Everyone Learns

Silvera Custom Training
Excel Intermediate

Filtering

Tables

Functions

Charts

Data Visualization

Created for: Silvera for Seniors

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INTERMEDIATE OVERVIEW

TOPICS INCLUDE

- Who uses Intermediate?
- Features
- Spreadsheet Lingo

WHY LEARN MORE

Excel is a tool with unlimited potential for enhancing business in today's quickly evolving global scene. Companies and their employees are leveraging the power of Excel for better success and results in very rapidly changing or competitive business environments. Excel users with intermediate to advanced skills in data analysis are growing in demand as businesses come to rely more on those who can crunch data in meaningful ways. With the power of Excel, businesses can help identify opportunities for expansion, save money, investigate deficiencies and overall help in the making of important business decisions. Many companies and employees are relying more on the automation and broad functionality of Excel to reduce workload, plan projects or manage records in their business operations. The sky is the limit, both for utilization in business and learning more. There are many ways to expand one's own Excel horizons, from instructor led courses in the classroom to independent study online.

MORE EXCEL FEATURES
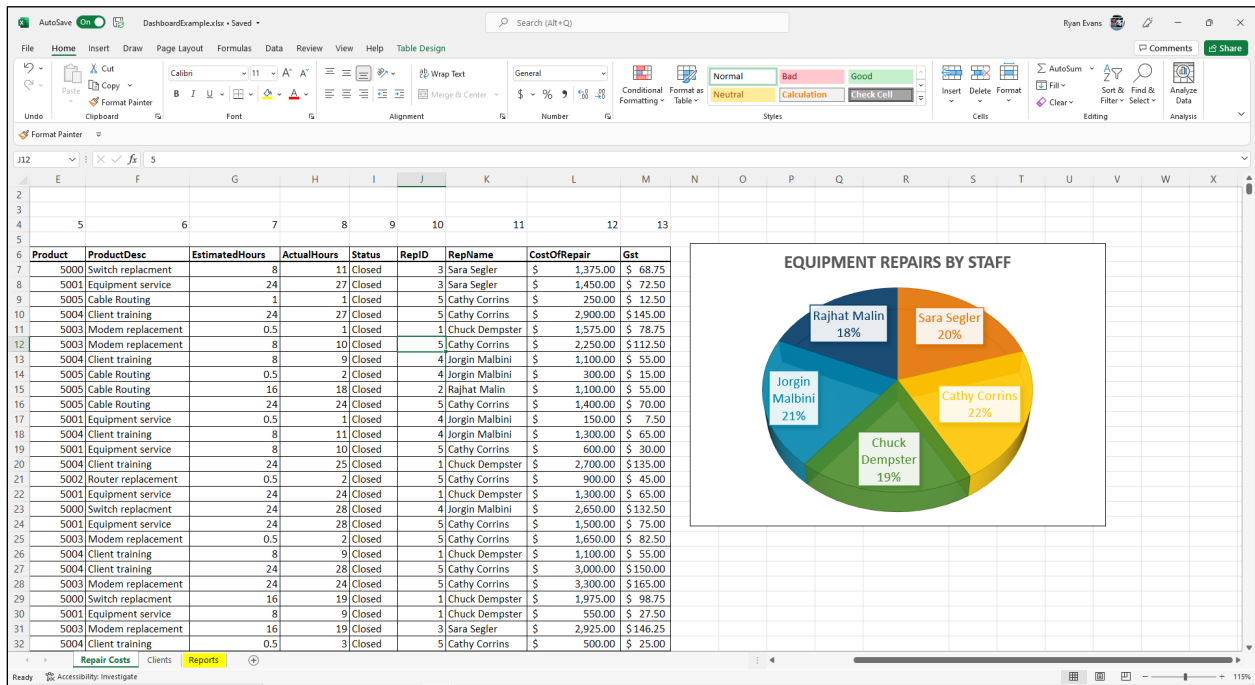
- [ ] Calculations
- [ ] Inventory
- [ ] Invoicing
- [ ] Forecasting
- [ ] Data Analysis
- [ ] Charting
- [ ] Graphical Analysis
- [ ] Operational Tools
- [ ] Limited only by imagination

It's just terminology and often has a simpler explanation than what it appears to be at first glance.

Sort & Filter

The Sort Tool sorts data automatically by date, number and more. The Filter Tool filters data to isolate, analyze and compare information within a column.

Tables

Converting a range of cells containing data into a Table will give you instant command of tools for further sorting, filtering, managing and analyzing groups of data. It's a sometimes a little easier on the eyes to look at data in a Table format.

Functions

Functions are pre-defined formulas that are built into Excel and used for automating simple and complex calculations.
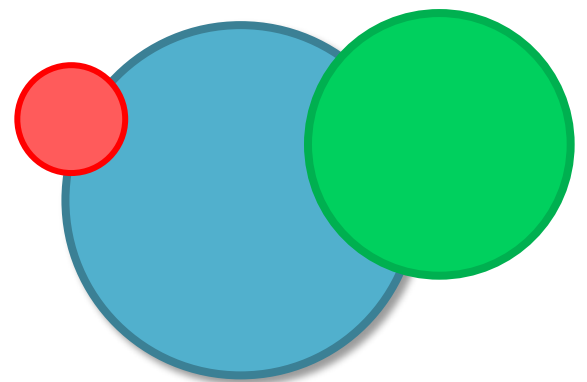
Pivot Table

A powerful tool that queries, organizes analyzes, and summarizes data to see patterns, identify trends, and make comparisons.

SORTING

- Sorting Information
- Sorting by Data Type
- Advanced Sort

SORTING INFORMATION

Grouping like information together or ordering it from smallest to largest or vice versa is one of the quickest tools that can be used in Excel. It just takes a few seconds to sort a column as only one cell needs to be selected in that column before sorting. If multiple cells are selected before completing a Sorting feature in Excel, you will see a dialog that will ask you to confirm or expand the selection. One selected cell is all that is required to start a Sort.

Sorting data can be done multiple ways in Excel. Using the A to Z and Z to A buttons is probably the quickest way to sort a column of data. These two buttons do feature sorting alphabetically, but they are also capable of sorting dates, numbers, along with text. It will depend on what cell is selected before pressing the sorting buttons.
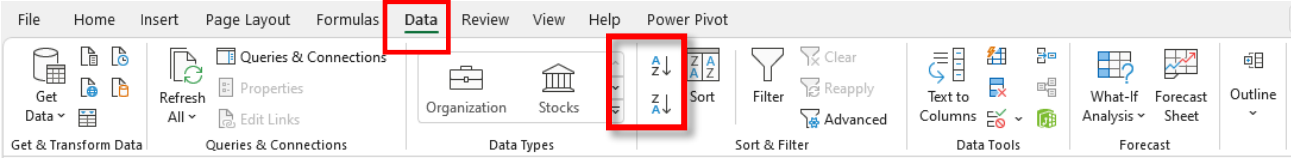
1. Click in the column that needs to be sorted
2. Select A to Z button to sort these types of data
   a. Alphabetical
   b. Smallest to Biggest
   c. Oldest date to newest date

Dept Column before Sort A to Z

Dept	First Name	Last Name	Hire Date	Wage
Contract Sales	Thaddeus	Flynn	10/26/2021	$ 51.00
Administration	Amber	Menard	4/25/2018	$ 46.00
Administration	Gloria	Sears	8/30/2020	$ 29.00
Administration	Ruby	Meeker	1/1/2016	$ 28.00
Contract Sales	Carol	Walls	2/25/2011	$ 43.00
Administration	Shirley	Mccullough	7/10/2011	$ 36.00
Contract Sales	Kristine	Baxter	9/24/2020	$ 39.00
Administration	Sharon	Chancellor	10/6/2016	$ 40.00
Contract Sales	Cindy	Toler	7/8/2017	$ 31.00
Accounts	Anna	Alverson	4/1/2019	$ 22.00
Accounts	Luna	Santos	5/14/2020	$ 22.00
Administration	Tammy	Mckown	9/29/2010	$ 22.00
Contract Sales	Luz	Dollar	6/17/2011	$ 55.00
Administration	Jorge	Svenenson	12/10/2012	$ 31.00
Contract Sales	Thomas	Tinkham	5/5/2017	$ 31.00
Contract Sales	Forrest	Beck	2/25/2016	$ 54.00

Dept Column after Sort A to Z

Dept	First Name	Last Name	Hire Date	Wage
Accounts	Anna	Alverson	4/1/2019	$ 22.00
Accounts	Luna	Santos	5/14/2020	$ 22.00
Administration	Amber	Menard	4/25/2018	$ 46.00
Administration	Gloria	Sears	8/30/2020	$ 29.00
Administration	Ruby	Meeker	1/1/2016	$ 28.00
Administration	Shirley	Mccullough	7/10/2011	$ 36.00
Administration	Sharon	Chancellor	10/6/2016	$ 40.00
Administration	Tammy	Mckown	9/29/2010	$ 22.00
Administration	Jorge	Svenenson	12/10/2012	$ 31.00
Contract Sales	Thaddeus	Flynn	10/26/2021	$ 51.00
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Contract Sales	Cindy	Toler	7/8/2017	$ 31.00
Contract Sales	Luz	Dollar	6/17/2011	$ 55.00
Contract Sales	Thomas	Tinkham	5/5/2017	$ 31.00
Contract Sales	Forrest	Beck	2/25/2016	$ 54.00

ADVANCED SORTING

With the Custom Sort feature, multiple columns and options for sorting are available. Sorting month and weekday names will automatically sort the data   alphabetically,   leaving the months out of order. Using the SORT button on the Data Tab will activate the Custom Sort dialog.
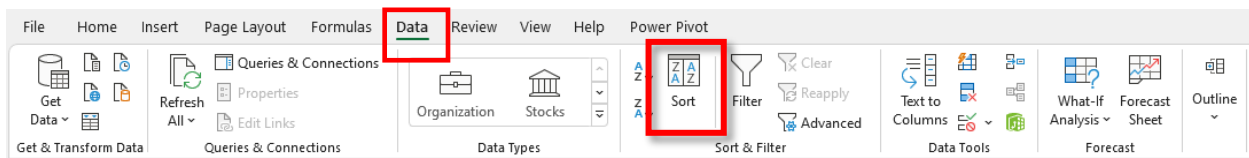
Much like the Filter feature of Excel, The Sort dialog can sort by properties other than just the Cell Value.

Cell Value – Text, Number or Date

Cell Color – Sort by the Same Fill colour

Font Color – Sort the cells using the font colour

Conditional Formatting Icon – Group all the like icons together applied using Conditional Formatting

Options Button – Sort by rows or even column headers

This data has been sorted first by the Dept. column and then within the department the date has been sorted Newest to Oldest.
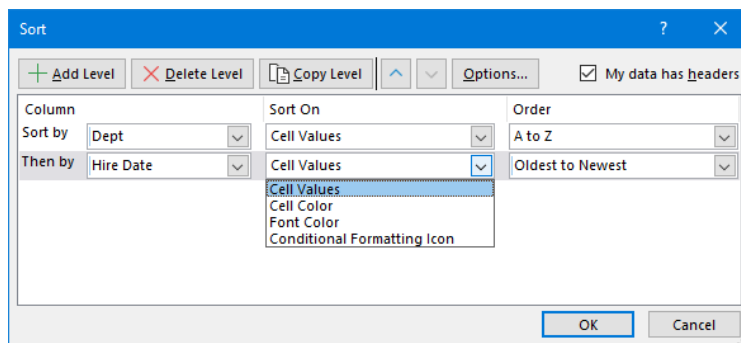

Dept	First Name	Last Name	Hire Date	Wage
Accounts	Anna	Alverson	4/1/2019	$ 22.00
Accounts	Luna	Santos	5/14/2020	$ 22.00
Administration	Tammy	Mckown	9/29/2010	$ 22.00
Administration	Shirley	Mccullough	7/10/2011	$ 36.00
Administration	Jorge	Svenenson	12/10/2012	$ 31.00
Administration	Ruby	Meeker	1/1/2016	$ 28.00
Administration	Sharon	Chancellor	10/6/2016	$ 40.00
Administration	Amber	Menard	4/25/2018	$ 46.00
Administration	Gloria	Sears	8/30/2020	$ 29.00
Contract Sales	Carol	Walls	2/25/2011	$ 43.00
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Contract Sales	Kristine	Baxter	9/24/2020	$ 39.00
Contract Sales	Thaddeus	Flynn	10/26/2021	$ 51.00

FILTERING

TOPICS INCLUDE

- Using Filters
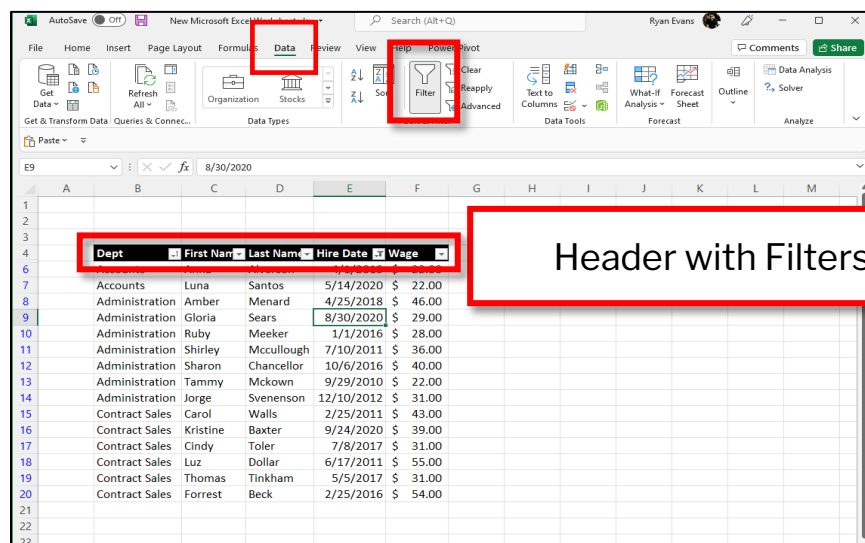- Filter by Data Type
- Applying Filters
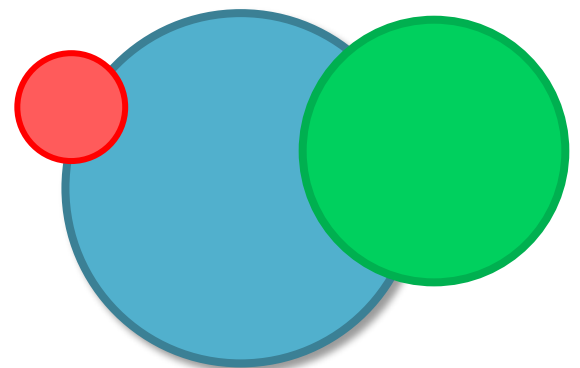
FILTERS

The Filters are drop-down menus that can appear on the header row of data. They are a very common feature in other tools within Excel and will be operated in the same way, wherever they are found. The Filters have both the capability to sort and can also hide rows of data, showing only the pertinent information that needs to be seen.

Clicking once inside of a data set and pressing the Filter button found on the Data Tab will activate the Filters at the top of the data on the header row. If Excel detects no row for the header names, it will add generic titles like Column 1 and Column 2.
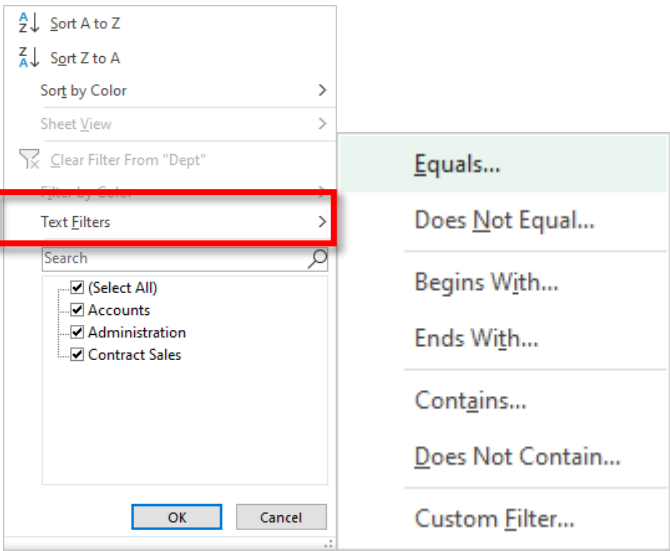
FEATURES OF THE FILTERS

- Hide/Show data by criteria
- Partial word search
- Sorting
- Specific Filters based on the data type. Text, Numbers and Dates
- Filter for blank cells
- Filtered data will show BLUE column numbers

Header with Filters

FILTER BY DATA TYPE

Text, Numbers and Dates all have Filter types that are specific to the respective data type. Showing data using these are a form of an advanced query that can be used.

