Excel Calculations (Office 365)

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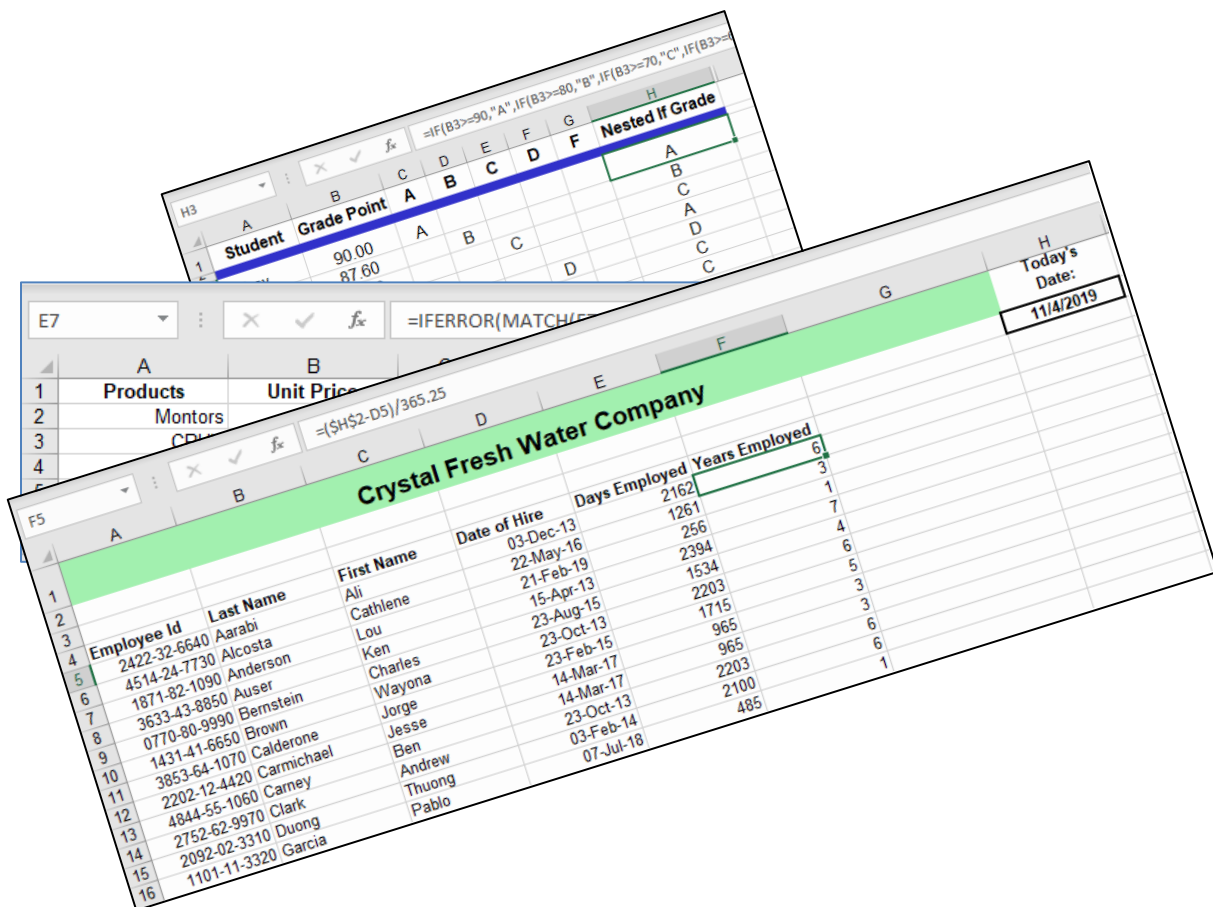
Excel Calculations Course Outline

