders you learned long ago and then promptly forgot.

=(E3-D3)+F2

To put it into English, the formula says to subtract the later time in the middle column, from the earlier time in the left column, to get the number of hours passed, then add this to the previous total from the row above.

F2					f_x	=(E2-D2)+G2

	C	D	E	F
1	Out	Rounded In	Rounded Out	Time Spent
2	11:46 AM	8:15 AM	11:45 AM	3:30:00
3	3:20 PM	12:15 PM	3:15 PM	6:30:00
4	11:32 AM	8:00 AM	11:30 AM	10:00:00

SUM					f_x	=(E3-D3)+F2

	C	D	E	F
1	Out	Rounded In	Rounded Out	Time Spent
2	11:46 AM	8:15 AM	11:45 AM	3:30:00
3	3:20 PM	12:15 PM	3:15 PM	=(E3-D3)+F2
4	11:32 AM	8:00 AM	11:30 AM	10:00:00
5	2:51 PM	12:00 PM	2:45 PM	12:45:00

CONCATENATE

Combines two strings of text; think of it as the opposite of Text to Columns.

In our example at right, we are creating a login name from a user's first and last name.

=CONCATENATE(A2,B2)

This formula combines the two cells into a single text string without spaces.

C2					f_x	=CONCATENATE(A2,B2)

	A	B	C	D
1	Last Name	First Name	Login	Email addre
2	Banner	Bruce	BannerBruce	BannerBruc
3	Bell	Tinker		

You can use concatenate to insert characters and text into a string as well, but placing the text to be inserted between quote marks. " "

The above would insert a space into the formula (quote mark, space, quote mark) but you can insert any text you want with concatenate.

D2					f_x	=CONCATENATE(A2,B2,"@olli.org")

	A	B	C	D
1	Last Name	First Name	Login	Email address
2	Banner	Bruce	BannerBruce	BannerBruce@olli.org
3	Bell	Tinker		
4	Blake	Henry		
5	Bonapart	Napolean		
6	Book	Shepherd		

To create an email address, we used the formula

=CONCATENATE(A2,B2,"@olli.org")

That combines cells A2 and B2 and appends the string of text @olli.org to create an email address.

SUMIF

Allows you to add the numbers in a range of cells that meet specific criteria that may or may not be in another range of cells.

Things are about to get complicated, so if you don't understand something immediately, take a break and come back another day to try again.

In this example we want to add the mean household income for all counties that border Ohio.

The first range is the cells that should meet our criteria is E2:E57, or the Ohio column. The Criteria is cell E1, or OH. The range that contains the values to add is H2:H56, or the column that gives the mean household income for every county in the state.

We're also going to use an absolute cell reference, so we can copy the formula across the various columns.

Our formula for this is

=SUMIF(E$2:E$56, E1,$H$2:$H$56)

To try and put it a different way, we are adding the values in column H only if the corresponding cell in column E contains the letters designated in cell E1.

Is this confusing? Absolutely. But once you figure it out, you can do complex calculations and apply them to multiple rows or columns.

Headers & Footers

Headers and Footers are used for data and information you want to appear when your worksheet is printed. They are the same as headers and footers in Word, only with different options.

Accessing Headers and Footers

1. Select the **Page Layout** tab of the ribbon.
2. In the Sheet Options section of the Page Layout tab, click the dialog box button.
3. Select the Header/Footer tab of the dialog box.
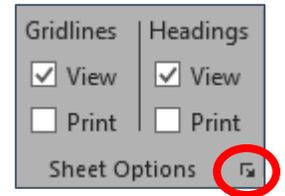
4. Click the drop down menu to select from a list of canned headers and footers, or click **Custom** to create your own.
5. Click **OK** to create the header / footer for your document.
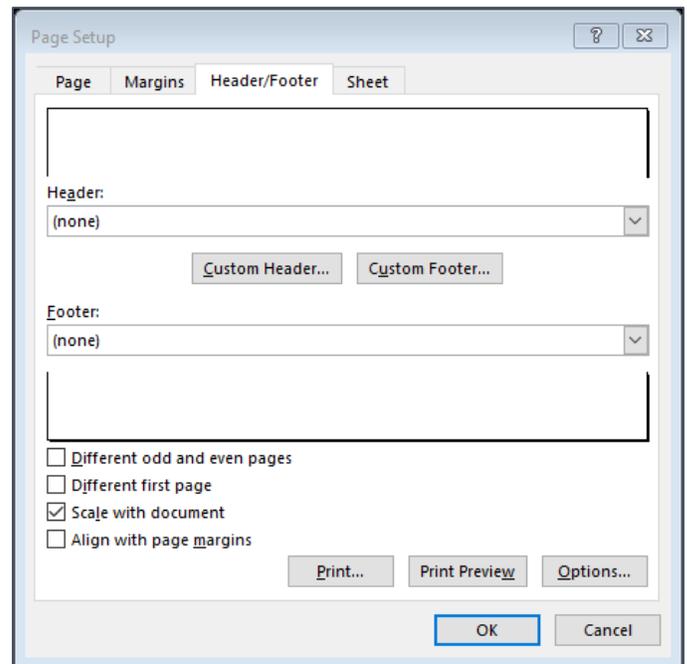
Charts

Charts are a way to display your data that makes it easy for the viewer to see what is happening.