Text

Numbers

A↓ Sort Smallest to Largest	
Z↓ Sort Largest to Smallest	
Sort by Color	>
Sheet View	>
⧖ Clear Filter From "Wage"	
Filter by Color	>
Number Filters	>

Search 🔍

- ☑ (Select All)
- ☑ $22.00
- ☑ $28.00
- ☑ $29.00
- ☑ $31.00
- ☑ $36.00
- ☑ $39.00
- ☑ $40.00
- ☑ $43.00

OK   Cancel
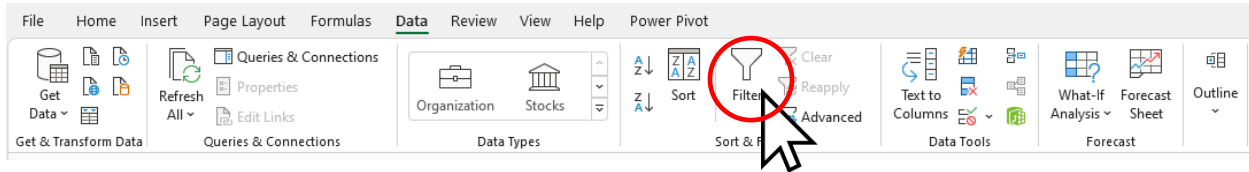
Equals...
Does Not Equal...
Greater Than...
Greater Than Or Equal To...
Less Than...
Less Than Or Equal To...
Between...

Top 10...
Above Average
Below Average

Custom Filter...

Dates

APPLYING FILTERS TO DATA

1. Click in a cell within the data. Ensure that there are no full blank rows or columns as they will not be part of the Filter. Alternatively, all the data including the headers can be selected, if Excel needs clarification on what should be part of the filter.
2. Operated the drop-down Filters to show/hide specific data. Sorting is also available.
3. Clearing the Filter, when necessary, can be done in the drop-down on the Filter button or in the Sort and Filter group on the Data tab Clear
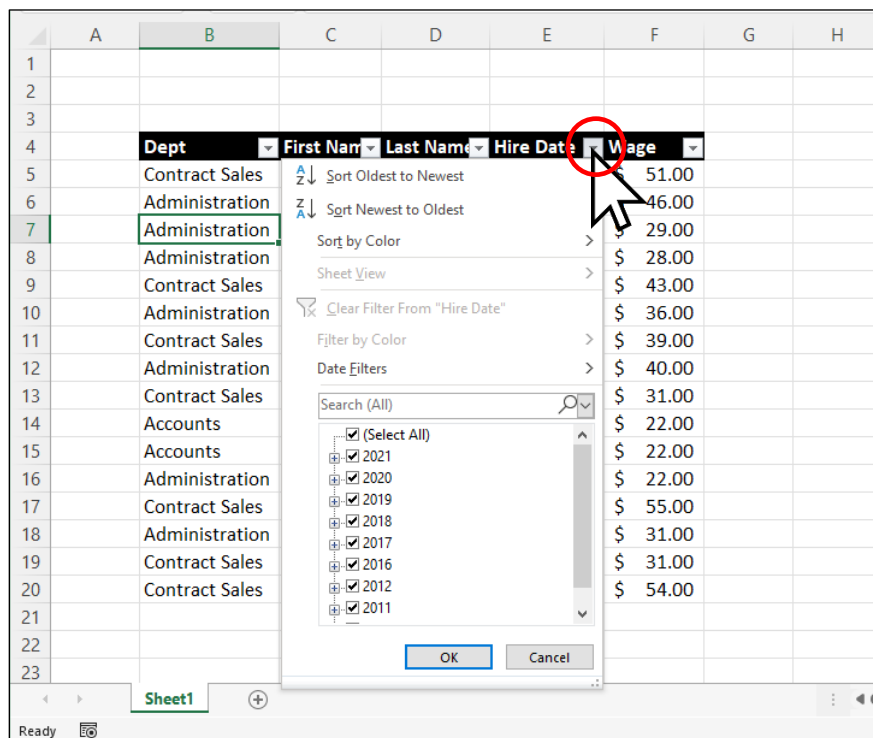
TABLES

- Table Info
- Benefits of using a Table
- Table Options
- Table Design

TABLE INFO

When data is ordered into rows and columns, some users will call the data a table. By converting a normal range of data into a Table, multiple tools and benefits are available. Tables consider the data as a group rather than a bunch of cells and makes the dataset updateable as the Table will grow when rows or columns are added.

Date Ordered	Supplier	Product	Cost	GST
April 6, 2022	Mountain Paper	Three Ring Binder	$ 183.81	$ 9.19
April 10, 2021	EML Supply	Seven Ring Binder	$ 101.63	$ 5.08
April 12, 2021	Office Port	Erasable Pencil Set	$ 199.54	$ 9.98
March 1, 2022	Office Port	Single Pencil - Red	$ 378.33	$ 18.92
March 9, 2022	Mountain Paper	Single Pencil - Blue	$ 131.44	$ 6.57
April 7, 2022	Mountain Paper	Tree Paper	$ 281.98	$ 14.10
April 11, 2022	Island Paper Co.	Bamboo Paper	$ 431.26	$ 21.56
April 14, 2022	Island Paper Co.	Waterproof Paper	$ 313.92	$ 15.70
May 13, 2022	Office Port	Spooler large	$ 313.29	$ 15.66
Total			$ 2,335.20	$ 116.76

None
Average
Count
Count Numbers
Max
Min
Sum
StdDev
Var
More Functions...

BENEFITS OF USING A TABLE

- Data automatically expands the Table when new rows or columns are added
- Formulas and formatting carry down to the next row
- Total Row feature can be turned on to run math functions using a drop-down menu
- Header row freezes at the top when scrolling through a Table
- Filters are turned on when a Table is created
- Using the Filters and the Total row a Table can be used to query data for answers
- Formulas AutoFill automatically down a column

- Banded Rows/Columns make it easier to visually follow a large row of data

Once a Table has been selected by clicking on one or more cells inside the Table, a set of Table tools show up on the Ribbon at the top right. One of the most important features in the Table tools could be the check box that toggles on and off the Total row, enabling math to happen automatically at the bottom of the data.

After a Table has been created the Total row can be Toggled on/off using the checkbox in the Table Design Tools. To activate the features of a Table including displaying the Table Tools on the Ribbon, click inside of a Table of data.
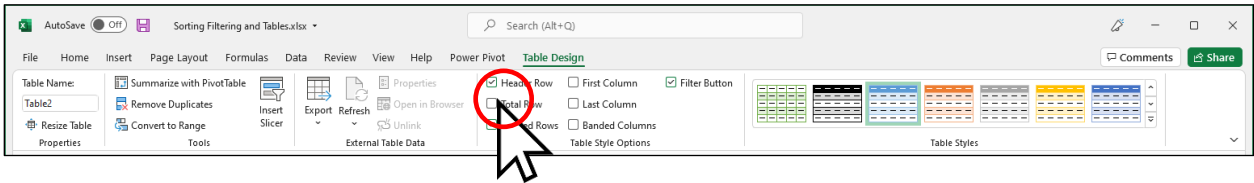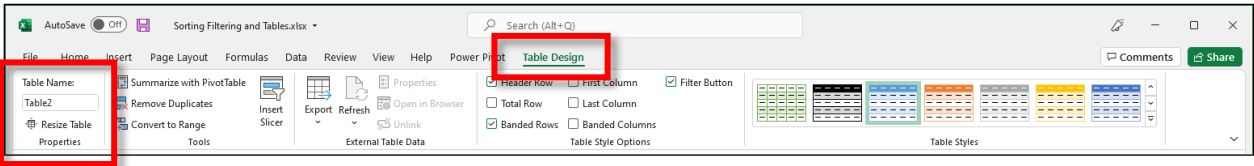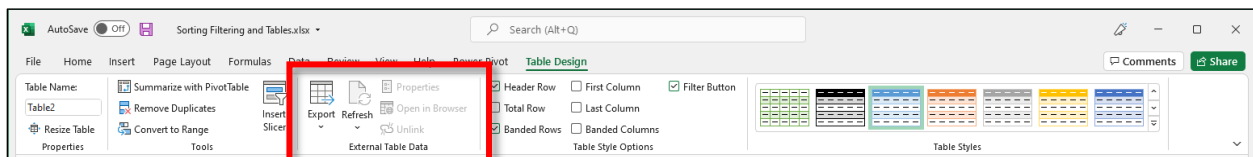

PROPERTIES

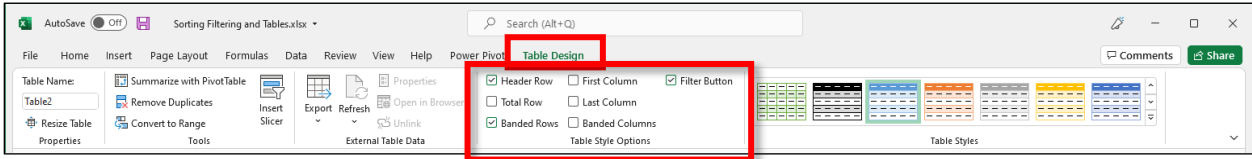| Table Name	All Tables get a name automatically when created, Table3 is an example of one of the unique names a Table is given. It is possible to rename a Table. Columns also have a reference generated automatically based on the name in the header row.
Resize Table	Add columns or rows that are not already part of the Table. It is not often necessary to resize a Table because Tables automatically grow as data is added

TOOLS
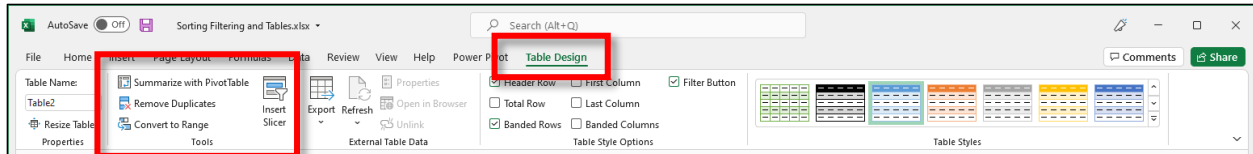
Summarize with PivotTable	A Pivot Table is a form of a Table with advanced tools for organization and summary analysis of data.
Remove Duplicates	The Remove Duplicates tool works on regular cells and table data. There are more advanced tools and techniques that are built-in to Excel
Convert to Range	Convert the Table back to a regular range of Data. It could still look like the original Table because the formatting will stick around.
Insert Slicer	A Slicer is a set of buttons that allow filtering to take place indirectly.

EXTERNAL TABLE DATA

| Export	Send the Data to Microsoft Visio Pivot Diagram or export the data to Office 365 SharePoint list.
Refresh	If the external data sourcing a Table has changed, the Table will need to be Refreshed.
Properties	Details about the external data connection
Open in Browser	Open the external data source
Unlink	Break the connection to the external data and stop updating

TABLE STYLE OPTIONS

Header Row	Turns of the headers. Useful if two tables with the same headers need to be combined
Total Row	Turn on the Total Row to automatically run Functions below the bottom row of the data. SUM, MIN, MAX, AVERAGE, COUNT, Variance and Standard Deviation Functions are available. Turn off the Total Row to easily add data
Banded Row	Every 2nd row is a light or darker colour. Some design in the Table Styles do not show Banded Rows.
First Column	The first column will be formatted differently than the following columns. Some designs offer a darker fill colour and some just bold the text/data.
Last Column	The same as the First Column feature but changes the look of the last column.
Banded Columns	Every 2nd column is a different colour or look. Not all styles show lighter/darker banding.
Filter Button	The Filters from the Data tab show up automatically when a Table is created. No need to go to the Data Tab to toggle the Filters, use the Filter button checkbox.

TABLE STYLES

Formatting data takes times and Tables will do most of the work. When data is added the design will carry forward to new rows or columns.
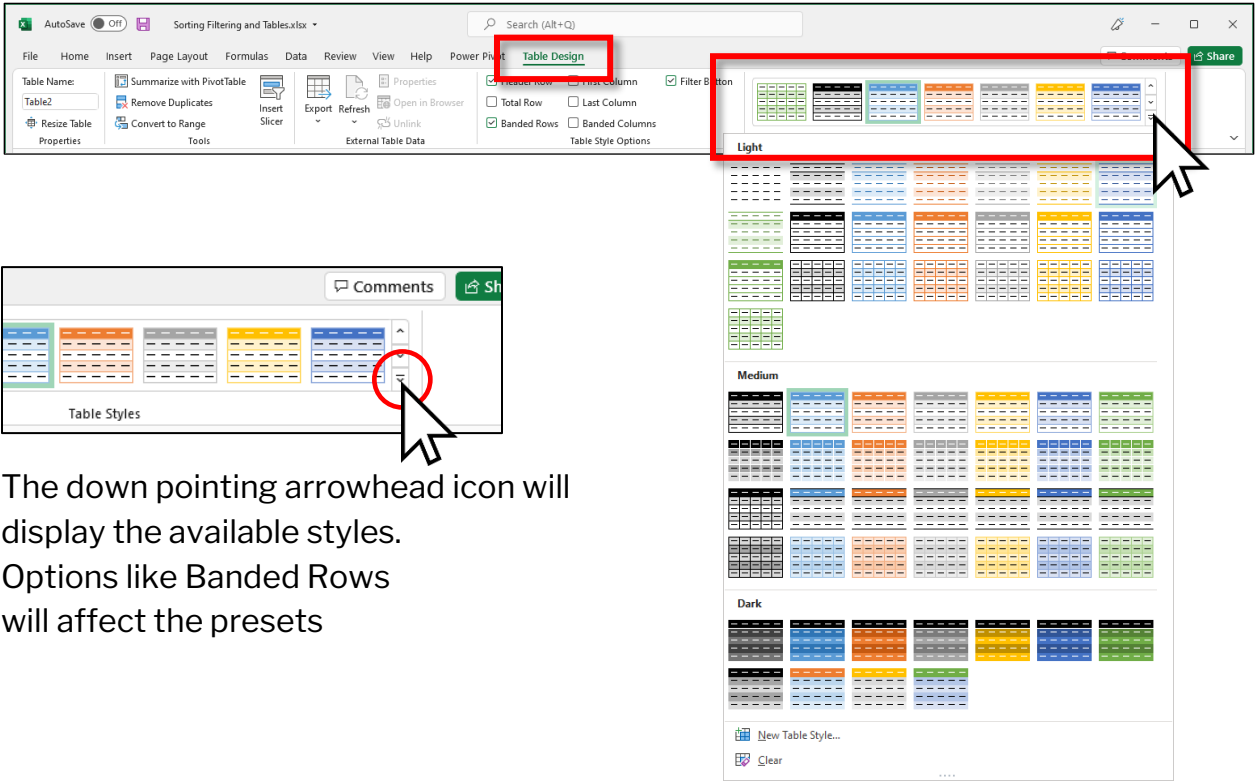
The down pointing arrowhead icon will display the available styles.
Options like Banded Rows will affect the presets

Table style presets	Choose from multiple presets to change the look of the Table quickly. The check boxes to the left of the Table Styles will change the look of the presets.
Create New Table style	The drop-down for Table Styles has a few more tools including the ability to create a Table Style preset
Clear Table Style	The drop-down for Table Styles has a button to clear the fill and border formats from a Table. The data will still be in a Table but will look like regular cells.

FORMULAS/FUNCTIONS IN COLUMNS

Tables do not use normal cell references when applying a Formula or a Function to a column of data, they act more like formulas in database software such as MS Access or MS Project. Some newer users of Excel find it easier to complete the formulas before converting data to a Table. It is not necessary to do a SUM or related Function at the bottom of the data as Tables have the built-in Total Row feature.

The references to the cells will be done by the name of the column heading. A formula can be applied to new column the same way as it is done on regular non-table cells. After entering the formula, Excel will automatically AutoFill down to the bottom of the Table. Even though no specific cell reference is used, AutoFill will apply the formula relative to each row. The @ symbol is an instruction to the formula to get the data from the row the formula is in. No need to write the column name or use the @ symbol when selecting cells with the mouse when writing formulas or functions.

E	F
Cost	GST
$ 183.81	=[@Cost]*0.05
$ 101.63	
$ 199.54	
$ 378.33	
$ 131.44	
$ 281.98	
$ 431.26	
$ 313.92	
$ 313.29	

The new Spill Functions added in 2019 version are not compatible with Tables.
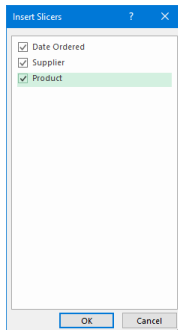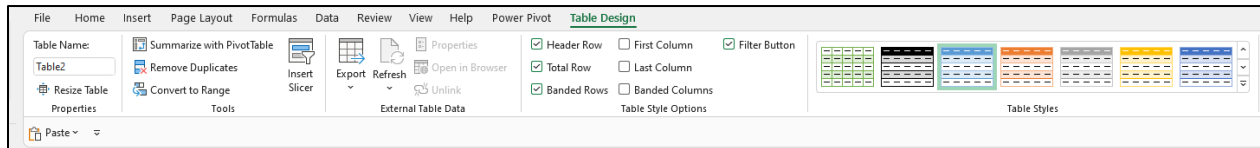
FILTERS

Filters really are a separate tool that happen to be applied automatically to Tables. The Filter feature in Tables operates the same as they do on a regular range of data along with features like freezing the header row so that it is visible when scrolling through a larger set of data. It also includes a Total Row to display the totals of the filtered data.