Day 1	Day 2
Module 1 Formula Basics • Learn formula basics. • Work with basic functions • Absolute vs. relative reference • Show Formulas	**Module 4 – Linking Formulas** • 3D Formula linking • External linking with workbooks
Module 2 – Learn an Array of Functions • Lookup Functions • Math Functions • Statistical Functions • Text Functions • Logical Functions • Date & Time Functions	**Module 5 – Data Analysis Tools** • Data Tables • Goal Seek • Solver • Data analysis add-ins • Sampling • Histogram
Module 3 - Conditional Formatting with Formulas • Compare data outside the conditional formatted range. • Use icons for key performance indicators	**Module 6 – Calculate with PivotTables** • Refresh and modify PivotTables. • Calculate fields.
Appendix A – Nesting Functions • Nesting with the syntax. • Nesting with the Function Box	**Appendix B – Range Names** • Create range names. • Apply and modify range names

Class Files Access

Class files for this course can be found on the website,

 www.windwardstc.com

Click on the Courses page and then the Class Files tab. Select the link to your course and download the files.

Course questions email:

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Module 1 – Formula Basics

This lesson is a review of the basic formula and functions observed in earlier courses.

- Learn formula basics.
- Work with basic functions
- Absolute vs. relative reference
- Show formulas.
- Grouping sheets

Learn Formula Basics

Open the file "Crystal Clear Sales Formulas and Functions."

Save as: "My Crystal-Clear Sales Formulas and Functions"

Excel formulas are instructions that perform calculations in worksheets. To start the formula in Excel all you need to do is type an = sign.

The formulas will commonly contain **references** to a cell or a range of cells on worksheets referring to the location of the data that you want to apply it to.

Sample Formulas
=B5+B6+B7+B8
= (B5+B6+B7+B8)/4

The formulas also contain **operators** which specify the type of calculation that will be performed on the various components of the formula.

The common math operators Excel uses are:

()   Parenthesis

^   Exponent

*   Multiply

/   Divide

+   Add

-      Subtract

Order of Operations:
When you are using a combination of operators there is a sequence of computations that determine the results of the formula. That sequence is displayed above with the math operators. The order begins with Parenthesis and ends with Subtraction.

Examples: 4 + 6 / 2 = 7
(4 + 6)/ 2 = 5

Formula Examples:

The formula was typed in cell B10 and is displayed in the formula bar. The value is in the active cell.

Note:
There is no + sign after B9 in the formula since there is nothing to add after it.

B10		▾ ⊙	f_x	=B5+B6+B7+B8+B9	
	A	B	C	D	E
1					
2					
3					
4	**Water**	Jan	Feb	Mar	Qtr 1 Total
5	1 pt. bottles	82897.22	99784.10	94489.77	
6	1 pt. cases	44782.35	45879.00	55887.22	
7	1 gal. bottles	164789.12	265478.99	277886.35	
8	3 gal. bottles	125645.33	225645.58	256554.85	
9	5 gal. bottles	326547.10	366879.20	378452.50	
10	Totals Sales	$744,661.12			
11	Average Sales				
12	Highest Sales				

The formula in cell B11 shows the order of operations used to calculate the average sales for Jan.

B11		▾ ⊙	f_x	=(B5+B6+B7+B8+B9)/5	
	A	B	C	D	E
1					
2					
3					
4	**Water**	Jan	Feb	Mar	Qtr 1 Total
5	1 pt. bottles	82897.22	99784.10	94489.77	
6	1 pt. cases	44782.35	45879.00	55887.22	
7	1 gal. bottles	164789.12	265478.99	277886.35	
8	3 gal. bottles	125645.33	225645.58	256554.85	
9	5 gal. bottles	326547.10	366879.20	378452.50	
10	Totals Sales	$744,661.12			
11	Average Sales	$148,932.22			
12	Highest Sales				

Tip: You can copy the formulas across the columns or rows using the "Fill Handle".

Work with Basic Functions:

Excel functions are predefined formulas. There are over 300 functions in the program and can be very useful in speeding up the calculation process.