Line Chart

A line chart is often used to show the relationship between two difference data series.
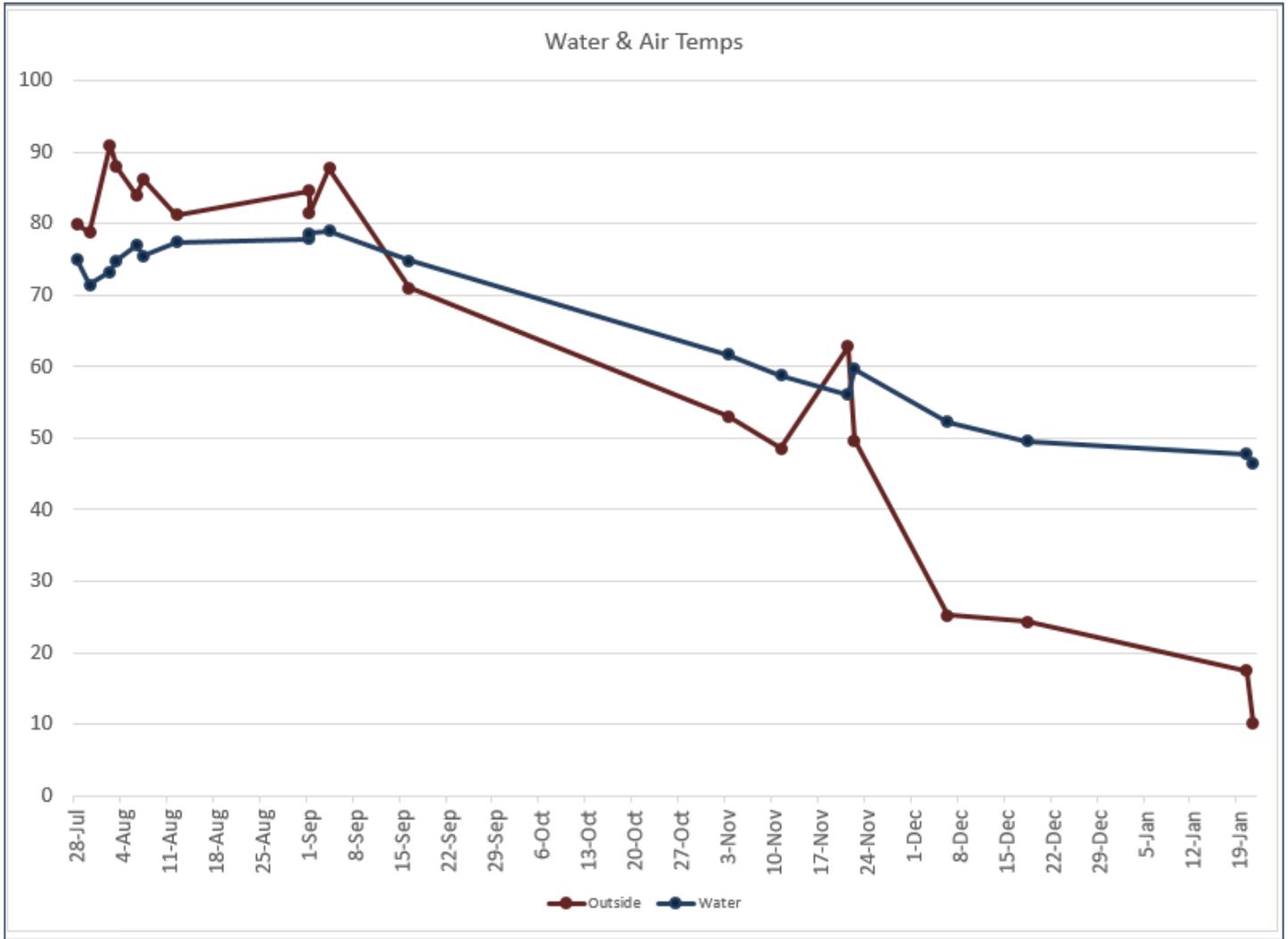
This line chart shows the relationship between the outside air temperature and the temperature of the water coming out of my kitchen spigot. Because temperature change is generally linear and related, this is a good time to use a line chart. (Yes, I really did collect six months of data for this solely to sate my curiosity.)

Bar Chart

A bar chart can be used to show how two elements change over time as well as compared to each other.
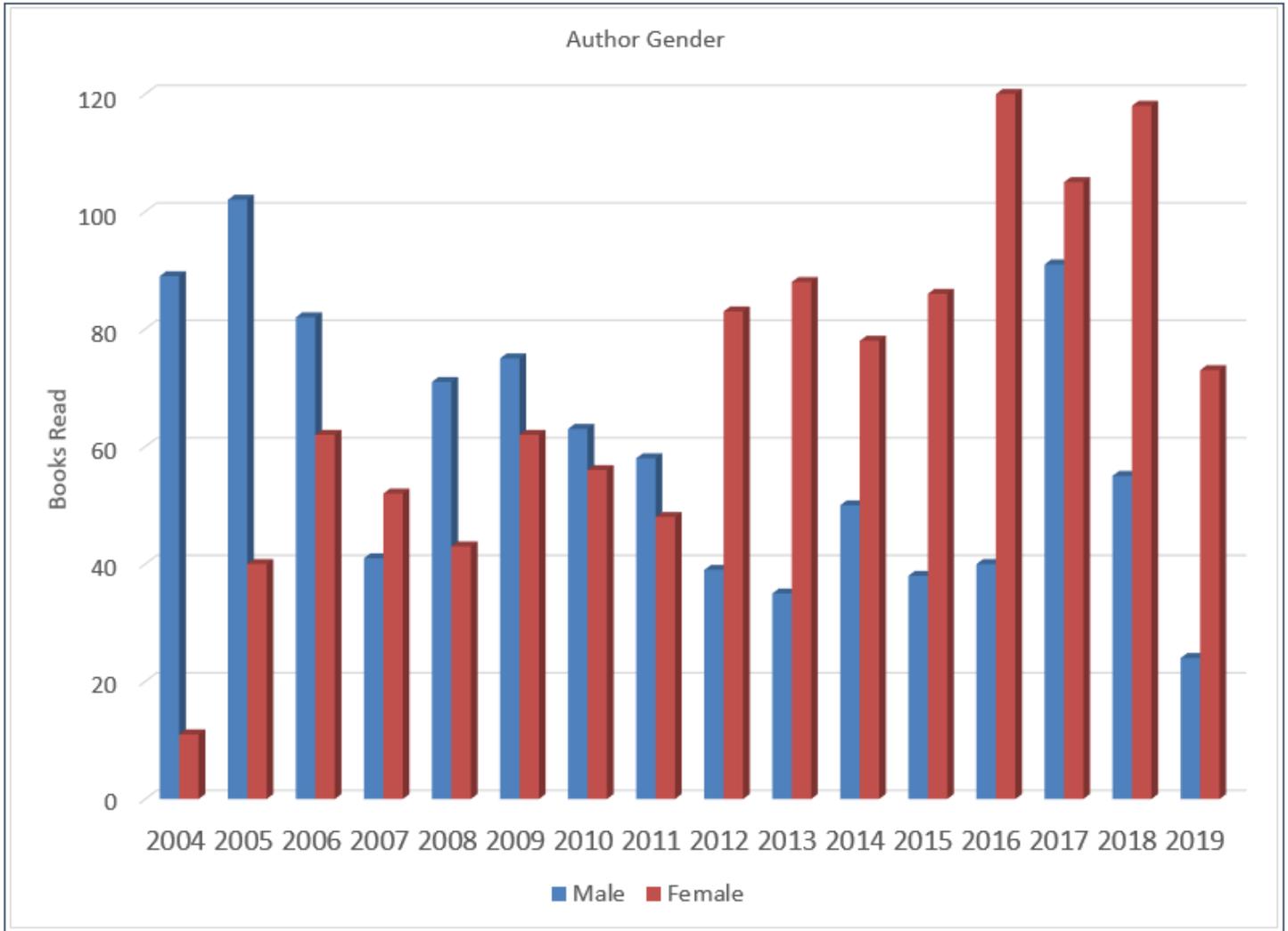
This chart is showing the number of male versus female authors that I have read each year. A bar chart shows you the way those numbers compare to teach other and have changed over time. This chart is showing us two different trends—how the numbers change over time and how those numbers compare to each other.