	A	Date Ordered	Supplier	Product	Cost	GST	G	H	I
12		April 7, 2022	Mountain Paper	Three Ring Binder	$ 281.98	$ 14.10			
13		April 11, 2022	Island Paper Co.	Bamboo Paper	$ 431.26	$ 21.56			
14		April 14, 2022	Island Paper Co.	Waterproof Paper	$ 313.92	$ 15.70			
15		May 13, 2022	Office Port	Spooler large	$ 313.29	$ 15.66			
16		Total			$ 2,335.20	$ 116.76			
17									
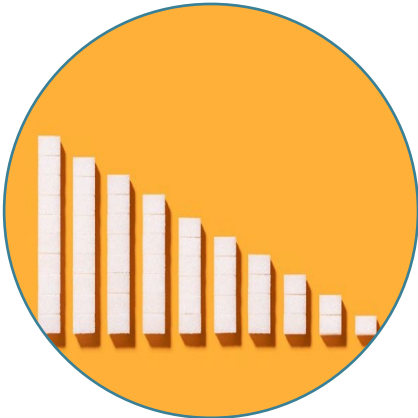
SLICERS

Slicers are buttons that can utilize the Filters indirectly without the need of using the drop-down for the filter on the Header Row. By pressing the Slicer button on Table Design tools, a dialog appears to select the columns by the header name to make the Slicer button show up.
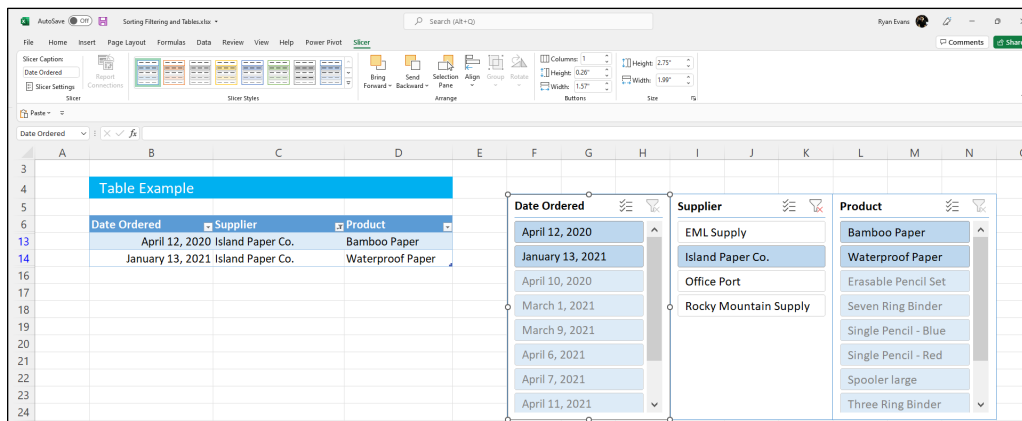
To delete a Slicer, click on the Slicer and press delete on the keyboard.

FUNCTIONS

- AutoSum and Friends
- IF Function
- Lookup Functions
- Spill Functions

INFO ABOUT FUNCTIONS

Functions are built in Math and Logic that are initiated by the functions name along with a set of parameters to tell the function what data to calculate. With just under 500 Functions in the 2019 and Office 365 version of Excel there is some of the Functions every Excel user should know and many that are for specific situations or industries.

A function can have the capability of referencing a group of cells in a row or column by using a semicolon. It would be impossible to add thousands of rows of data using a regular math formula = A1 + B1 + ...

COMMON FUNCTIONS

SUM AND THE AUTOSUM FUNCTIONS

SUM is the most used Function in Excel. It is the only Function that has a shortcut, ALT + =. The main difference between using SUM and a regular formula is that the SUM function can use a range of rows, columns or both and a math formula would have to reference every cell individually.

The AVERAGE Function is a good example on how it is possible to supply the cells with the numbers that need averaging to the AVERAGE Function and all the math needed to average happens behind the scenes and only returns the answers. It is no longer necessary to use math formula of adding up all the numbers and dividing by the count of numbers as taught in early grade school.

Average using a non-Excel math formula to average three numbers

(2+3+10)/3

Using the AVERAGE Function to average ninety-eight cells of data

=AVERAGE(B2:B100)

SUM FUNCTION

The SUM Function, the most used function, has the capability of referencing a group of cells in a row or column by using a semicolon. It would be impossible to add thousands of rows of data using a regular math formula = A2+A3+A4+A5+A6+... until A1001

The SUM function can add up thousands of rows of data in a short formula. This will add up cells in rows A2 to A10000

$$=SUM(B1:A10000)$$

SUM Function Examples

=SUM(B2:B10000)	Sums almost 10 thousand of numbers in a column
=SUM(B2:M2)	Sums 12 cells that are in row 2
=SUM(B2:D100)	Sums rows and columns from B2 to D100 (297 cells)
=SUM(B2:B100,D2:D100)	Sum up 99 cells in column B and 99 cells in column D
=SUM(D2,E2,F2)	Sum up three different cells. A math addition formula would have worked here also but use the SUM function if there is a range of adjacent cells
=SUM(B2:B10)*0.05	SUM B2 to B10 and then multiply by 0.05 (5%)
=SUM(B2:B10)>100	The SUM will add up the number and the greater than and 100 will run a test that will result in either TRUE or FALSE as the answer

Many of the Functions are like how the Arguments work inside of the SUM Function. Average, Min, Max, and Count use the same argument structure but will produce a different answer based on the Function. An incorrectly entered

function will show the error #NAME, which is Excel telling you that it doesn't understand what was typed.

BASIC FUNCTIONS

- ☐ SUM
- ☐ AVERAGE
- ☐ COUNT NUMBERS (COUNT)
- ☐ MIN
- ☐ MAX

POPULAR FUNCTIONS

- ☐ IF
- ☐ VLOOKUP
- ☐ SUMIF
- ☐ TODAY

Explore the different categories found under the Formula tab on the Ribbon. Adding a Function is the next topic and will show the Formula Tabs Function Library in more detail. A listing of all the available Functions can be found on Microsoft's website, in alphabetical order.

https://support.microsoft.com/en-us/office/excel-functions-alphabetical-b3944572-255d-4efb-bb96-c6d90033e188

EXAMPLES FUNCTIONS

Built-in logic to add smarts to your spreadsheet can be entered into the cells where the answer is to be displayed. After entry the Function or formula will disappear showing only the answer

Data used for examples:
Column C
cells C2 to C1100

Functions showing answers

ADDING A FUNCTION

There are several ways to add a Function to a cell. See below for more information about applying the AutoSum button to a cell.
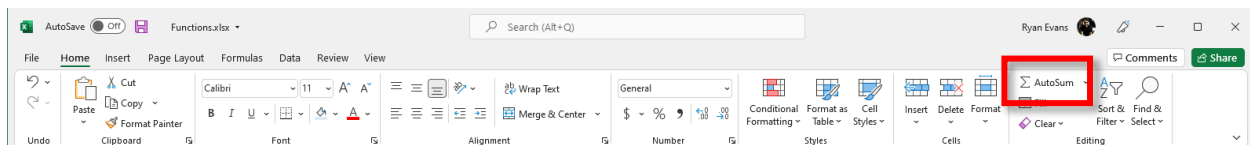
AUTOSUM BUTTON

AutoSum is a virtual one-click addition of your data. When triggered, AutoSum intuitively selects and adds up your data, with the resulting value returned into the answer cell, where AutoSum was applied.

To add a SUM Function to a cell. click into the cell where you would like result returned, and then click the AutoSum button in the ribbon. There are five more important automated functions in the drop-down menu of the AutoSum button.

HOME & FORMULA TAB ON THE RIBBON TOOLS

AutoSum on the Home Tab

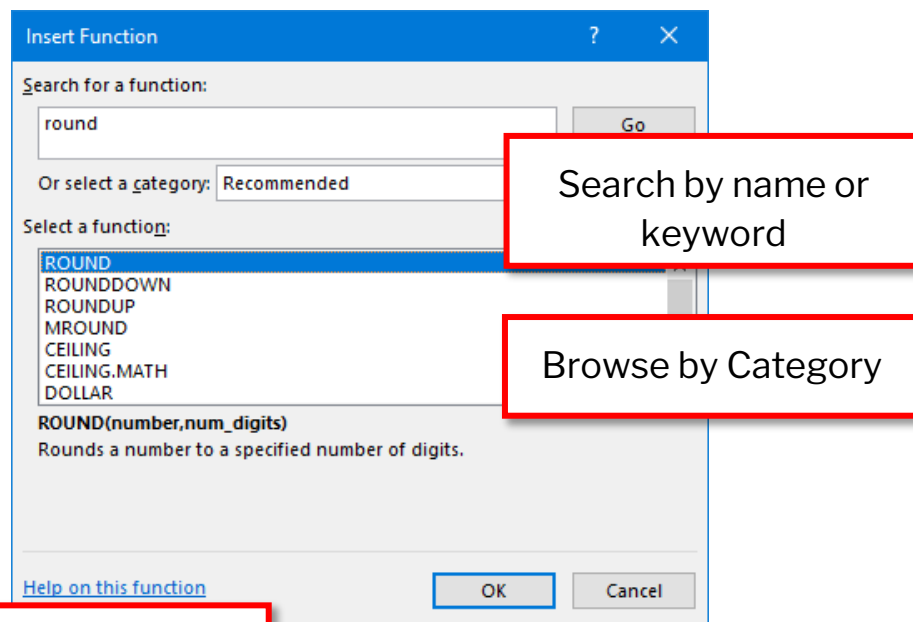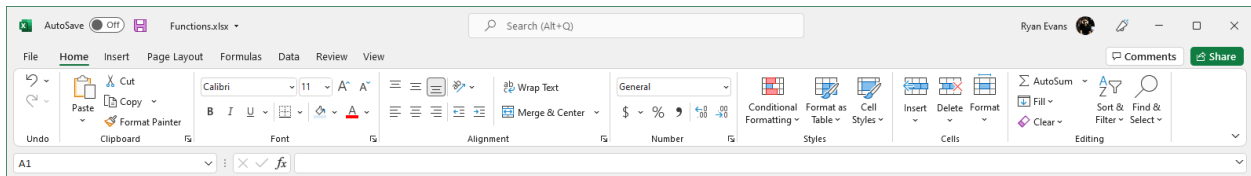Smaller laptops/screens will show the same icon without the label AutoSum
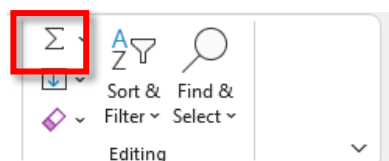
AutoSum on the Formula Tab
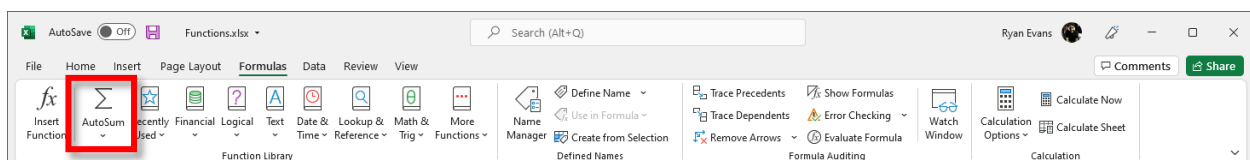
INSERT FUNCTION BUTTON

Found to the left of the Formula bar,   Insert Function has   search and help capabilities
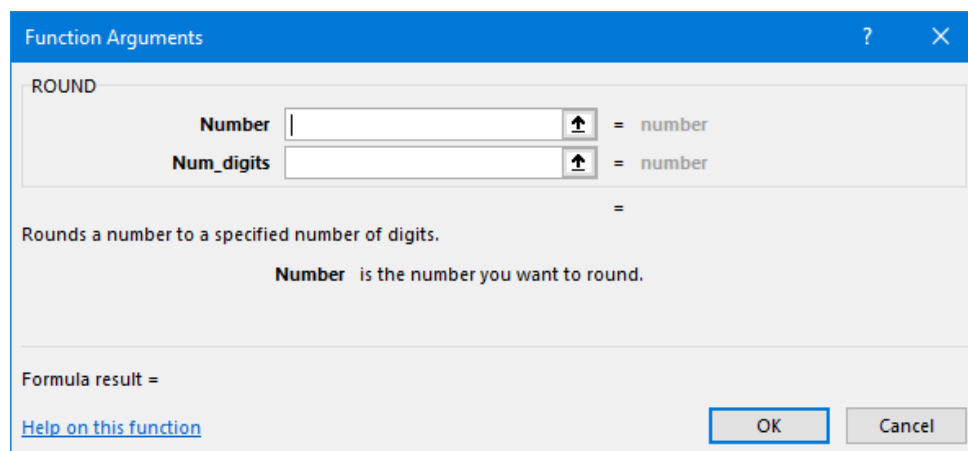

Search by name or keyword

Browse by Category

Help and Reference

After selecting the desired Function, the Function Arguments Dialog appears. Fill in the required arguments and press OK to complete. Help on the Function is also available in the bottom left corner if reference is needed to understand the argument required. Clicking in each field shows a brief description of that specific argument. Many find the Help button more useful for reference.

You can return to this dialog after the Function has been completed to edit what was entered. Edit by selecting the cell or editing the cell that contains the Function and pressing the same Insert Function button to left of the Formula bar.
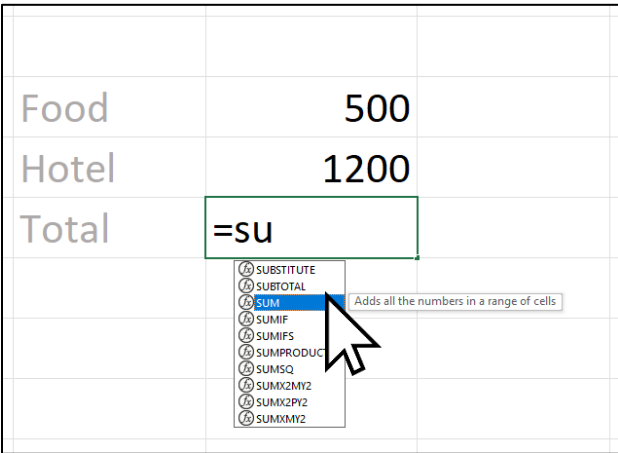
FORMULA TAB

The Function Library allows you to Explore Functions by category. The Insert Function dialog will appear after a Function is chosen.
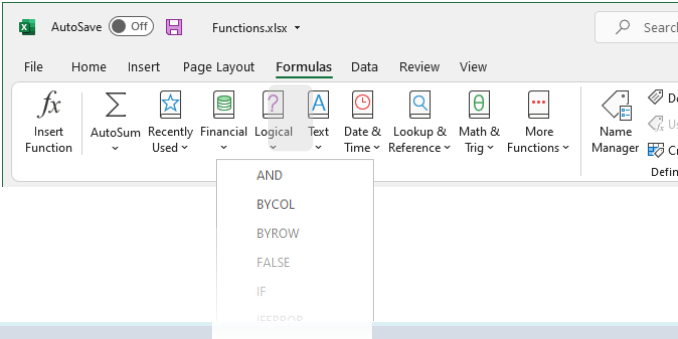
TYPING

Start typing the Function in a cell or Formula Bar. Typing is the only method of adding a Function that will autocomplete the names of the Function along with several other drop-down lists to choose options from. **Function** names and **Named Ranges** will pop-up when typing a formula.

USING THE AUTOSUM BUTTON

Apply a Function from the Home or Formula Tab (Ribbon). – AutoSum button
This includes all the five basic functions: SUM, AVERAGE, MIN, MAX, and COUNT
NUMBERS.

The Auto part of AutoSum and the related functions, Excel will automatically select
cells adjacent to the cell where the answer will show. AutoSum often will include
cells that are not

1. Click – click on the cell you want an answer in
2. Select – Select a Function using the AutoSum button
3. Correct – Correct the selected range if necessary

2 Step **TWO**: Choose a Function

1 Step **ONE**: Select a cell

ense Date	Description	Cost	Tax
1-Jun-22	Travel	$177.23	$ 8.86
2-Jun-22	Entertainment	$127.00	$ 6.35
3-Jun-22	Travel	$166.31	$ 8.32
4-Jun-22	Food	$90.38	
5-Jun-22	Food	$97.71	
6-Jun-22	Travel	$128.30	
7-Jun-22	Food	$168.98	

While inserting a function you will have a chance to select the cells in step
3 when needed.

3 Step **THREE**: Correct if necessary

4 PRESS **ENTER**

REFERENCING CELLS

Formulas and functions and tools will use cell range references. Math formulas do not reference a column or row of data like some of the Functions and tools are able to reference a whole column. When you are selecting cells with mouse, Excel will write the cell references for you. To show a more realistic example the SUM function is used for demonstrating cell referencing as it is one of many functions that can use a range of more than one cell.