Examples of Common Functions:

=Sum (B5:D5)

=Average (B5:D5)

=Max (B5:D5)

=Min (B5:D5)

=Count (B5:D5)

	E5		f_x	=SUM(B5:D5)	
	A	B	C	D	E
1					
2					
3					
4	Water	Jan	Feb	Mar	Qtr 1 Total
5	1 pt. bottles	82897.22	99784.10	94489.77	$277,171.09
6	1 pt. cases	44782.35	45879.00	55887.22	
7	1 gal. bottles	164789.12	265478.99	277886.35	
8	3 gal. bottles	125645.33	225645.58	256554.85	
9	5 gal. bottles	326547.10	366879.20	378452.50	
10	Totals Sales	$744,661.12			

Excel Functions must have the following components:

=Sum(B5:D5)

An equal sign   A function name   An argument
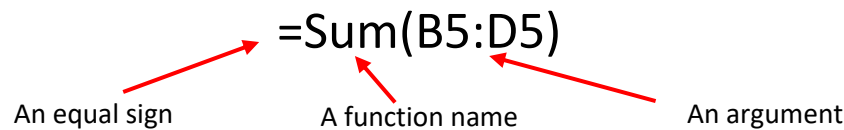
Functions can be entered in a variety of ways:

1. Typed in the cell
2. Inserted with Auto Function
3. Created with the Function Library
4. Started with Auto Complete
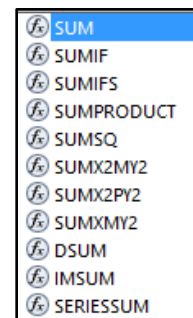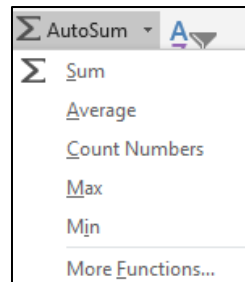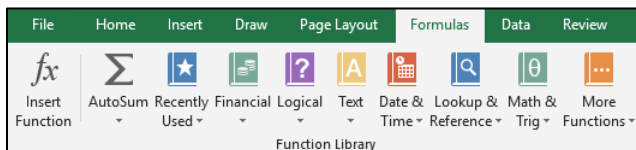
Function Practice:

Using the "My Crystal-Clear Sales Formulas and Functions" file

A. Start with the sheet tab Qtr 3.
B. Type the sum function to figure the January Totals in the Water products.
C. Use the Average function from the Auto Function command list to figure the January averages for Water products.
D. Use the Max function from the Function Library group in the Formulas tab.
   (Hint: Look under More Functions, then Statistical.)
E. Complete all the functions for water products by copying them with the fill handle.
F. Complete all the functions for dispenser products with your preferred method.

Completed Sample:

Quarter 1 Sales								
Water		**Jan**		**Feb**		**Mar**		**Qtr 1 Total**
1 pt. bottles		9,000.00		99,784.10		94,489.77	$	203,273.87
1 pt. cases		44,782.35		45,879.00		55,887.22	$	146,548.57
1 gal. bottles		164,789.12		265,478.99		277,886.35	$	708,154.46
3 gal. bottles		125645.33		225645.58		256554.85	$	607,845.76
5 gal. bottles		326547.10		366879.20		378452.50	$	1,071,878.80
Totals Sales	$	670,763.90	$	1,003,666.87	$	1,063,270.69	$	2,737,701.46
Average Sales	$	134,152.78	$	200,733.37	$	212,654.14	$	547,540.29
Highest Sales	$	326,547.10	$	366,879.20	$	378,452.50	$	1,071,878.80
Dispensers		**Jan**		**Feb**		**Mar**		**Qtr 1 Total**
3 gal. cold		55,478.32		56,487.25		58,975.33	$	170,940.90
3 gal. hot/cold		44,658.88		46,553.68		436,587.15	$	527,799.71
3 gal. crock/stand		33547.66		34587.99		35789.44	$	103,925.09
5 gal. cold		66547.22		67894.56		688489.22	$	822,931.00
5 gal. hot/cold		77356.88		78663.25		791458.11	$	947,478.24
Total Sales	$	277,588.96	$	284,186.73	$	2,011,299.25	$	2,573,074.94
Average Sales	$	55,517.79	$	56,837.35	$	402,259.85	$	514,614.99
Highest Sales	$	77,356.88	$	78,663.25	$	791,458.11	$	947,478.24

Absolute vs. Relative Reference

Using the "My Crystal-Clear Sales Formulas and Functions" file

Absolute References:

Based on the layout of the worksheet some formulas require the use of absolute references. When you use the fill handle to copy cell formulas Excel, by default, uses <u>relative references</u>. Relative references automatically adjust the column or row indicator when you copy them using the fill handle. You can create an <u>absolute reference</u> to keep the cell(s) from adjusting.