Pie Chart

A pie chart is good for showing comparative amounts for a single series
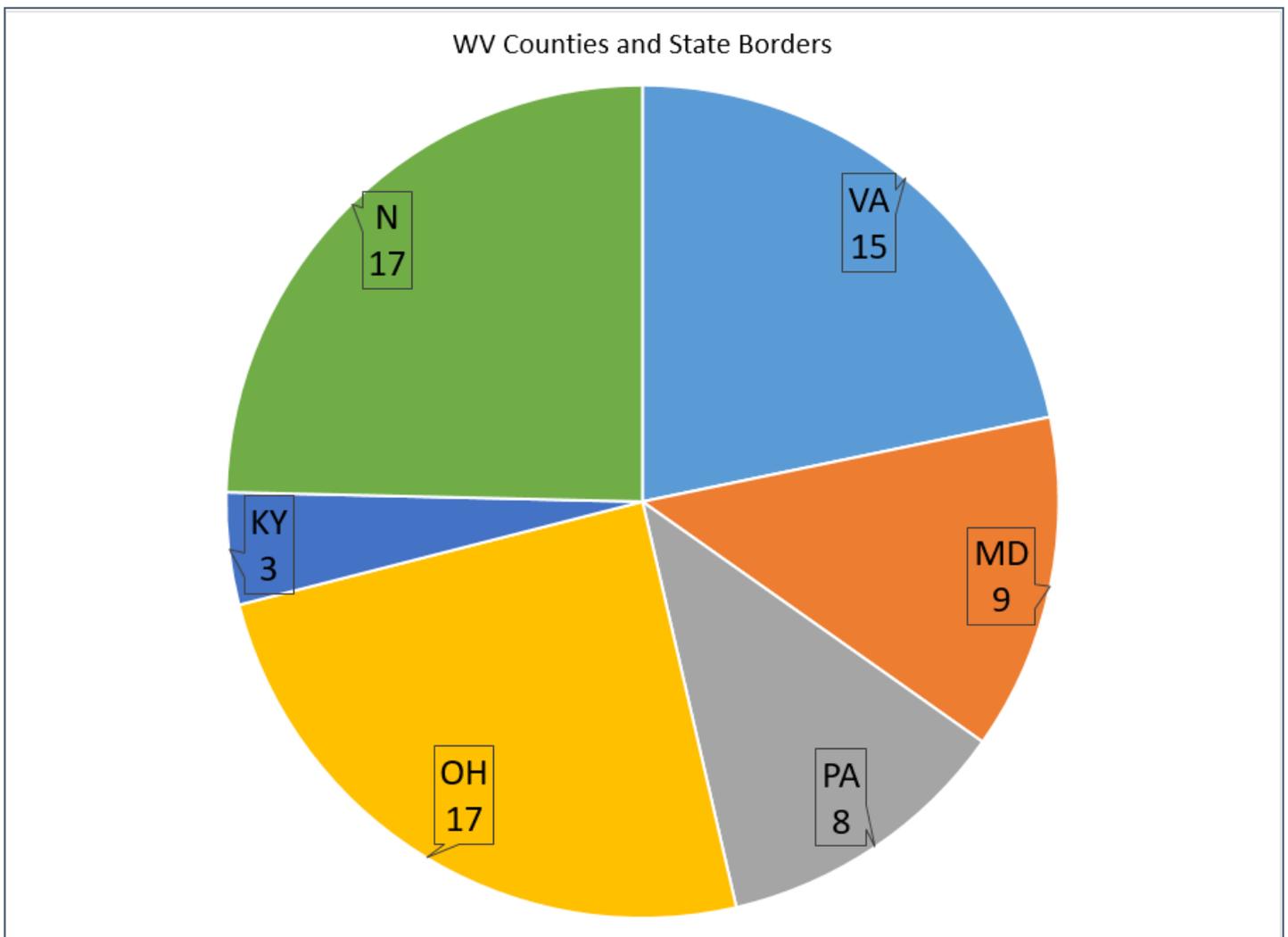
This chart is showing how many WV counties border each state, and how many counties have no state border. The pie chart clearly shows that few counties border Kentucky while Ohio borders the most counties.