It is possible to use numbers directly in formulas and functions in Excel and is acceptable to do if the number is not going to change often. Cell references have two main advantages

1. The formulas/functions will not have to be updated if the data changes
2. AutoFill will fill in similar rows or columns with the same formula/function but change the reference so that it applies to the new row/col

Example Cell References

Same Sheet	=B2	
Column using SUM	=SUM(C2:C10)	The SUM function is referencing and adding up row C2 all the way to C10. This is a lot shorter than using addition because of the column ref.
Row/col using SUM	=SUM(B2:J100)	The SUM function is adding up multiple rows and multiple columns.
Different Sheet	='Expenses 2021'!E11	This is what is referencing a cell from another worksheet in the same workbook. The worksheets name is separated from the cell address by an exclamation mark. If the Worksheet name has a space in it, single quotes will surround the name.
Different Workbook	='[More Data.xlsx]data sheet'!$E$11	This references CELL E11 from the More Data workbook.xlsx file within the data sheet worksheet. [Workbook]worksheet!E11
Named Ranges	=SUM(NameOfCells)	Naming cells has many benefits, discussed later. Named Cells are a form of an absolute reference. Both topics are mentioned in this manual.

This is not an exhaustive list of ways to references cells in a Worksheet or within a workbook. The above examples show three main ways to reference a single or a group of cells. If a cell reference contains a $ in the cell references, that   is a locked in reference used in the next topic, called AutoFill Formulas

☐ **Same Worksheet:** E11 or $E$11 (both point to cell E11)
☐ **Different Worksheet:** [Workbook Name]Worksheet Name!Cell Address
☐ **Different Workbook:** [Workbook Name]Worksheet Name!Cell Address

IF

The If function is the most popular logic function which can test one cell to see if it meets a criteria and then will give one of two answers. Test a cell to see if it contains more than 40 hours and IF it does, calculate   overtime and IF it doesn't don't pay overtime. An IF Function can output a TRUE or a FALSE answer. Those answers can set to show a text, number, cell references, formula or even another Function.

Three Arguments

=IF(LOGICAL TEST , VALUE IF TRUE , VALUE IF FALSE)

1. Logical Test - The test will result in a TRUE or FALSE Answer.
2. Value if TRUE – If the test gets a TRUE answer this value will show
3. Value if False – If the test gets a FALSE answer this value will show

Comparison Operators work in many areas of Excel including Functions/Formulas and some of the tools in Excel.
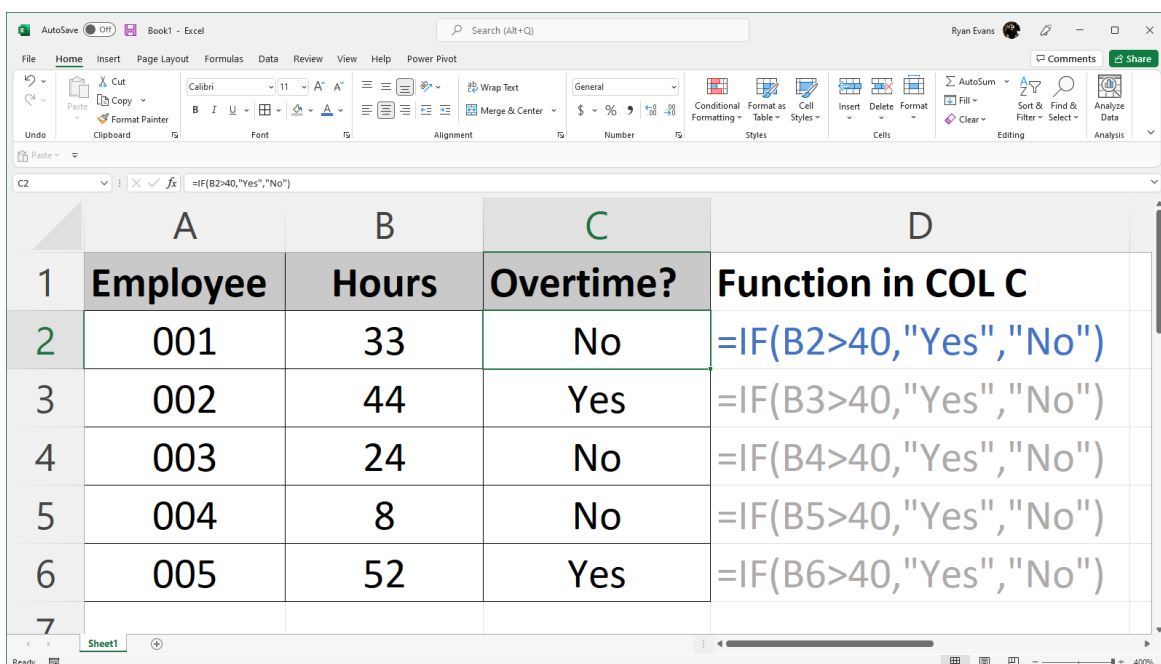
Comparison Operator	Symbol
Equals	=
Not Equals	<>
Greater Than	>
Greater Than or Equal To	>=
Less Than	<
Less Than or Equal To	<=

An IF Function uses comparison operators to test a cell. When CELL references are used this question of overtime can use the AutoFill feature to fill in the adjacent rows.

=IF(B2>40,"Yes","No")

Quotes are used for the True and False answer in the example as they output text. If Functions that output numbers, formulas or functions, are recognized directly by Excel and will not need quotes.

Testing to see if a cell has a value greater than 40, if so, the answer is **Yes** and if not, the answer is **No**

EXAMPLE IF FUNCTIONS

The IF Function is a very versatile Function that has many variations. It can test Text, Numbers, Formulas, Cells against other CELLS and even tell if a CELL has been left blank.

Example IF	Description
=IF(B2="Canada",5%,0)	Checks cell B2 to see if it contains the text Canada. Notice anytime text is used it features the double quotes. If B2 is Canada, the cell that contains this Function would output 5%
=IF(B2<=100,"Small","Large")	The logical test checks to see if cell B2 is less than 100 and if it is than set the Function cell to the word Small and anything else will get Large.
=IF(B2="","Please Fill in Cell B2","Thank you")	The double quotes with no space between them represent BLANK. This example is testing cell B2 to see if it is left blank, if it is than it politely reminds the user to fill it in. When cell B2 is filled with any data the Function cell will say Thank you.

=IF(B2>=C3 , "Target Met" , "Keep Going")	The logical test compares two cells to see if the B2 is equal to or greater than the target set in C3. If it is than the answer cell will contain the words Target Met and default to Keep Going, if not.
=IF(B2>=TODAY(),"Due Now","pending")	Test a cell with a date to see if it is greater than or equals to Today's date. Functions and formulas can be used in all three arguments. This example has the TODAY function in the logical test.
=IF(B2="Complete","✓"," ✗ ")	The if Function can output any text including symbols. All symbols will be the font colour of the cell. It is possible to use conditional formatting to make the check mark green and the X red, formatting is not done in the Function itself.

IF(B2<50,"Small",IF(B2>100,"Large","Medium"))	This is a what is considered a Nested Function. The first logical test will check B2 to see if it is less than 50, if it is NOT then it will run the 2nd IF function that tests to see if is greater than 100. If B2 is not greater than 100 it will default to Medium. The 2nd IF is located inside the FALSE position of the 1st IF.

Notice in all the examples whenever text is used it has been double quoted. Text and symbols will have to be protected by the quotes as Excel will output the #NAME error there is something in the formula or Function that is not understood.

The IFS Function was added to Excel in 2019 and can be a great alternative to creating a more complex nested IF Functions.

The following IFS example tests CELL B2 twice with two possible outcomes. If neither test gets a pass, the answer defaults to 16.

=IFS(B2="Contract",32,B2="Fulltime",28,TRUE,16)

CONDITIONAL FUNCITONS

SUMIF, AVERAGEIF, COUNTIF are examples of Functions that will only calculate data on a given condition/criteria that could even come from a corresponding column. The SUM Function will add up everything in a column where the SUMIF could be given the condition to only add up specific costs from.

The SUMIF and family of conditional functions often need more than one column, using Named Ranges is helpful when working with frequently selected and large sets of data. It also helps simplifying the user writing and reading the functions.

COUNTIF

CELL F6 looks through B4 to B9 and counts how many times the word Laptop shows up. The criteria can be from a CELL E6 or typed directly into the CountIF function.

CELL F6 - =COUNTIF($B$4:$B$9,E6)

SUMIF

CELL G6 looks through B3 to B9 and matches the criteria of Laptop. When Laptop is found the SUMIF will add it to the SUM of Laptop.

CELL G6 - =SUMIF($B$4:$B$9,E6,$C$4:$C$9)

	A	B	C	D	E	F	G	H
G6		=SUMIF($B$4:$B$9,E6,$C$4:$C$9)						
1		**Data**						
2								
3		**Item**	**Cost**		**Totals**			
4		Laptop	$ 500.00					
5		Desktop	$ 5,000.00		criteria	**COUNTIF**	**SUMIF**	
6		Ergo Chair	$ 600.00		**Laptop**	2	$ 2,000.00	
7		Laptop	$ 1,500.00		**Desktop**	3	$ 6,800.00	
8		Desktop	$ 600.00		**Ergo Chair**	1	$ 600.00	
9		Desktop	$ 1,200.00					
10								
11								

VLOOKUP

Looking up information is a daily occurrence in business and even in our personal lives. Using a catalog to lookup a price or a phone book to look up a phone number would be examples of a lookup. Companies create many types of datasets and databases that can be used to lookup a unique product number, name, or data. It is important that the source of data has a unique identifier in the first column such as an employee ID number or a product UPC number. The V in VLOOKUP stand for a vertical lookup as it searches through a column vertically starting at the top cell in said column.

=VLOOKUP(C4,$I$5:$K$8,2,FALSE)
=VLOOKUP(C4,ProvTaxDB,2,FALSE)

4 arguments

A	What are you looking up
B	Where is the data
C	What column # returned
D	Approximate (TRUE) or Exact Match (FALSE)

A Database has a unique identifier such as a Product ID #, Province, or department name, in the first column.

The following example will use a simple product ID #. Some of the data in the columns of this list of products will have to be looked up to complete an order sheet.

There are four columns in the Product DB, VLOOKUP will need to know if it is column 2, 3, or 4 that the answer should be pulled from when a match is found.
If a match is not found the VLOOKUP Function will output the #NA error.

Product DB			
ProdID	**Desc.**	**Stock Available**	**Cost**
1000	Red Pen	11	$ 2.00
1002	Big Eraser	5	$ 10.99
1004	VR Goggles	2	$ 199.99
1006	Skeetch Plate	6	$ 5.85

Having to look up products by the ProdID Field could be time consuming if done manually. Writing a Function that looks up the first product ID can use AutoFill to complete the following products that also need to be looked up.

Customer Order				
ProdID	**Cost**	**Descrtiption**	**Ordered**	**Total**
1006			10	
1000			20	
1004			10	
1006			2	
1001			0	
1004			1	

Another VLOOKUP Example

The following example show VLOOKUP looking up product ID #1006 in cell B5, it uses CELLS H5 to K8 but only looks in the first column to match the number. When it finds the match, the Function asks for the answer from COL 2 and is set to FALSE for an exact match
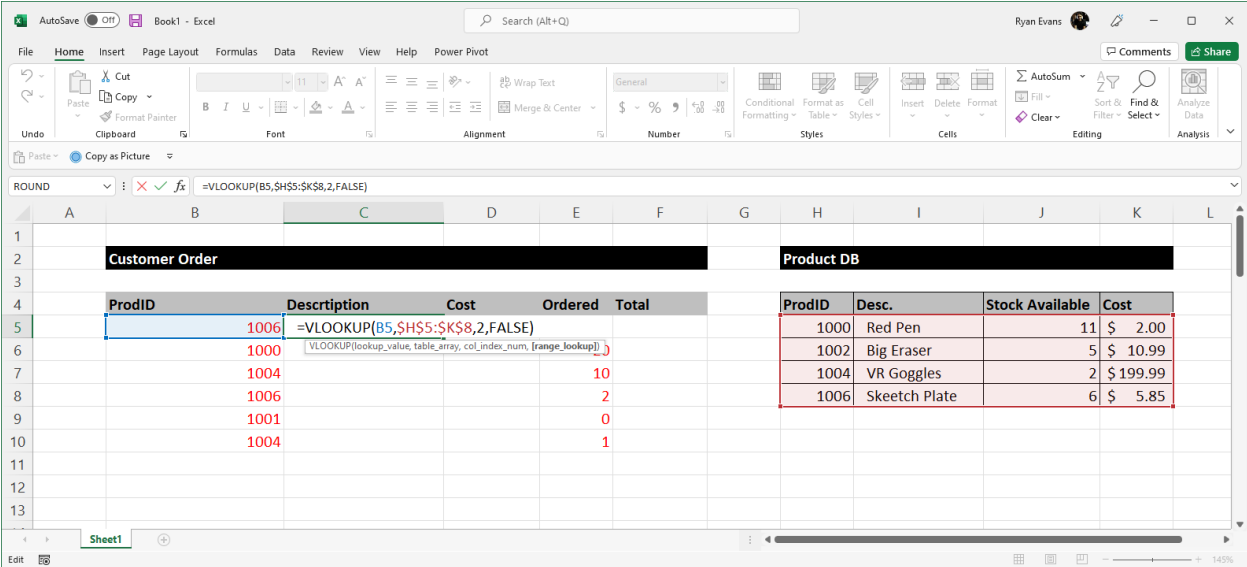
SPILL FUNCTIONS

In 2019 Excel updated the Functions by adding Functions that could output to more than one CELL. Before Spill Functions existed this capability of querying data and outputting a new list of results, was reserved for tools, Array Formulas or VBA programming.

Spill Function needs room below or sometimes beside where the Function is typed as the answer will spill-out into the necessary number of cells needed to. If there is not enough room the **#SPILL** error will show and if the Function needs editing or deleting it must be done in the first cell in the array of answers.

2016 and older versions of Excel do not support the Functions added to Excel in 2019 and beyond. Ensure compatibility when collaborating with other users. Excel online and their competitor Google Sheets support more Functions than Excel 2016 and older. Most of tools in Excel are also available online, but not all.

UNIQUE

Use the unique Spill Function on a list on text, names, dates, or numbers to output only one of each.

=UNIQUE(A2:A9)

FILTER

The Filter Function first specifies the whole data set, and the second part tells the Function what column and criteria to look for. When the criteria are met, the Filter Function can output multiple rows and columns of data. Make sure to leave lots of room for the output. This new Function can do some of the work that an older tool called Advanced Filter was capable of.

$$=\text{FILTER}(A2:B9,A2:A9="Hamill")$$
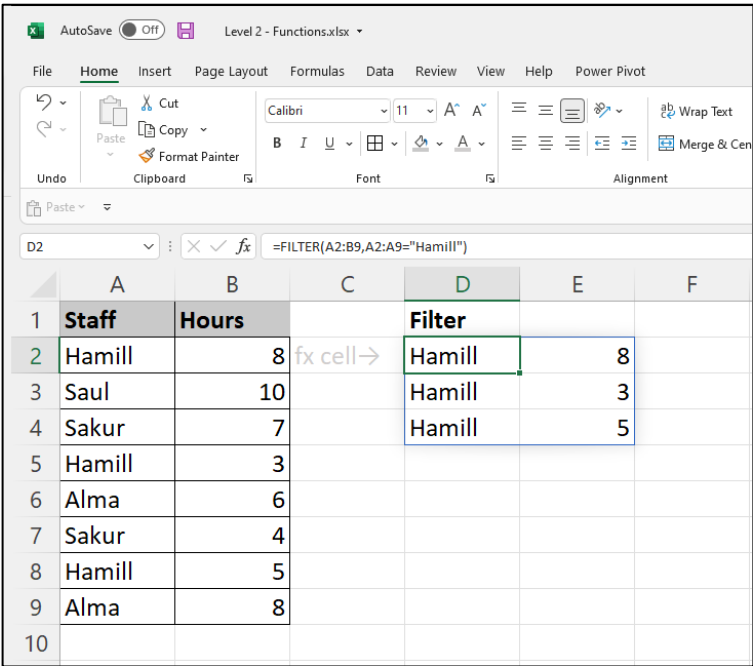
SORT

The Sort can reference a column/row of data and output it in various types of chronological, number, or alphabetical orders. This Functions has many optional arguments within the brackets. The following example shows basic usage of the SORT Spill Function.