Method: Placing dollar signs before the column or row reference in a cell will make it absolute. A quick method of creating an absolute reference is to select the reference and use the F4 function key.

Steps:

1. In cell G1 add the label Commission Rate.
2. In cell H1 add the amount of 10%.
3. Create a Commission column in cell F3.
4. In cell F4 create a formula to multiply E4 with H1 to come up with the commission.
5. Use the fill handle to copy the formula down to cell F8.
6. Notice the cells are empty.
7. Select cell F4 and view the formula.
8. Select cell F5 and view the formula.
9. By default, Excel uses Relative referencing.
10. You need to make cell H2 and absolute reference. **$H$2**

Qtr 1 Total		Commission	
$	203,273.87	$	20,327.39
$	146,548.57	$	-
$	708,154.46	$	-
$	607,845.76	$	-
$	1,071,878.80	$	-

F4 fx =E4*$H$1

	A	B	C	D	E	F	G	H
1			Quarter 1 Sales				Commission Rate	10%
2								
3	Water	Jan	Feb	Mar	Qtr 1 Total	Commission		
4	1 pt. bottles	9,000.00	99,784.10	94,489.77 $	203,273.87 $	20,327.39		
5	1 pt. cases	44,782.35	45,879.00	55,887.22 $	146,548.57 $	14,654.86		
6	1 gal. bottles	164,789.12	265,478.99	277,886.35 $	708,154.46 $	70,815.45		
7	3 gal. bottles	125645.33	225645.58	256554.85 $	607,845.76 $	60,784.58		
8	5 gal. bottles	326547.10	366879.20	378452.50 $	1,071,878.80 $	107,187.88		
9	Totals Sales $	670,763.90 $	1,003,666.87 $	1,063,270.69 $	2,737,701.46 $	273,770.15		
10	Average Sales $	134,152.78 $	200,733.37 $	212,654.14 $	547,540.29			
11	Highest Sales $	326,547.10 $	366,879.20 $	378,452.50 $	1,071,878.80			
12								

Show Formulas

Excel provides a great visual to see the formulas for multiple cells on the spreadsheet rather than looking one at a time on the formula bar.

Select the Formulas tab and in the Formula Auditing group click the Show Formulas tab.

You can also use the keyboard shortcut CTRL **+ ~** (Tilde)

Grouping Sheets

One of the most beneficial time savers in Excel is the group sheets feature. Hours may be spent trying to make all your sheets in a workbook have the same formatting, formulas, and other elements, such as column sizes to provide a common look.

You can group all sheets or just chosen sheets in a workbook using a few mouse clicks.

- Right-click a sheet tab and choose "Select all Sheets".
- Select a sheet then hold down the Shift key and select the last sheet you choose to group.
- To select non-adjacent sheets, start with selecting a sheet and use the CTRL key to select the other sheets.

The value of grouping sheets is that when they are "grouped", everything you do on one sheet is done on all the other sheets at the same time. The title bar will display (Group) when sheets are grouped.

If you were working on expenses for your organization, you could create a workbook with 12 or 13 sheets. Name each sheet with the prospective Year, and then group all the sheets. Now all you need to do is enter the labels, formulas and formats to all 12 or 13 sheets at the same time. When you are done you can save it as a template and make it available for future years.

Here is an example of grouped sheets by product in an expense's workbook showing a consistent layout:

Create a new grouped workbook:

- Start with a blank workbook.
- Save the file in the class folder as **"My Expenses.xls "**
- Name the sheets 2019, 2020, 2021 and group them
- Using the above sample, input the expenses, months, and totals
- Format as desired and ungroup the sheets to see your work.

Module 2 – Learn an Array of Functions

There are over 400 functions in Excel. This module will explore an array of 6 categories of them. We'll use lookup functions to extract data, math functions to calculate, statistical functions to average and count cells, text functions to combine and extract data, logical functions to solve true/false questions and date & time functions to calculate time parameters.