In general, graphs should tell you something at a glance (something besides the fact that I am a tremendous geek who loves data). The point of a graph is to make the information you have collected / collated comprehensible *at a glance* to the viewer.

The most important thing to do in creating a chart is to know what kind of chart will best explain *your* data.

Bar Charts

In the bar chart we looked at, we could see how the data changed over time as well as with respect to the other data series.

When creating our chart we want to select our two data series and the column and row headers related to those series.

Initially stick with basic chart types—as you better understand your data and the various chart types you can experiment with different chart types.

But remember that the point is to select a chart that lets someone see at a glance what your data is showing. I highly recommend asking someone who has no idea what you are doing to try and interpret your chart; if they are completely confused you should probably start again.

Creating a Bar Chart

1. Highlight the data you want to use for your chart. You can click and drag or use Ctrl + click + drag to highlight the cells you want to use for your chart.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
11	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
12 Male	89	102	82	41	71	75	63	58	39	35	50	38	40	91	55	24
13 Female	11	40	62	52	43	62	56	48	83	88	78	86	120	105	118	73
14 Joint + Anthology	9	13	4	12	6	5	5	12	5	35	10	3	8	34	9	3

2. Select the **Insert** tab of the ribbon.
3. In the Charts section, select Column or Bar chart, and then from the drop down menu, select the style of chart you want. If you have not worked with charts before, select a basic chart, such as one of the two pointed out in the image at right.
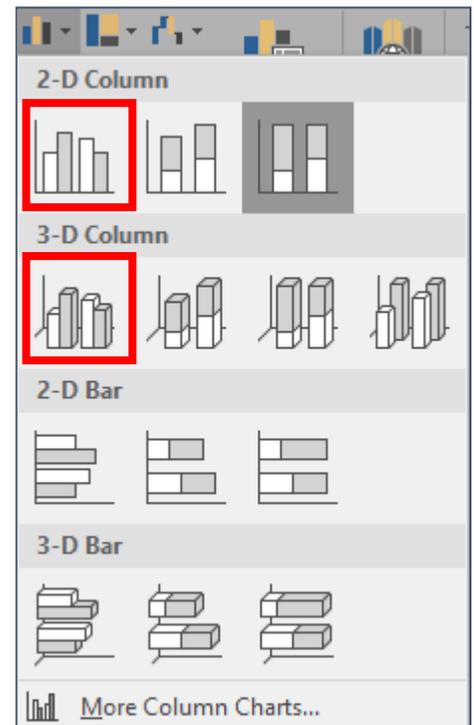
4. The chart is added into your current image.

Line Charts

Creating a Line Chart

1. Highlight the data you want to use for your chart. You can click and drag or use Ctrl+click+drag to highlight the cells you want to use for your chart. (Notice that we have not selected the Time column, so the chart will not display it.)

	A	B	C	D
1	Date	Time	Outside	Water
2	28-Jul	13:00	80	75
3	30-Jul	18:30	78.7	71.4
4	2-Aug	17:30	91	73.2
5	3-Aug	18:30	88	74.8
6	6-Aug	17:30	84	77
7	7-Aug	17:00	86.2	75.5
8	12-Aug	20:45	81.2	77.4
9	1-Sep	15:15	84.6	77.9
10	1-Sep	18:30	81.4	78.6
11	4-Sep	18:30	87.7	79
12	16-Sep	16:30	71	74.8
13	3-Nov	19:30	53.1	61.7

2. Select the **Insert** tab of the ribbon. In the Charts section select Line or Area chart.
3. From the drop down menu, select one of the basic line charts. If you have not worked with charts before, select a basic chart, such as one of the two pointed out in the image at right.
4. The chart is added into your current image.
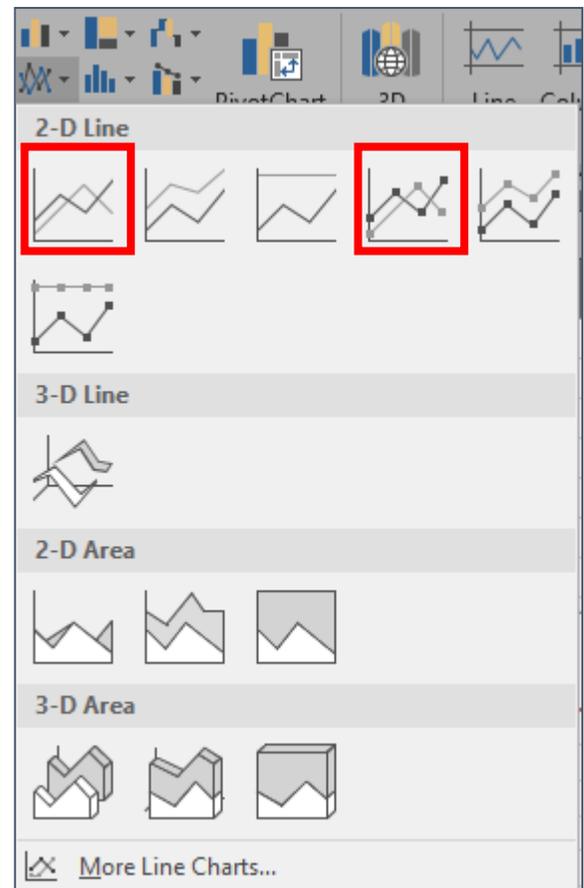
Pie Charts

Creating a Pie Chart

1. Highlight the data you want to use for your chart. You can use Ctrl+click+drag to highlight the cells you want to use for your chart.