<p style="text-align:center;">=SORT(A2:B9)</p>
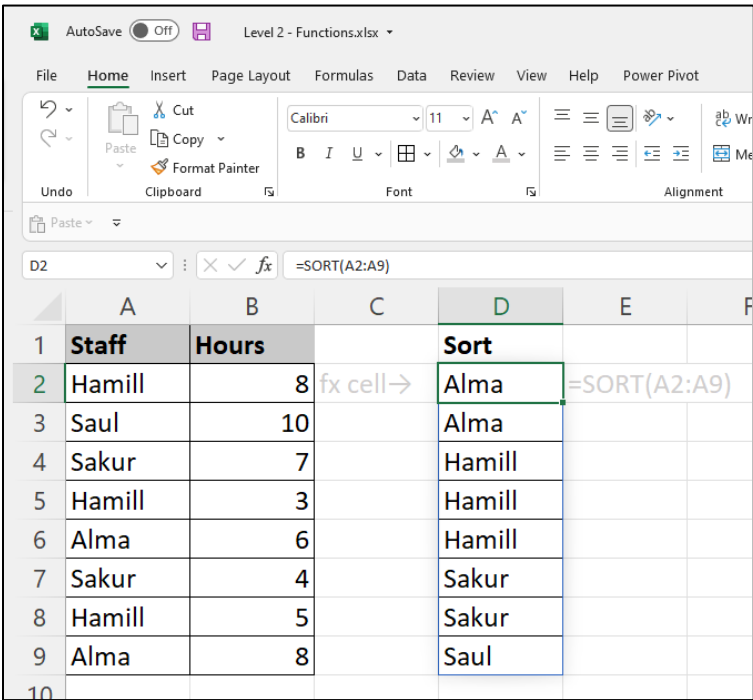
Using nested Functions (two or more Functions working together), it is possible to combine   so that the output uses SORT, UNIQUE and/or FILTER.

<p style="text-align:center;">=SORT(UNIQUE(A2:A9))</p>

CHARTS

- Chart Info
- Chart Designs
- Chart Examples

CHART INFORMATION

Creating a chart to visualize data can bring to light new information that could not be seen by looking at the data itself. There are seventeen categories of Charts in Excel and some of the categories have up to seven variants.
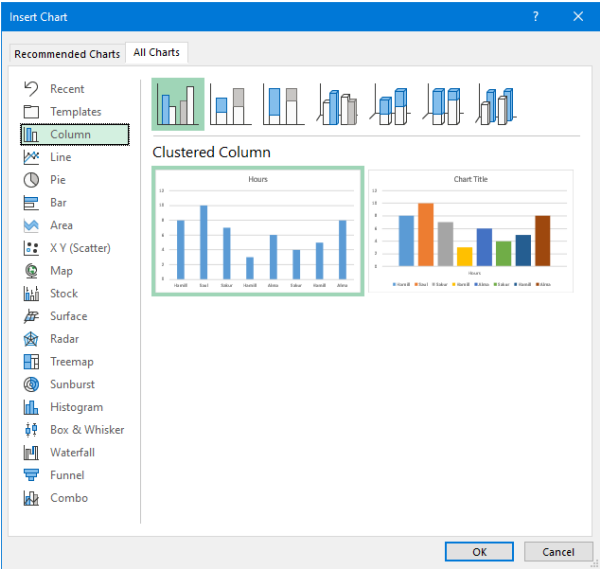
3D Pie Chart with Customizations
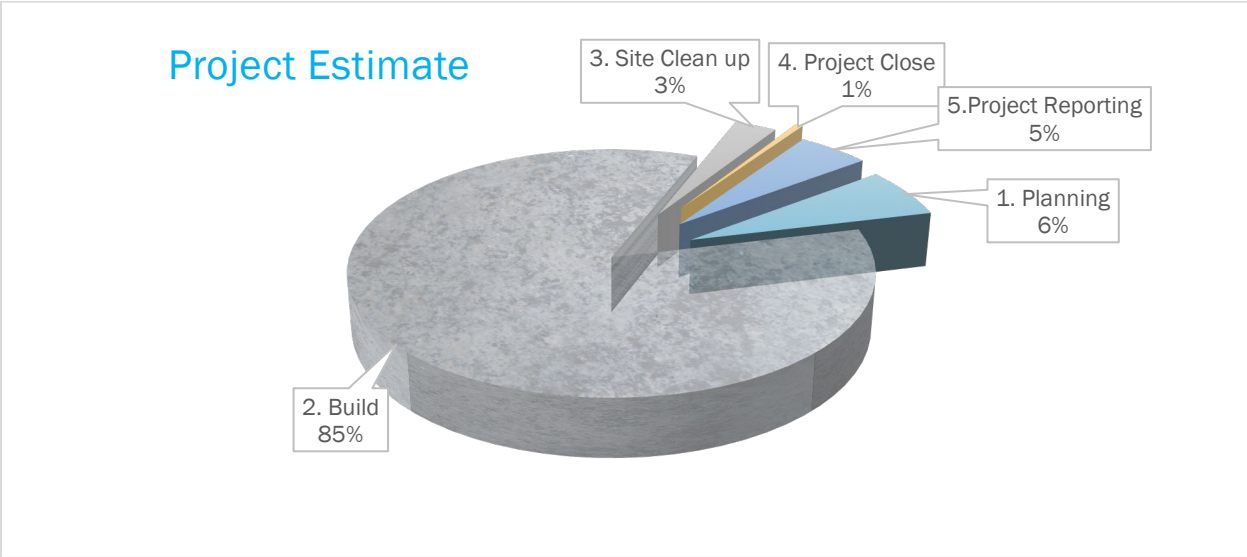
CHART DESIGNS

Once a Chart has been created, time can be saved by selecting a preset design that is closer to the desired result. The designs can be selected from the Chart Design tools that appear on the Ribbon when a Chart is selected, or the paint brush icon that appear beside a selected Chart.

Chart Designs on the Ribbon
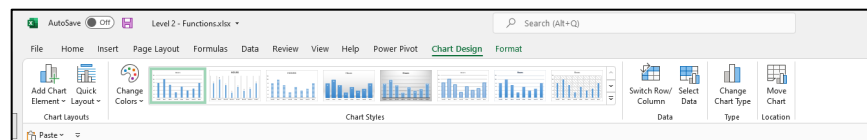
Chart Design button
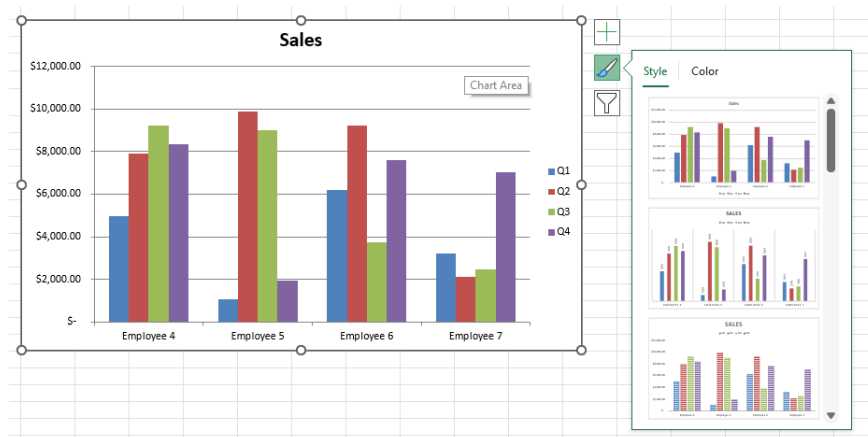
The Chart Designs also have the capability to change your chart to different sets of colours. An Excel document does have a default set of colours defined under the Page Layout Tab on the Ribbon, which is a good place to manage all the fonts and colours for the whole document.

CHART ELEMENTS

Adding a label percentage to a Pie Chart or Labels on the Axis are examples of Chart Elements. Using the Plus sign Icon on the chart or the Add Elements on the Ribbon in the Chart Design Tools, it is effortless to further the customization of a Chart quickly. It will depend on the type of chart on which options are available. A Pie Graph has only three main options to add as Chart Elements.

Bar Chart Showing the Add Chart Elements Button
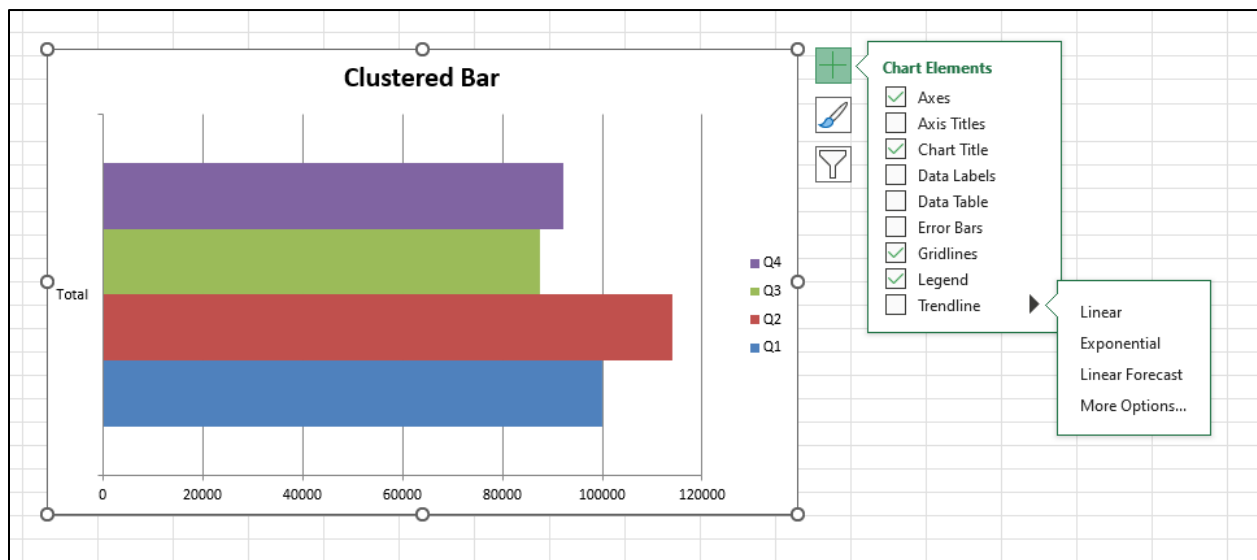
Pie Graph showing the available Chart Elements
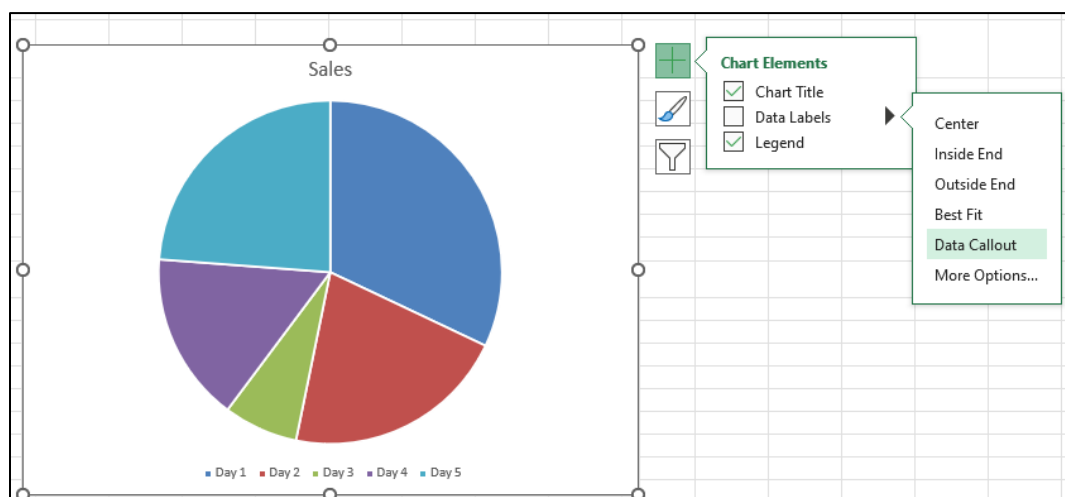
FORMAT PANE

Once the Element has been added many options are available in the Format Pane set of tools that can be opened by clicking on More Options that is found in each of the categories.

Alternatively, it is also possible to right click on any of the parts of the chart and find the Format option in the Right click menu. If the bar is right clicked on the menu, it will say Format Series.
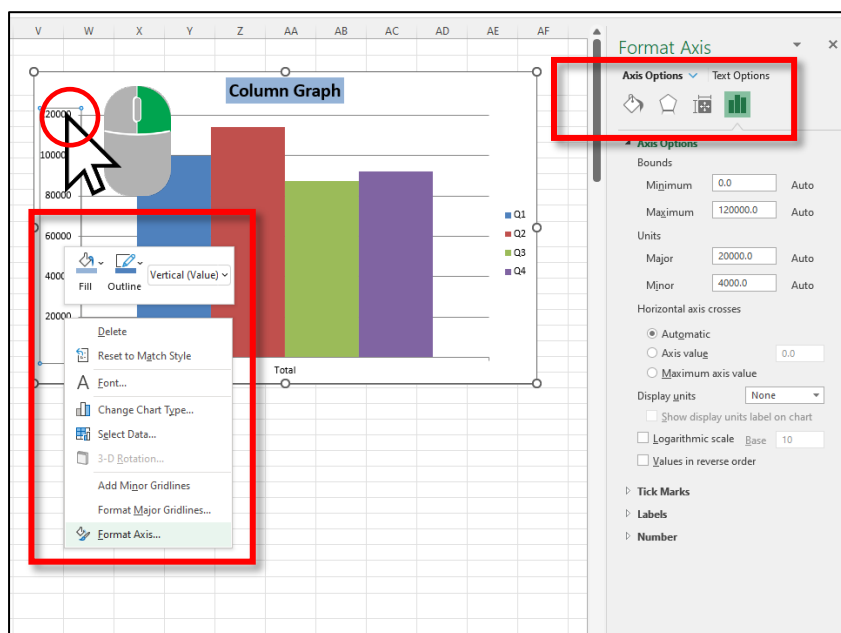
Fill

Effects

Size and Alignment

Options

Once the Format Pane is open it can stay open and will show all the options available for the current item selected in the chart.

TYPES OF CHARTS

COLUMN CHART

Data that's arranged in columns or rows on a worksheet can be plotted in a column chart. A column chart typically displays categories along the horizontal (category) axis and values along the vertical (value) axis, as shown in this chart
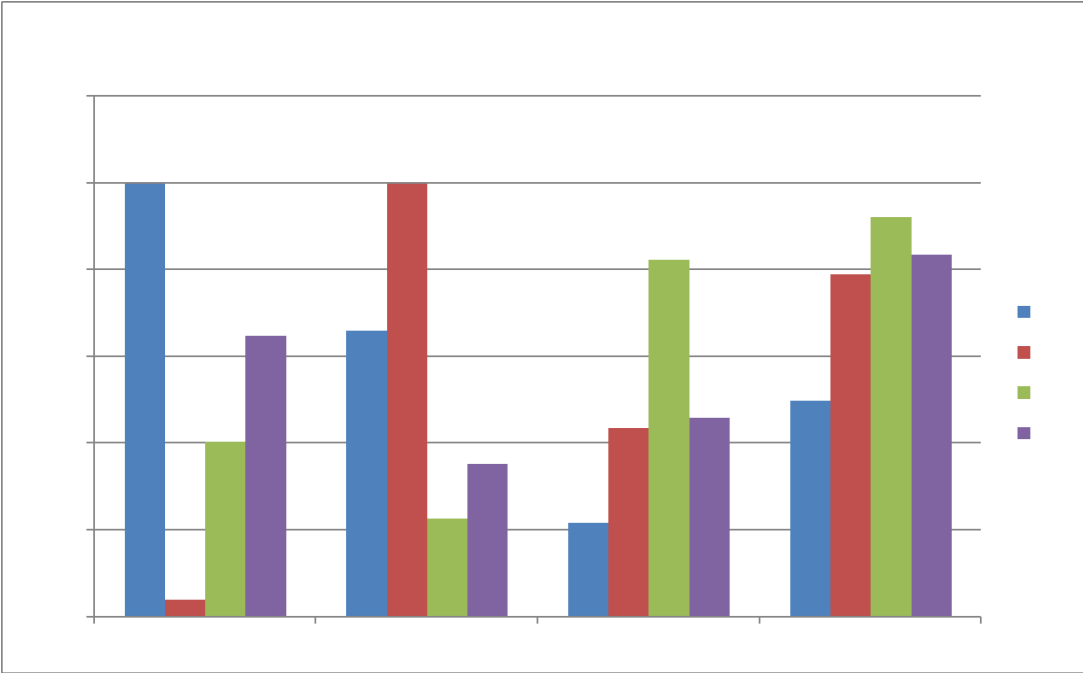
LINE CHART