- Lookup functions
- Math functions
- Statistical functions
- Text functions
- Logical functions
- Date & time functions

Lookup Functions

The lookup functions search through datasets and return a value based on some criteria.

Open the file "Lookups."
Save it as "My Lookups."

Common Lookup Functions:

VLOOKUP

Looks for a value in the leftmost column of a table, and then returns a value in the same row from a column you specify. By default, the table must be sorted in ascending order.

HLOOKUP Function

Looks for a value in the top row of a table or array of values and returns the value in the same column from a row you specify.

INDEX Function

Returns a value or reference of the cell at the intersection of a row or column, in a given range.

MATCH Function

Returns the relative position of an item in an array that matches a specified value in a specified order.

VLookup Function

Looks for a value in the leftmost column of a table, and then returns a value in the same row from a column you specify. By default, the table must be sorted in ascending order.

The two most important parts of a VLOOKUP are:

1. The left most column of the "table array" you use in the VLOOKUP is sorted in ascending order.
2. The table array in the VLOOKUP is used as an absolute value. Easiest is to give the table a named range. Named ranges are always absolute when you first create them.

VLOOKUP Example:
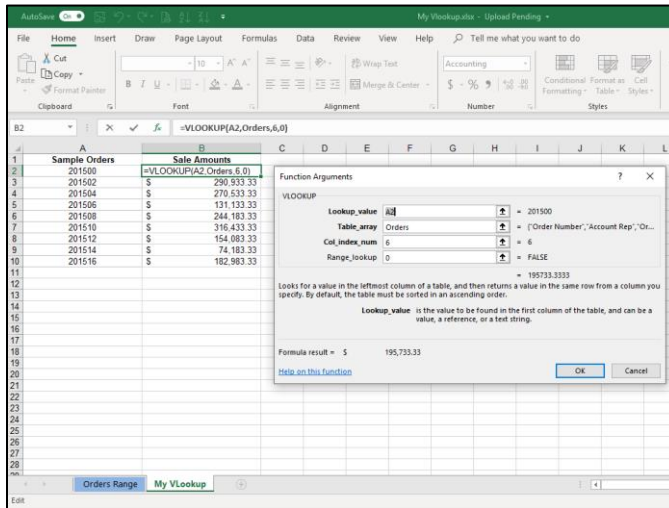
Practice:

Open the file "Lookup" Save it as "My Lookup".

A. On the VLOOKUP sheet tab select cell B2 to create a VLOOKUP to find the Sale Amounts from the order numbers in column A.
B. Remember the two most important steps.

Completed Example:
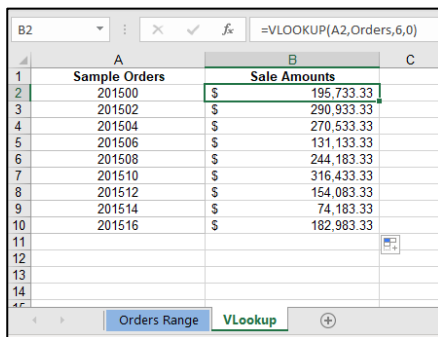
Close the "My Lookup file".

Open the file "Lookups Functions".

Save it as "My Lookups".

Practice VLOOKUP:

Select the H&V Lookups tab.

1. Create a Vlookup in cell C5.
2. Lookup value is B3.
3. The Table Array is "Prices".
4. Column and index_num is 3.
5. Range_lookup is False.

Function Arguments		? ☐ ✕
VLOOKUP		
Lookup_value	B5 ↥	= 3040
Table_array	Prices ↥	= {1120,"Plasma TV",2350;2010,"LCD TV",
Col_index_num	3 ↥	= 3
Range_lookup	0 ↥	= FALSE

= 2900
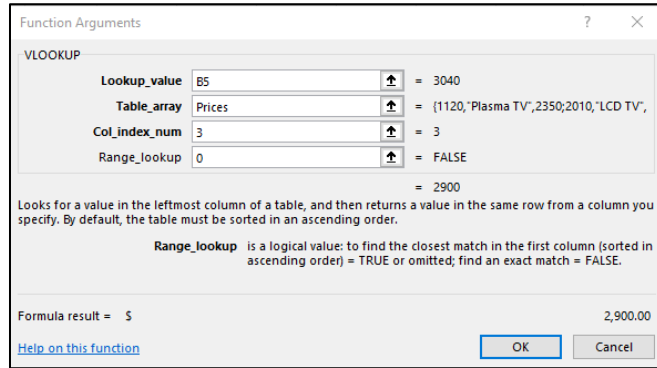
Looks for a value in the leftmost column of a table, and then returns a value in the same row from a column you specify. By default, the table must be sorted in an ascending order.