	A	B	C	D	E	F	G
1	County	VA	MD	PA	OH	KY	NB
53	Wetzel			PA	OH		
54	Wirt				OH		
55	Wood				OH		
56	Wyoming	VA					
57	Counts	15	9	8	17	3	18
58		$776,547	$505,436	$399,317	$855,339	$142,957	$902,716

2. Select the **Insert** tab of the ribbon. In the Charts section select Pie chart.
3. From the drop down menu, the 2-D Pie or 3-D Pie chart.
4. The chart is added into your current image.
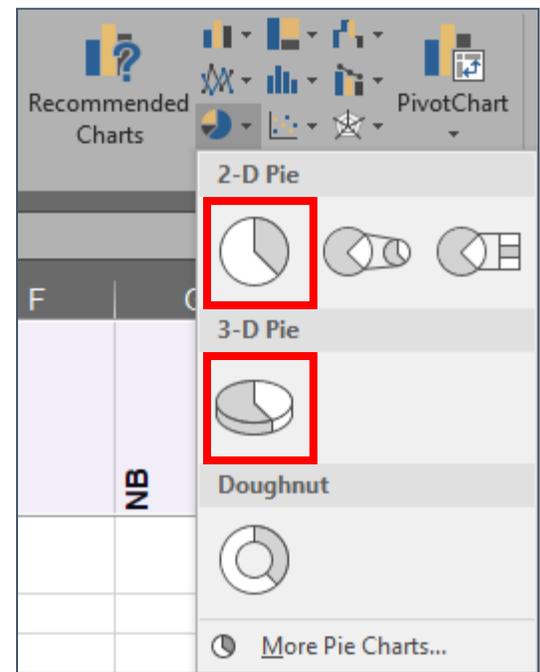
Because it's a Microsoft product, Excel assumes you want your chart to be in the same tab as your data. It's easy to move a chart to its own tab, where it will be larger and possibly easier to work with.

Moving a Chart to Its Own Tab

1. Select the chart to be moved to its own tab.
2. Select the Chart Tools Design tab of the ribbon, and at the far right end of the ribbon, click the **Move Chart** button.
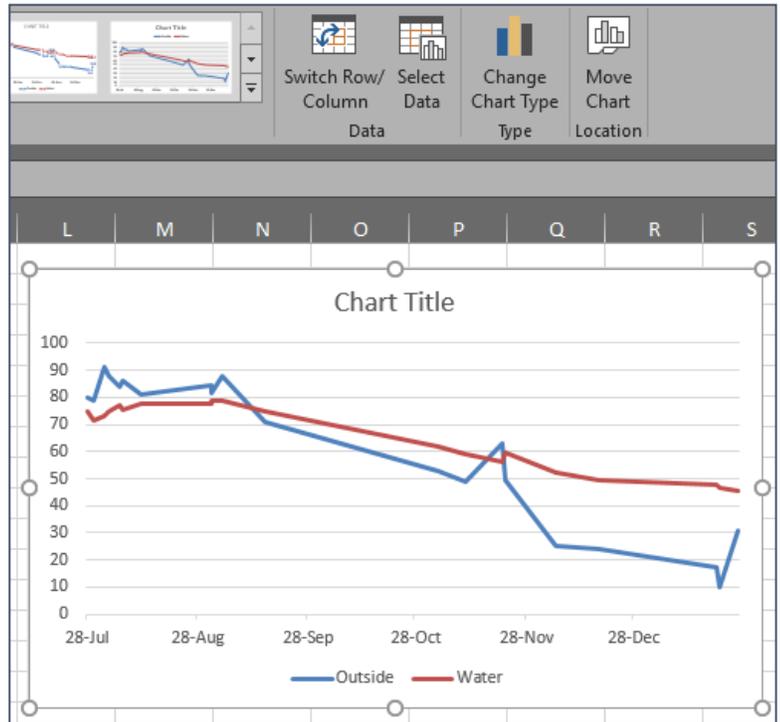
3. In the dialog box select **New sheet**, name the chart tab if you want, and click **OK**.
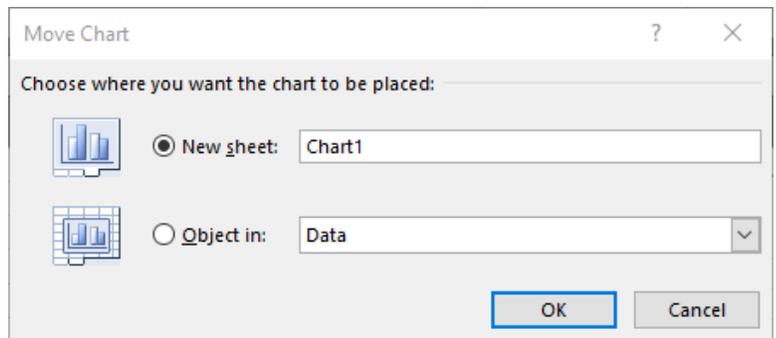
Switching Your Chart Type
It's very common to select the wrong chart type initially, luckily you can easily try a different kind of chart to see if that does a better job of displaying your data.

Switching Chart Type
1. Make sure your chart is selected.
2. In the Chart Tools Design tab, on the far right of the ribbon, click **Change Chart Type** icon.

3. Select the new chart type from the list. You'll get a preview of how the chart will look when you select a chart type.