Data that's arranged in columns or rows on a worksheet can be plotted in a line chart. In a line chart, category data is distributed evenly along the horizontal axis, and all value data is distributed evenly along the vertical axis. Line charts can show continuous data over time on an evenly scaled axis, so they're ideal for showing trends in data at equal intervals, like months, quarters, or fiscal years.
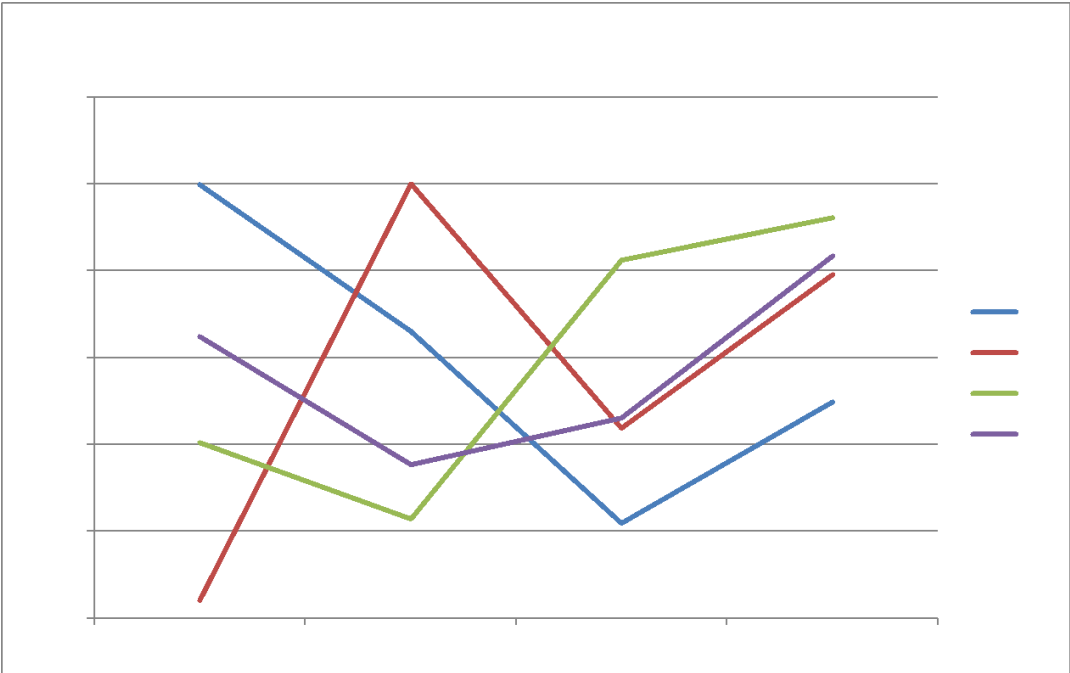
PIE AND DOUGHNUT CHARTS

Data that's arranged in one column or row on a worksheet can be plotted in a pie chart. Pie charts show the size of items in one data series.
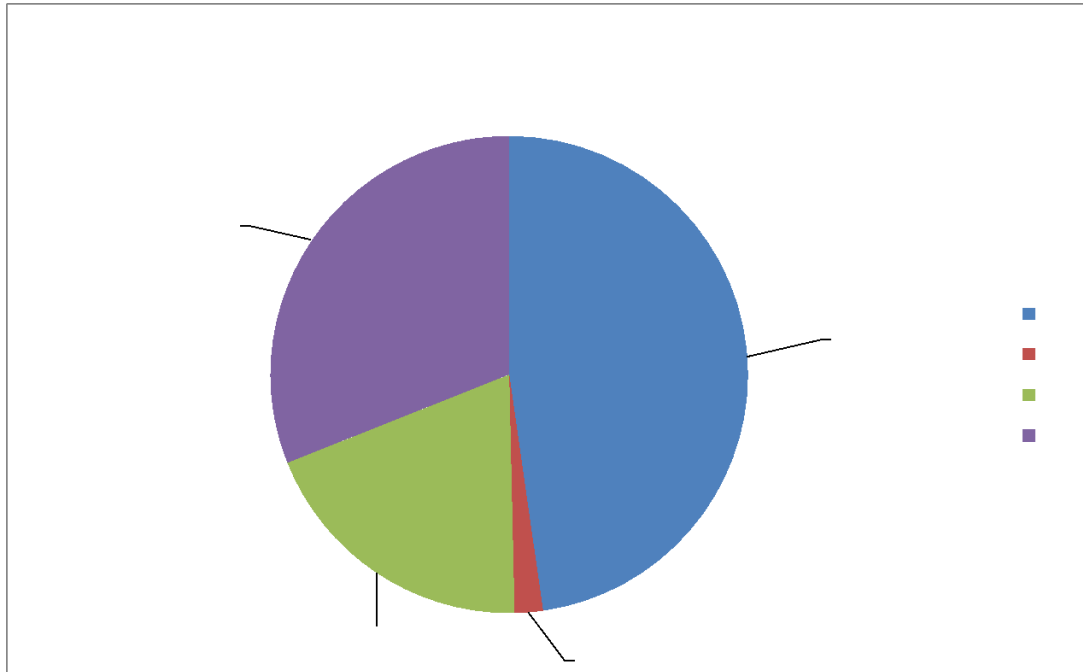
BAR CHART

Data that's arranged in columns or rows on a worksheet can be plotted in a bar chart. Bar charts illustrate comparisons among individual items. In a bar chart, the categories are typically organized along the vertical axis, and the values along the horizontal axis.
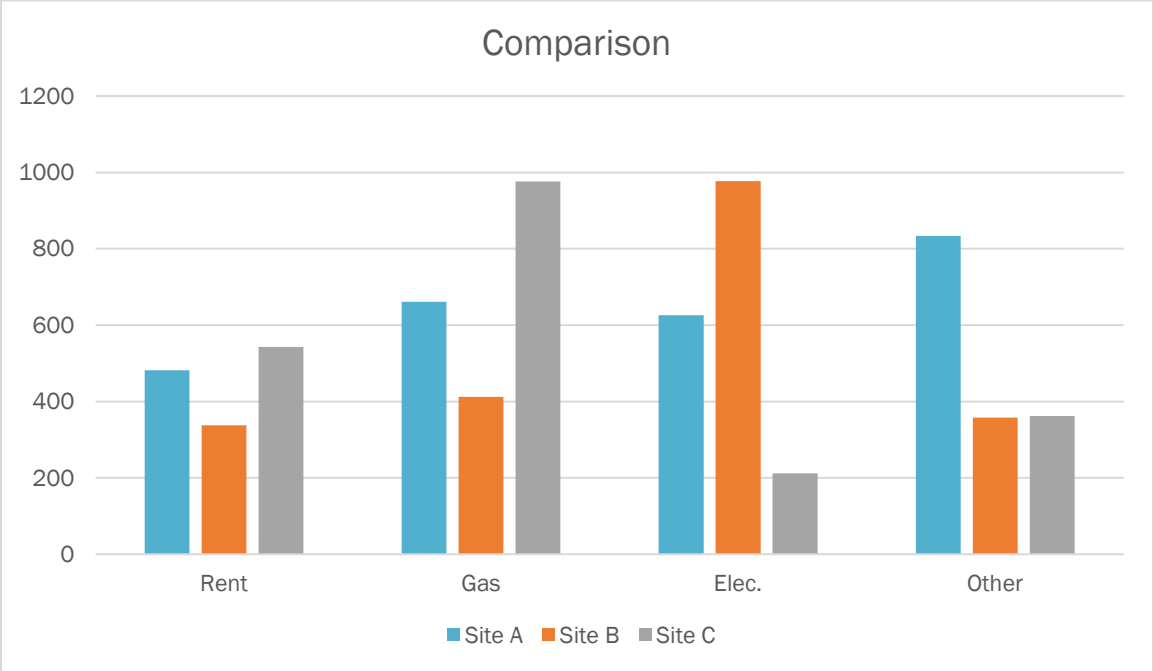
8AREA CHART

An area chart combines the line chart and bar chart to show how one or more groups' numeric values change over the progression of a second variable, typically that of time.
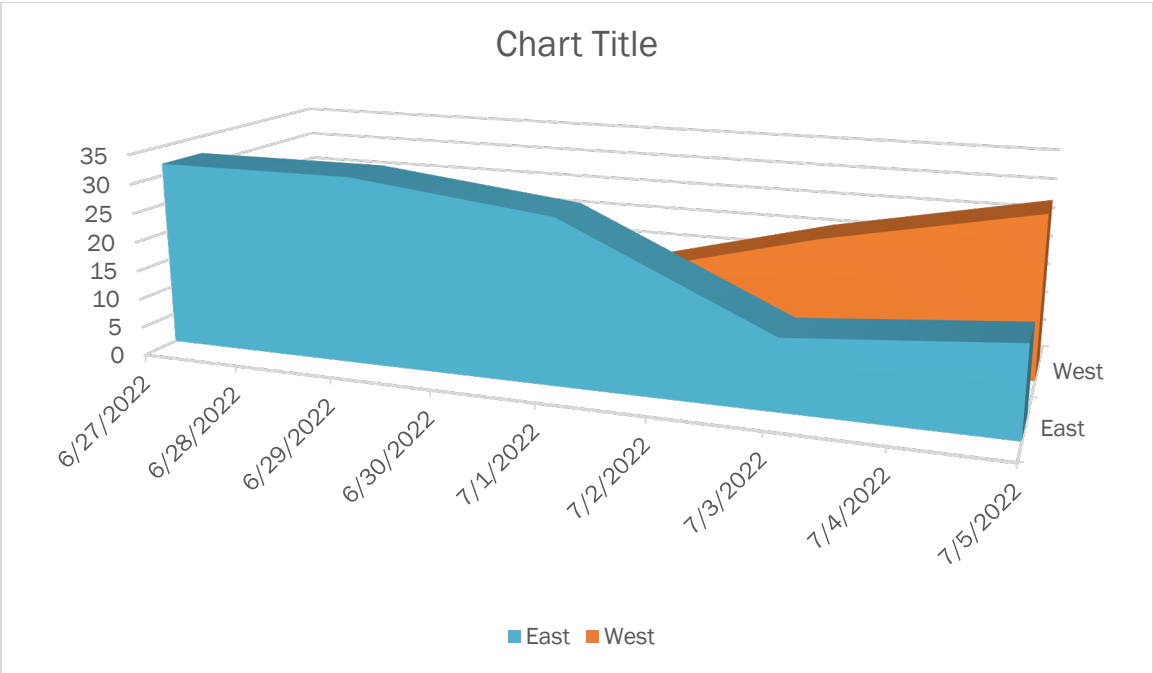
XY SCATTER

Data that's arranged in columns and rows on a worksheet can be plotted in an xy (scatter) chart. Place the x values in one row or column, and then enter the corresponding y values in the adjacent rows or columns.

Trend Analysis
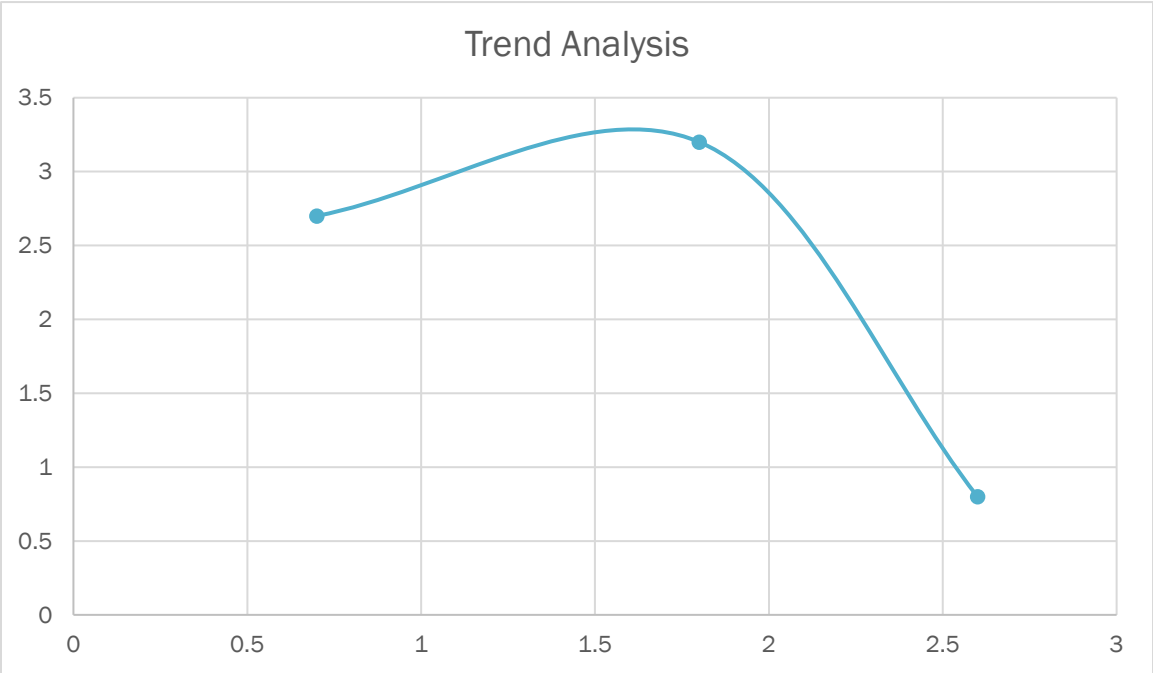
BUBBLE

Much like a scatter chart, a bubble chart adds a third column to specify the size of the bubbles it shows to represent the data points in the data series.
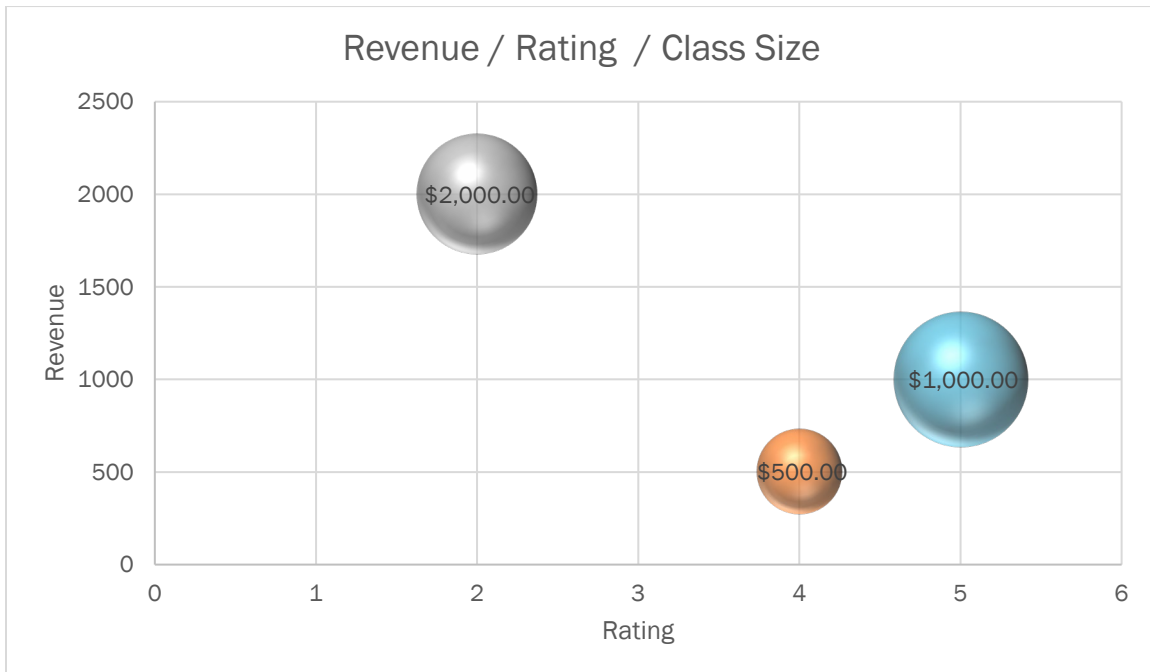
STOCK

Data that's arranged in columns or rows in a specific order on a worksheet can be plotted in a stock chart. As the name implies, stock charts can show fluctuations in stock prices. However, this chart can also show fluctuations in other data, like daily rainfall or annual temperatures. Make sure you organize your data in the right order to create a stock chart.