Range_lookup is a logical value: to find the closest match in the first column (sorted in ascending order) = TRUE or omitted; find an exact match = FALSE.

Formula result = $

2,900.00

Help on this function   OK   Cancel

C5	⌄ : ✕ ✓ *fx*	=VLOOKUP(B5,Prices,3,0)					
◢	A	B	C	D	E	F	G
1	**Electronic Depot**						
2	**Orders**						
3							
4	**Customer**	**Product**	**Price**	**Qty**	**Product Total**	**Shipping**	**Total Cost**
5	Ergo Imports	3040	$ 2,900.00	10	$ 29,000.00		$ 29,000.00
6	Acme, Inc.	4499	$ 1,050.00	75	$ 78,750.00		$ 78,750.00
7	Megatron Corp.	5840	$ 2,050.00	100	$ 205,000.00		$ 205,000.00
8	Genco	3049	$ 375.00	20	$ 7,500.00		$ 7,500.00
9	Universal Imports	8984	$ 225.00	200	$ 45,000.00		$ 45,000.00
10	Roberta Jensen	1120	$ 2,350.00	2	$ 4,700.00		$ 4,700.00
11	Daily Planet	3049	$ 375.00	100	$ 37,500.00		$ 37,500.00
12	Wayne Industries	9099	$ 299.00	300	$ 89,700.00		$ 89,700.00
13	Sam Ertel	2010	$ 2,247.50	1	$ 2,247.50		$ 2,247.50
14							
15							
16	**Prices**					**Shipping Charges**	
17	1120	Plasma TV	$ 2,350.00			**Amount**	$ - $
18	2010	LCD TV	$ 2,247.50			**Shipping Cost**	0
19	3040	Laptop Computer	$ 2,900.00				
20	3049	Router	$ 375.00				
21	3292	5 MP Camera	$ 652.50				
22	3948	8 MP Camera	$ 800.00				
23	4499	10 MP Camera	$ 1,050.00				
24	4848	Desktop Calculator	$ 65.25				
25	4994	DVD Player	$ 299.00				
26	5840	Desktop Computer	$ 2,050.00				
27	5934	Color Monitor	$ 647.50				
28	6476	Home Printer	$ 375.00				
29	8373	Business Printer	$ 1,900.00				
30	8394	DV Camcorder	$ 750.00				
31	8738	Hard Drive Camcorder	$ 999.00				
32	8873	High Def Camcorder	$ 1,600.00				
33	8984	Cell Phone	$ 225.00				
34	9099	GPS	$ 299.00				
35	9938	MP3 Player	$ 350.00				
36							

HLookup Function

Looks for a value in the top row of a table or array of values and returns the value in the same column from a row you specify.

Note: In this example the "Range Lookup" property is True, which looks up values that are the closest match instead of exact.

HLOOKUP Example:

Practice:

A. Select the sheet tab HLookup.
B. Choose cell F5 to start the HLookup function.
C. The lookup_ value is E5.
D. The table_ array is Shipping.
E. The row_index_num is 2.
F. The Range_Lookup is True.