4. Click OK when you have decided on a new chart type.
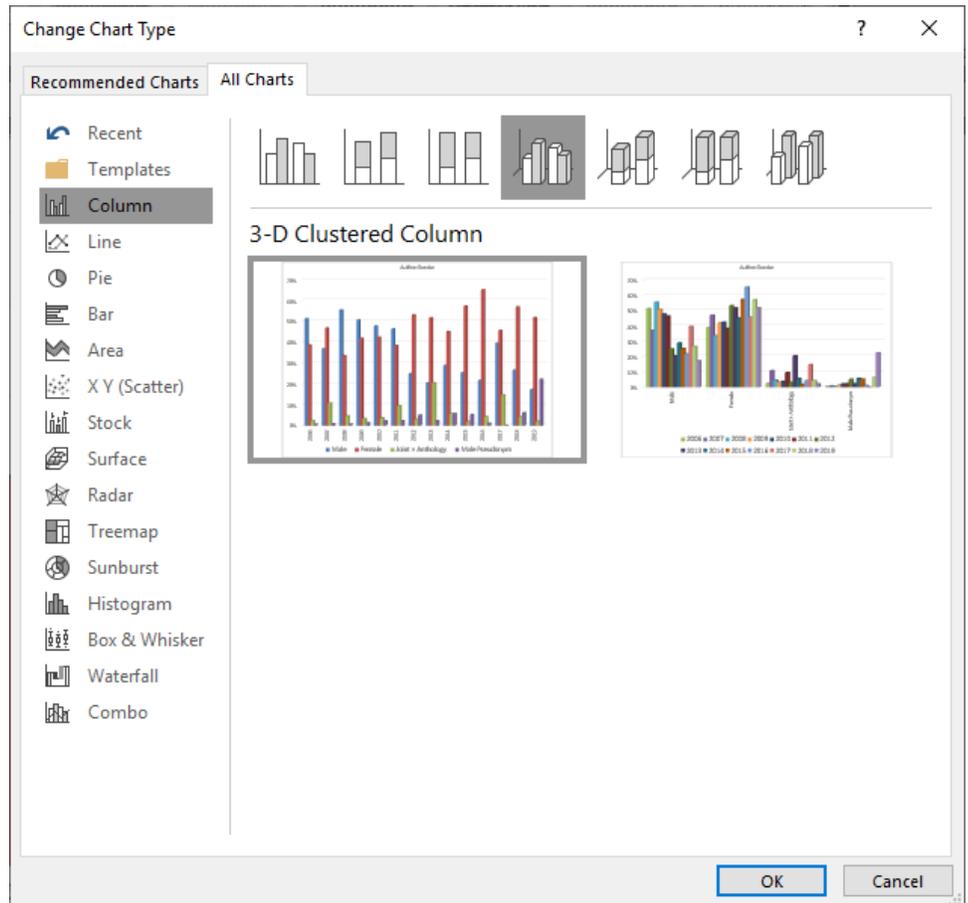
Chart Parts

It is helpful to know what the different parts of the chart are called, so when you go to modify your chart you can be sure you have the correct bit selected/
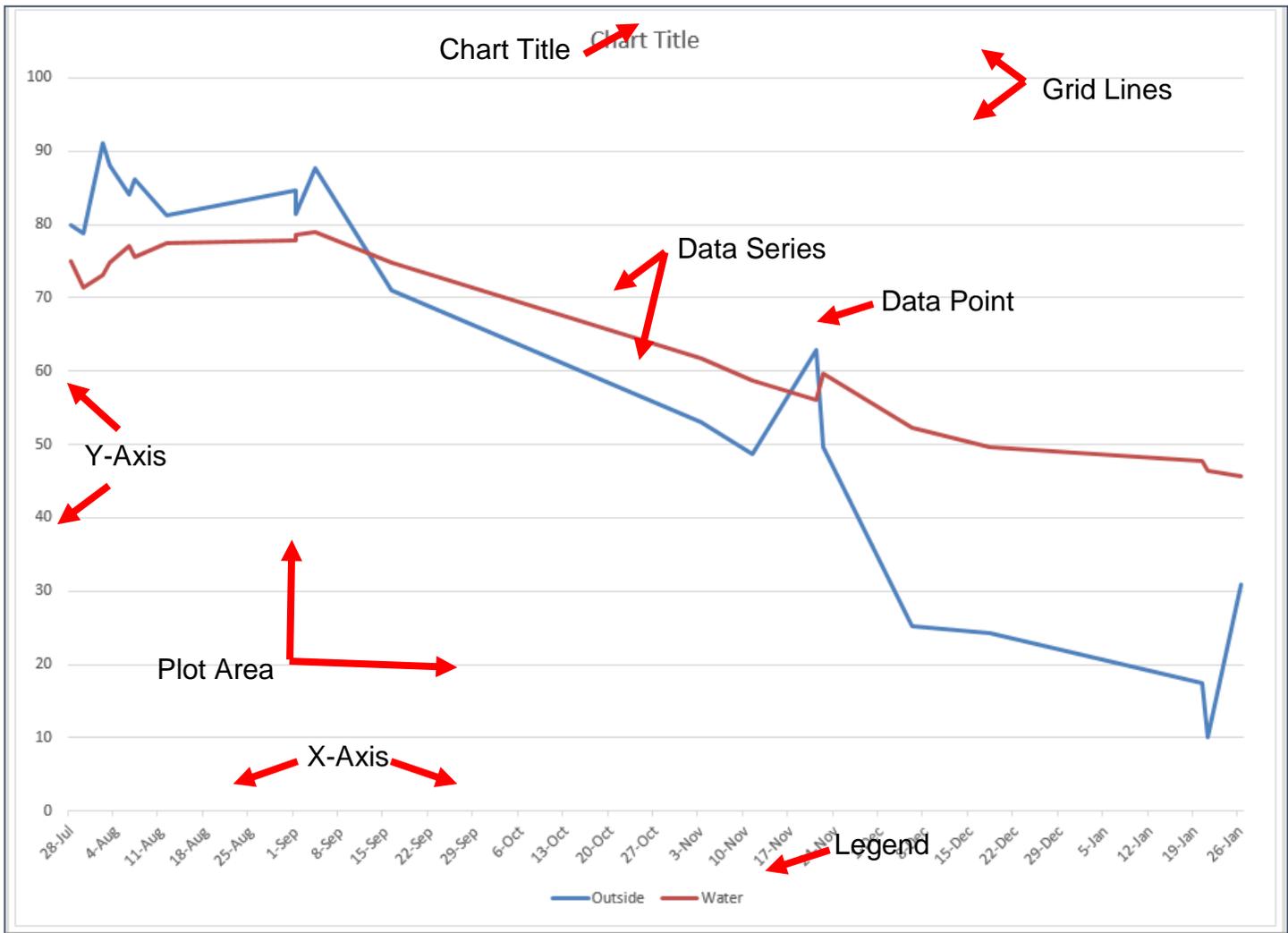
Chart Title – The name of your chart. This can be deleted if you desire.
Plot Area – The area enclosed by the two axes where the data is displayed
Grid Lines – Lines that demarcate the tick marks, allowing you to more easily see the value of a point on the chart
X-Axis – The horizontal axis or category axis
Y-Axis – the vertical or value axis
Data Series – The related values you are displaying
Data Point – A single measurement from your data set.