For example, to create a simple high-low-close stock chart, arrange your data with High, Low, and Close entered as column headings, in that order.
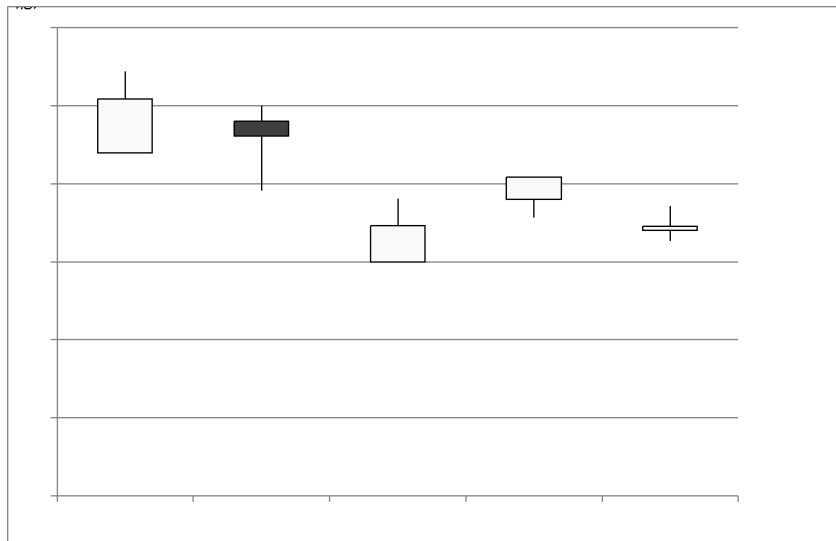
SURFACE

Data that's arranged in columns or rows on a worksheet can be plotted in a surface chart. This chart is useful when you want to find optimum combinations between two sets of data. As in a topographic map, colors and patterns indicate areas that are in the same range of values. You can create a surface chart when both categories and data series are numeric values.
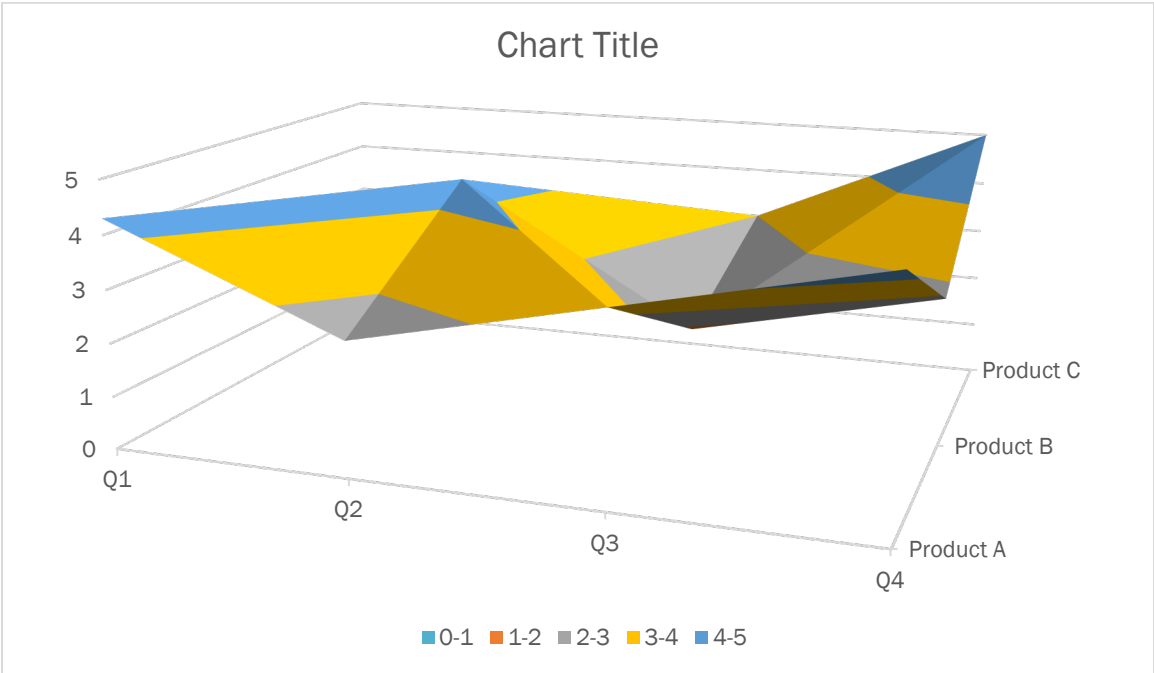
RADAR

Data that's arranged in columns or rows on a worksheet can be plotted in a radar chart. Radar charts compare the aggregate values of several data series (data series: Related data points that are plotted in a chart. Each data series in a chart has a unique color or pattern and is represented in the chart legend. You can plot one or more data series in a chart. Pie charts have only one data series.).
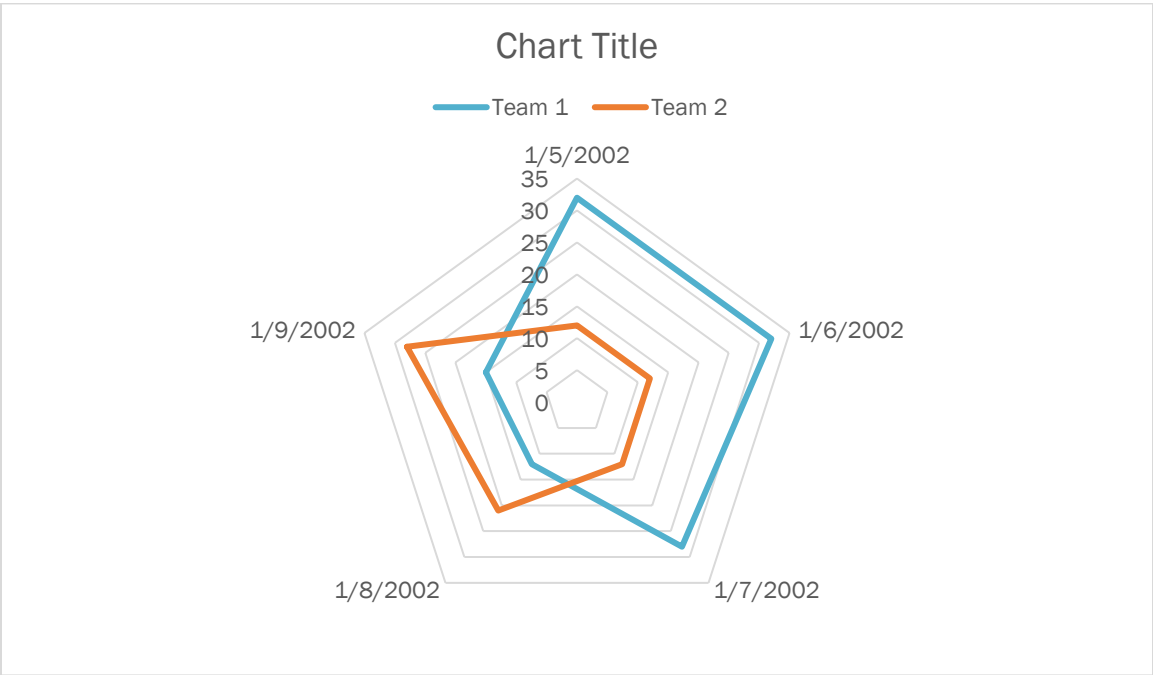
TREEMAP

The treemap chart provides a hierarchical view of your data and is an easy way to compare different levels of categorization. The treemap chart displays categories by color and proximity and can easily show lots of data which would be difficult with other chart types. The treemap chart can be plotted when empty (blank) cells exist within the hierarchal structure and treemap charts are good for comparing proportions within the hierarchy.
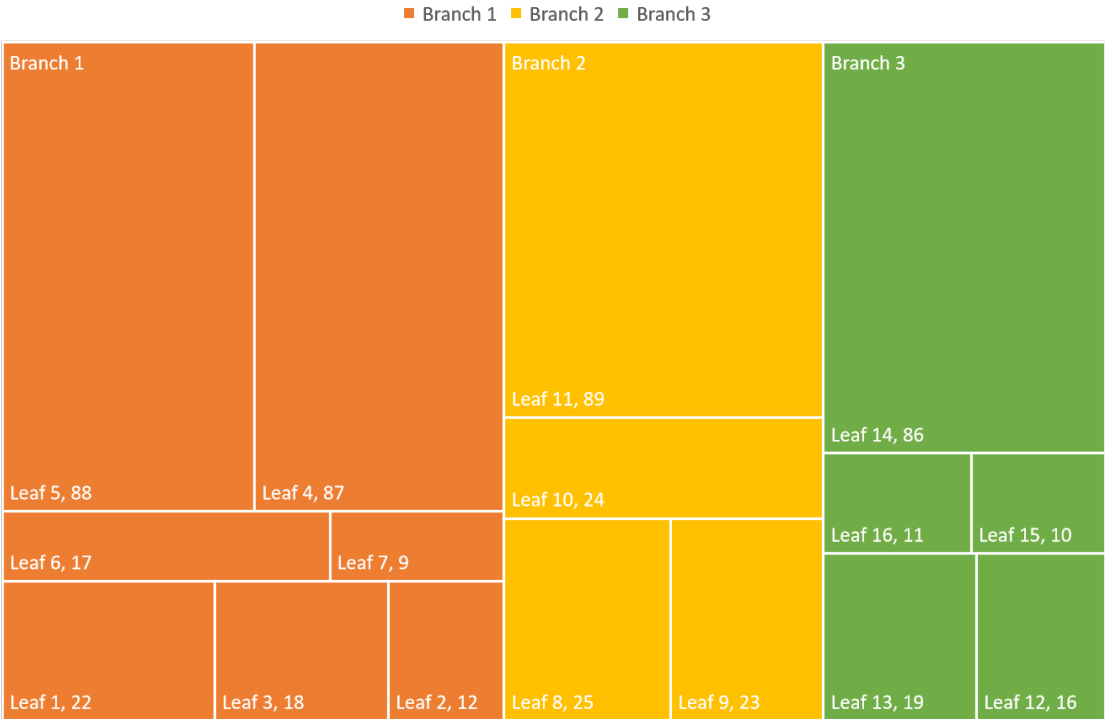
SUNBURST

The sunburst chart is ideal for displaying hierarchical data and can be plotted when empty (blank) cells exist within the hierarchal structure. Each level of the hierarchy is represented by one ring or circle with the innermost circle as the top of the hierarchy. A sunburst chart without any hierarchical data (one level of categories), looks like a doughnut chart. However, a sunburst chart with multiple levels of categories shows how the outer rings relate to the inner rings. The sunburst chart is most effective at showing how one ring is broken into its contributing pieces.
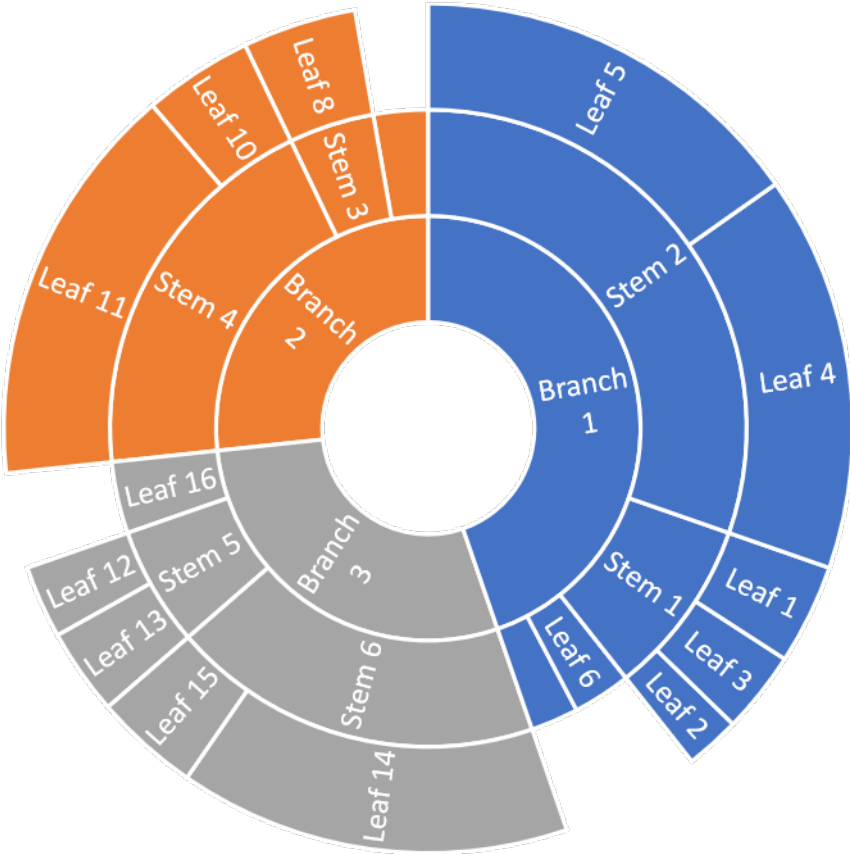
HISTOGRAM

Data plotted in a histogram chart shows the frequencies within a distribution. Each column of the chart is called a bin, which can be changed to further analyze your data. For further grouping of information such as demographics that group people by age, use PivotTables to prepare the data.

Histogram
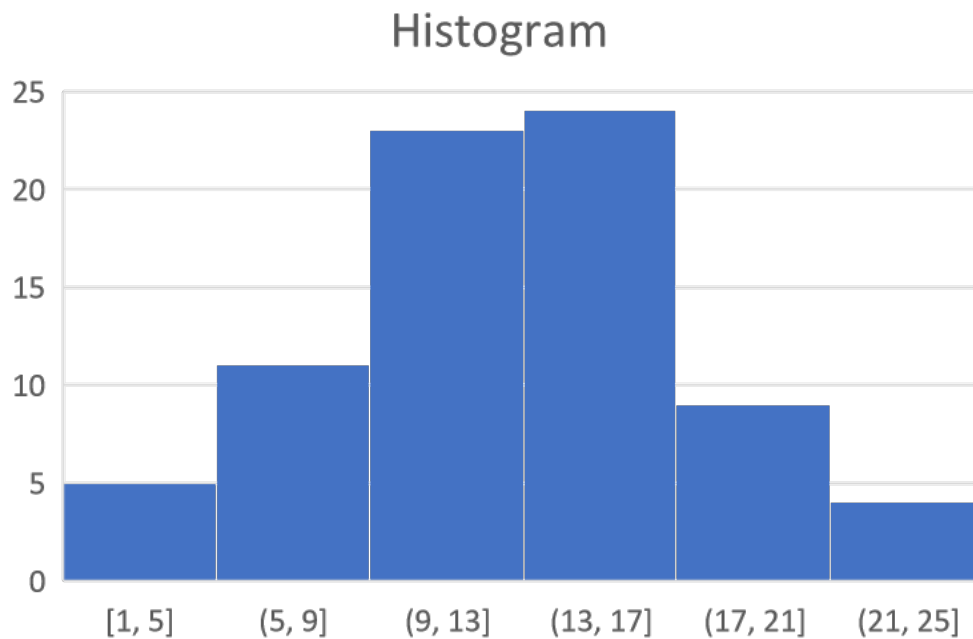
BOX AND WHISKER

A box and whisker chart shows distribution of data into quartiles, highlighting the mean and outliers. The boxes may have lines extending vertically called "whiskers". These lines indicate variability outside the upper and lower quartiles, and any point outside those lines or whiskers is considered an outlier. Use this chart type when there are multiple data sets which relate to each other in some way.
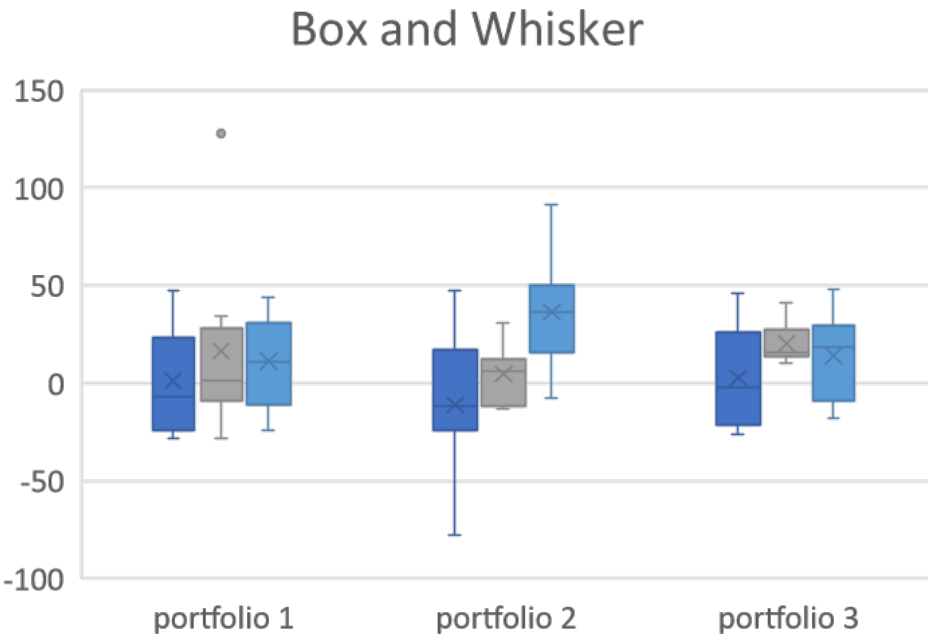
WATERFALL

A waterfall chart shows a running total of your financial data as values are added or subtracted. It's useful for understanding how an initial value is affected by a series of positive and negative values. The columns are color coded so you can quickly tell positive from negative numbers.
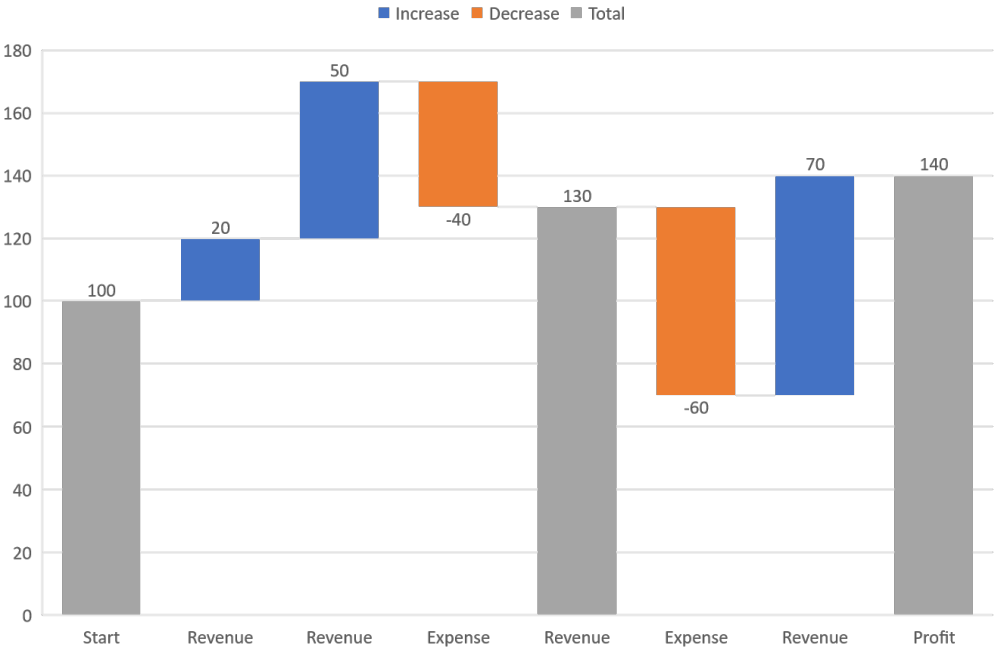
FUNNEL

Funnel charts show values across multiple stages in a process. Much like a Bar Graph that is center aligned.

Funnel

Blue	5000
Red	4000
Green	3000
Yellow	1000
Other	
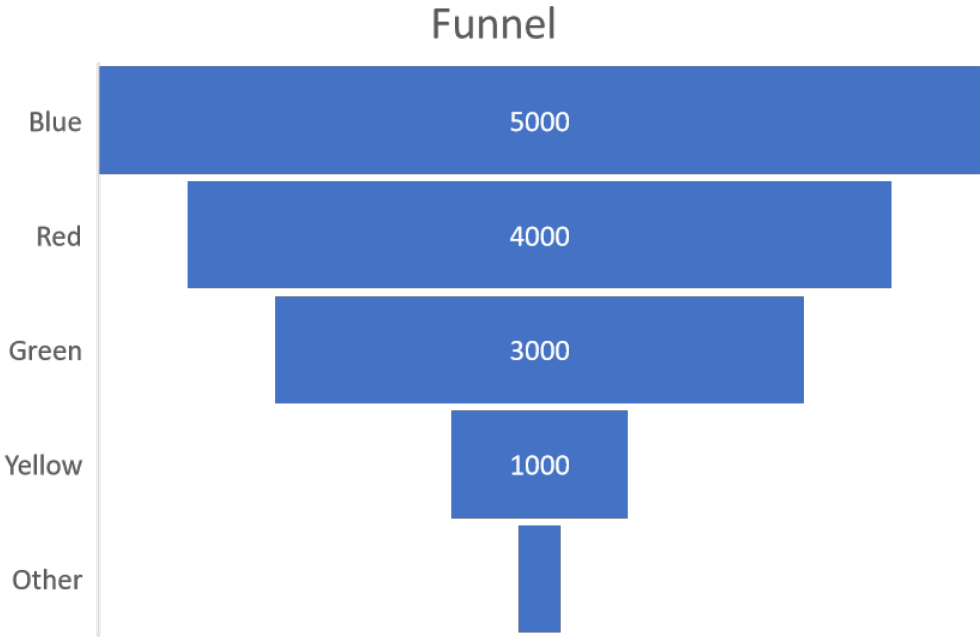
COMBO

Data that's arranged in columns and rows can be plotted in a combo chart. Combo charts combine two or more chart types to make the data easy to understand, especially when the data is widely varied. Shown with a secondary axis, this chart is even easier to read. In this example, we used a column chart to show the number of homes sold between January and June and then used a line chart to make it easier for readers to quickly identify the average sales price by month.
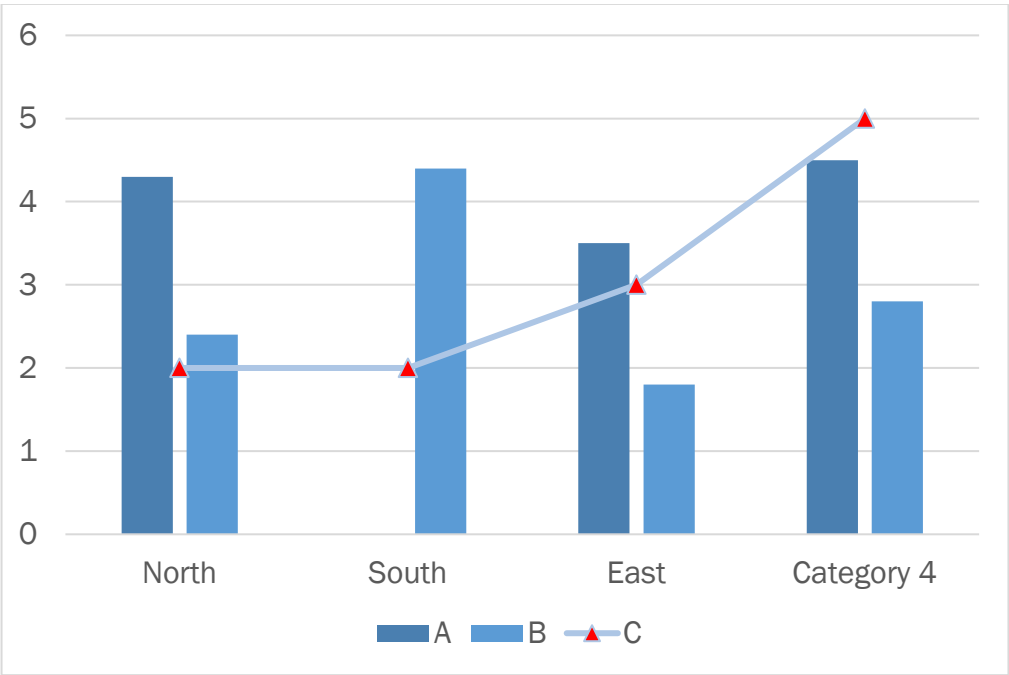
Not to be overlooked is the summary of data before a chart is created, if necessary. SUM, SUMIF, COUNT and AVERAGE might be some of the Functions utilized to prepare data before creating a Chart. A PivotTable is a tool that can organize and summarize large sets of data and will utilize Pivot Charts to visualize and analyze data. Almost all the knowledge gained in Charts is transferable to Pivot Charts, taught in the next level of training.

DATA VISUALIZATIONS

- Conditional Formatting
- Sparklines

CONDITIONAL FORMATTING

Cell formats including Fill, Data format, and borders are often set by selecting the cells and formatting the cell to the desired look. Conditional Formatting not only can change the look or format of the CELL, it also has built in visualizations that will show up in the CELL.

With large sets of data, it is often used to spot problems such as extreme values or duplicates. The Cells format can change based on a criteria or utilize the Data Bar visualization.
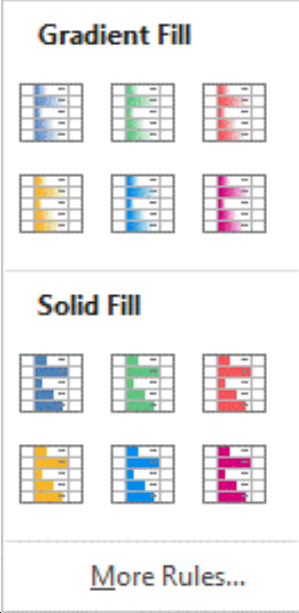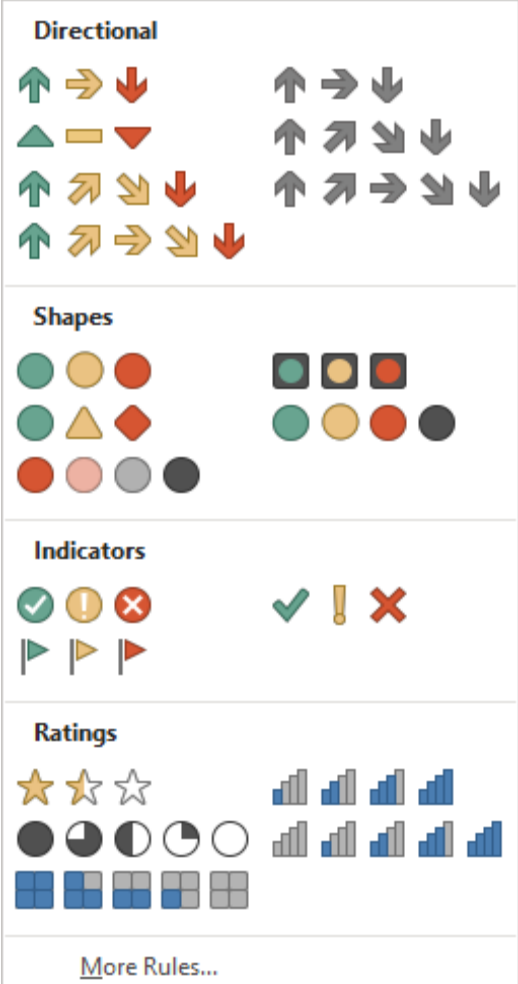
MANAGE RULES DIALOG

Selecting only one cell that has Conditional Formatting on, and then selecting Manage Rules from the Conditional Formatting Dialog, the Conditional Formatting Rules Manager will show the rules for all the cells applicable to that specific rule. Use this dialog to change the criteria in Edit Rule, adjust what cell the rule applies to or delete just that rule. It is possible to see all the Rules on the worksheet by using the Show formatting rules in the   drop-down found at the top of this dialog.
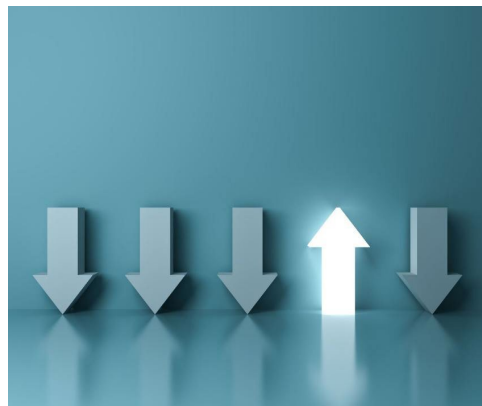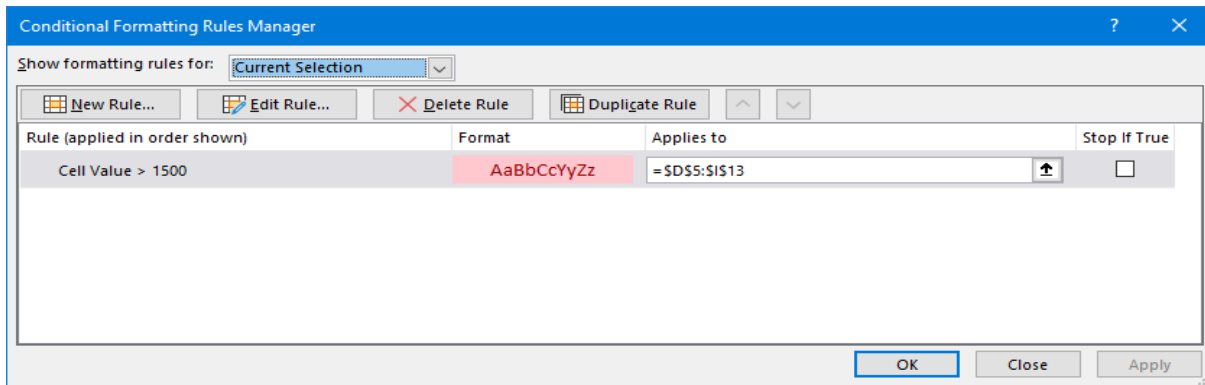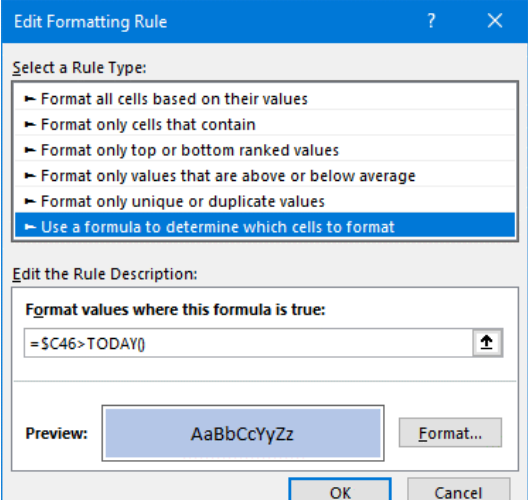
TYPES OF CONDITIONAL FORMATTING

Rule Type	Conditional Formatting drop-down	Description
Highlight Cell Rules	> Greater Than... < Less Than... Between... = Equal To... a Text that Contains... A Date Occurring... Duplicate Values... More Rules...	Most of the Highlight Cell Rule types will ask about the criteria in the dialog that follows. Duplicate Values has only a few options. All of the Highlight Cell Rules can customize to highlight in any colour, font styles or borders.
Top/Bottom Rules	10 Top 10 Items... % Top 10 %... 10 Bottom 10 Items... % Bottom 10 %... x̄ Above Average... x̄ Below Average... More Rules...	Highlight not only the Top 10 or bottom 10, but it is also possible to set the criteria to any number in the dialog that will follow selecting the rule type.

| Rule Type	Conditional Formatting drop-down	Description
Data Bars	**Gradient Fill** **Solid Fill** More Rules...	Data Bars fill the cell with a bar in the background of the cell. The number that drives the bar is still present. Much like a column graph, the bars are relative to each other. If one of the bars has an extreme value, the normal value cells will appear with a tiny bar.
Color Scales	More Rules...	Colour Scales could also be called a heat map. The first choice will colour the higher value cells with a green fill and the lower value cells will have the red fill. The third colour of yellow represents the middle average of the data.

Rule Type	Conditional Formatting drop-down	Description
Icon Sets		Icon Sets will display in the Cells where the rules are set. Excel will do all the math, behind the scenes, to figure out what icon to display. The icon sets with four icons in the group will display an icon based on the value of the cell.

Rule Type	Conditional Formatting drop-down	Description
Formula Based Rules		This formula is checking to see what is in Cell C46 to see if it is a date greater than today's date (TODAY Function) If it is, the cell will be highlighted in blue fill colour.

SPARKLINES

Spark are the smallest of visualizations as they will be placed in one cell to be able to visualize the data in multiple cells. The Sparklines can be customized when the cell containing Sparklines is selected. A menu will appear on the Ribbon allowing the user to customize the sparkline. The examples are showing the custom colour for all the data points and custom highest value and lowest value. (Red and light yellow)

Sparkline Tools on the Ribbon along with examples of the three types of Sparklines.
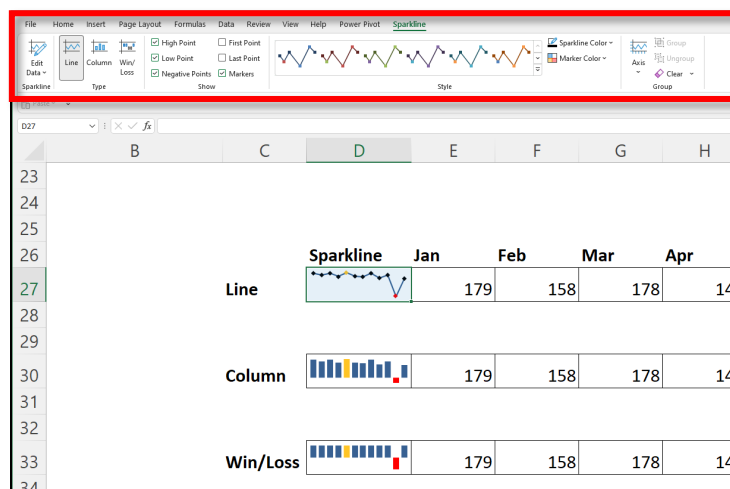
Line- All the data points are connected by a line segment. Much like a line graph, the   Sparkline can be used to represent data trends over time.

Column – Each of the data points is represented by a column. Used to compare categories or groupings of data values, like a column graph but is only capable of showing one series in a cell.
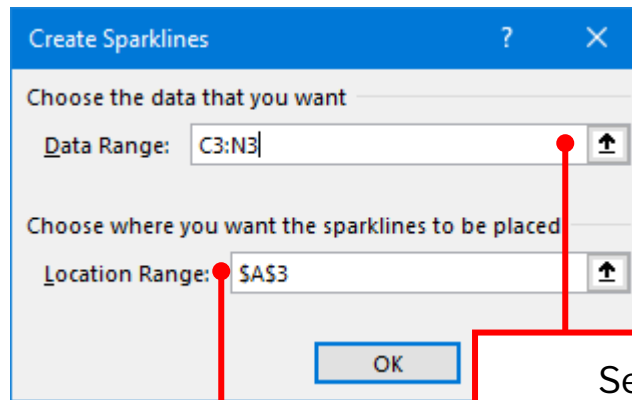
Win/Loss

 – The bars going in an upward direction show a positive value and the downward will show negative value. Using the Sparkline options, the highest and lowest points can be marked by a specific colour.

APPLYING SPARKLINES

Select the destination cell first. Insert⬚Sparklines group Line.

The Location Range should already be set for where the first Sparkline will show up.

Select the data

Location for first Sparkline

AutoFill the following rows

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Content created by: Ryan Evans

Editing: K. Shahab