There are other options you can add to a chart, but a good chart should be comprehensible with only a few elements. Unless you are comfortable with statistics, avoid adding error bars because Excel rarely does this correctly.

Formatting Chart Elements

Any element of a chart can be formatted by right clicking on that element and from the menu selecting **Format (item)**. Chart elements can also be selected from the Chart Tools Design tab.
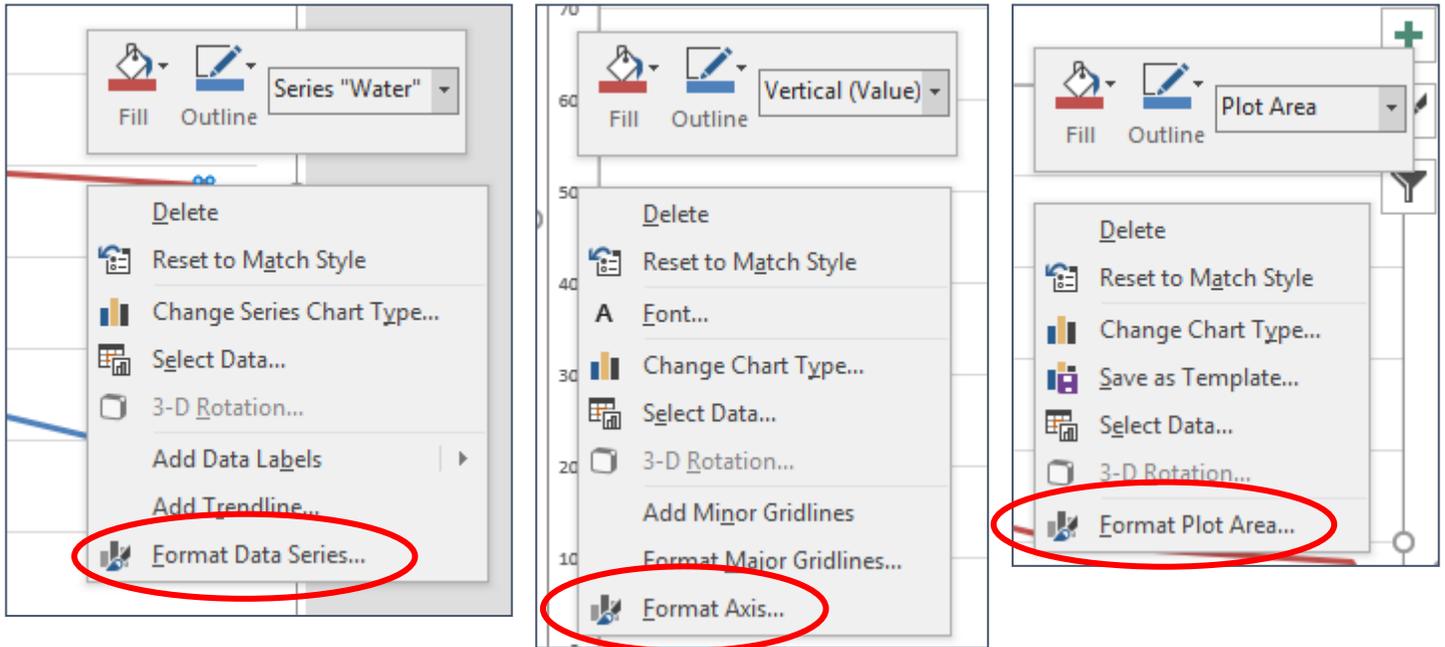
Some of the things you will commonly want to edit are: chart title, legend size and location, axis text size, and data series color and style.

It's easy to spend hours and hours formatting a chart in a manner that is not going to make a lot of difference to the viewer; most of the default chart styles are going to be okay for most uses—don't worry about the formatting of the chart, worry more about whether what you are presenting is confusing or doesn't make sense. You should also pay attention to font size—will the text be large enough to read when you copy the chart into Excel or PowerPoint.

Secondary Axis

Sometimes you may want a graph to compare data on two separate scales, for instance, the population of WV over time and the WV Unemployment rate.

Creating a Chart with a Secondary Axis

1. Select the data to be used.
2. On the Insert tab of the ribbon, in the Charts section, click the See All Charts button.
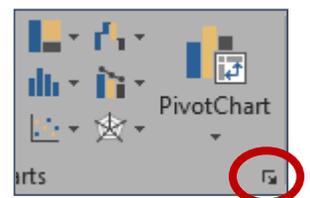
3. Along the top, select the **All Charts** tab.
4. In the left pane, select **Combo**.
5. Select the type of chart for each axis, and then place a check in the box beside the data that should appear on the secondary axis.
6. Click **OK**.

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Excel Quick Reference

Command	Tab Location	Other Location	Keyboard	Reference
Align Text	Home > Alignment			
Arrange All	View > Window			
AutoFit	Home > Cells			
AutoSum	Home > Editing **OR** Formulas > Function Library		Alt + =	Σ ▾
Bold	Home > Font	Mini Toolbar	Ctrl + B	B
Borders	Home > Font	Mini Toolbar		
Charts	Insert > Charts			
Clear	Home > Editing			
Column Width	Home > Cell	Click & drag in heading row		
Copy	Home > Clipboard	Right click	Ctrl + C	
Currency	Home > Number		Ctrl+Shift+$	General ▾
Cut	Home > Clipboard	Right click	Ctrl + X	
Data Validation	Data > Data Tools			
Date	Home > Number		Ctrl+Shift+#	General ▾
Delete	Home > Cells		Ctrl + Minus Sign (-)	
Document Views	View > Workbook Views	Status Bar		
Error Bars	Chart Tools Layout > Analysis			Error Bars ▾
Filter	Data > Sort & Filter **OR** Home > Editing		Ctrl+Shift+L	
Find	Home > Editing		Ctrl + F	
Font	Home > Font	Mini Toolbar		Georgia ▾
Format Cells	Home > Cells	Right click		

Command	Tab Location	Other Location	Keyboard	Reference
Format Numbers	Home > Number	Mini Toolbar		
Format Painter	Home > Clipboard		Ctrl+Shift+C Ctrl+Shift+V	
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Functions	Formulas > Function Library	Formula Bar	Shift + F3	fx
Gridlines	Page Layout > Sheet Options **OR** View > Show			
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Hide / Unhide	Home > Cells > Format Button > Hide & Unhide	Right click		
Hide the Ribbon	Double click on the open tab		Ctrl + F1	
Hyperlink	Insert > Links	Right click	Ctrl + K	
Images	Insert > Illustrations			
Insert	Home > Cells		Ctrl + Shift + Plus Sign (+)	
Insert Current Date			Ctrl + ;	
Insert Current Time			Ctrl+Shift+ :	
Italic	Home > Font	Mini Toolbar	Ctrl + I	I
Landscape / Portrait	Page Layout > Page Setup			
Macros	View > Macros			
Margins	Page Layout > Page Setup			
Merge Cells	Home >Alignment	Mini Toolbar	Alt + F8	
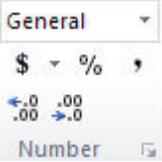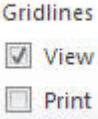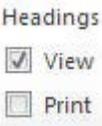
Command	Tab Location	Other Location	Keyboard	Reference
New Worksheet	Home > Cells > Insert button > Insert Sheet	Worksheet tabs	Shift + F11	
Non-Keyboard Characters	Insert > Symbols			Ω
Normal View	View > Worksheet Views	Status bar		
Number Formatting	Home > Number	Mini Toolbar		
Open	File > Open		Ctrl + O	
Open Recent File	File > Recent tab	Quick Access Toolbar		
Orientation	Page Layout > Page Setup			
Page Break	Page Layout > Page Setup > Breaks button > Insert / Remove Page Break			
Page Break Preview	View > Workbook Views	Status bar		
Page Layout View	View > Workbook Views	Status bar		
Page Numbering	Insert > Header & Footer button > Header & Footer Tools Design tab			
Paper Size	Page Layout > Page Setup			
Paste	Home > Clipboard	Right click	Ctrl + V	
Paste Link	Home > Paste (triangle)			
Paste Special	Home > Paste (triangle) > Paste Special			
Percent	Home > Number		Ctrl+Shift+%	%
Pivot Table	Insert > Tables			
Print	File > Print		Ctrl + P	
Print Titles	Page Layout > Page Setup			
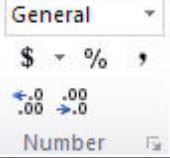
Command	Tab Location	Other Location	Keyboard	Reference
Program Options	File > Options			
Recent Files	Home > Recent tab	Quick Access toolbar		
Redo		Quick Access Toolbar	Ctrl + Y	
Remove Duplicates	Data > Data Tools			
Rename Worksheet	Home > Cell	Right click		
Replace	Home > Find & Select button > Replace		Ctrl + H	
Row Height	Home > Cell	Click & drag in Heading column		
Save	File > Save button	Quick Access Toolbar	Ctrl + S	
Save As	File > Save As button		F12	
Scale to Fit	Page Layout > Scale to Fit			
Scientific Format	Home > Number		Ctrl+Shift+^	
Screen Shots	Insert > Illustrations			
Select Column			Ctrl + Space	
Select Row			Shift + Space	
Sort	Data > Sort & Filter **OR** Home > Editing			
Split Columns	Data > Data Tools			
Split Panes	View > Window			
Sum	Home > Editing **OR** Formulas > Function Library		Alt + =	
Switch Windows	View > Window			
Symbols	Insert > Symbols			
Text Formatting	Home > Font	Mini toolbar		
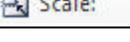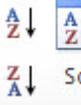
Command	Tab Location	Other Location	Keyboard	Reference
Text Size	Home > Font	Mini Toolbar		
Text to Columns	Data > Data Tools			
Text Wrap	Home > Alignment			
Undo		Quick Access Toolbar	Ctrl + Z	
View	View > Workbook Views	Status Bar		
Worksheet Options	File > Options button			
Zoom	View > Zoom	Status Bar		

Keyboard Shortcuts for Excel

Closes selected **workbook**	Ctrl+W
Closes the selected workbook **window**	Ctrl+F4
Positions the **insertion point** at the end of the cell contents	F2
Enters the current **date**	Ctrl+;
Enters the current **time**	Ctrl+:
Insert **Function**	Shift+F3
Maximizes or **restores** the selected workbook window	Ctrl+F10
Moves to the cell above	Shift+Enter
Moves to the cell to the left	Shift+Tab
New line in the same cell	Alt+Enter
New worksheet	Shift+F11
New worksheet inserted into current workbook	Alt+Shift+F1
Selects an entire **column** in a worksheet	Ctrl+Spacebar
Selects an entire **row** in a worksheet	Shift+Spacebar
Selects cells to the **last used cell** on the worksheet	Ctrl+Shift+End
Strikethrough	Ctrl+5
Unhides any hidden **columns** within the selection	Ctrl+)
Unhides any hidden **rows** within the selection	Ctrl+(

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