Function Arguments dialog box showing HLOOKUP with Lookup_value E5 = 29000, Table_array Shipping = {0,1000,2500,3500,5000,7500,10000,...}, Row_index_num 2 = 2, Range_lookup TRUE = TRUE. Formula result = $ 200.00

Completed Example:

=HLOOKUP(E5,Shipping,2,TRUE)

duct	Price	Qty	Product Total	Shipping	Total Cost
040	$ 2,900.00	10	$ 29,000.00	$ 200.00	$ 29,200.00
499	$ 1,050.00	75	$ 78,750.00	$ 300.00	$ 79,050.00
840	$ 2,050.00	100	$ 205,000.00	$ 400.00	$ 205,400.00
049	$ 375.00	20	$ 7,500.00	$ 90.00	$ 7,590.00
884	$ 225.00	200	$ 45,000.00	$ 200.00	$ 45,200.00
120	$ 2,350.00	2	$ 4,700.00	$ 70.00	$ 4,770.00
049	$ 375.00	100	$ 37,500.00	$ 200.00	$ 37,700.00
099	$ 299.00	300	$ 89,700.00	$ 300.00	$ 90,000.00
010	$ 2,247.50	1	$ 2,247.50	$ 50.00	$ 2,297.50

Shipping Charges

				Amount	$ -	$ 1,000	$ 2,500	$ 3,500	$ 5,000	$ 7,500	$ 10,000	$ 25,000	$ 50,000	$ 100,000
	$ 2,350.00			Shipping Cost	0	50	60	70	80	90	100	200	300	400
	$ 2,247.50													

INDEX and MATCH Function:

In the example below the INDEX function is nested with the MATCH function to provide the Product ID in cell B2.

Completed Example:

B2	▾	⋮	✕	✓	*fx*	=INDEX(A6:C27,MATCH(B1,B6:B2	

◢	A	B	C
1	**PRODUCT ID**	BH1985	
2	**NAME**	Bell Housing	
3			
4			
5			
6	**Product Name**	**Product ID**	**Storage Location**
7	Bell Housing	BH1985	3E
8	Caulk - Clear	CC2011	8D
9	Caulk - White	CW2012	8A
10	Cement - PreMix	CM3111	10A
11	Electric Pump 300 amps	EP4001	11A
12	Electric Pump 750 amps	EP4005	11B
13	Flange	FN5111	8E
14	Gasket	GN6122	9A
15	Manual Pump	MP7899	2C
16	Pipe 1/2" Curved	PH8114	12C
17	Pipe 1/2" L-Shape	PH8112	12A
18	Pipe 1/2" Straight	PH8113	12B
19	Pipe 1/4" Curved	PQ8134	12C
20	Pipe 1/4" L-Shape	PQ8132	12A
21	Pipe 1/4" Straight	PQ8133	12B
22	Pipe 3/4" Curved	PT8154	12C
23	Pipe 3/4" L-Shape	PT8152	12A
24	Pipe 3/4" Straight	PT8153	12B
25	Rubber Stop	RS9128	8B
26	Tiles - quarter-cut	TQ0155	12A
27	Tiles - third-cut	TT0166	12D

MATCH Function

Returns the relative position of an item in an array that matches a specified value in a specified order.

Note: #N/A is returned when there is no match found on the list.

D7	▾	⋮	✕	✓	*fx*	=MATCH(F7,$A$2:$A$7,0)		

	A	B	C	D	E	F	G
1	**Products**	**Unit Price**		**Match**		**Products**	**Unit Price**
2	Montors	$125.00		1		Montors	$125.00
3	CPU's	$225.00		2		CPU's	$225.00
4	Mouse	$25.00		3		Mouse	$25.00
5	Keyboard	$20.00		4		Keyboard	$20.00
6	Mouse Pad	$5.00		5		Mouse Pad	$5.00
7	Cell Phone	$450.00		#N/A			$450.00

Math Functions

Calculate with Sum functions that include criteria to help analyze data within ranges of cells.

- SumIf
- Sumifs
- Round

SumIf and If's Functions

1) The **Sum IF** function includes the option to select a criterion, like a Region, to analyze within a range of cells and bring back results specific to the criteria.
2) The **Sum IF's** function includes the options to select multiple criteria, like a Region and Department and bring you the results for the criteria that match.

SumIf Example

	=SUMIF(D4:D43,I5,G4:G43)							
B	C	D	E	F	G	H	I	J
code	SSN	Region	Department	Hire Date	Salary		SumIf	Results
7	467-29-9320	East	Accounts	3/4/1972	$73,500		North	$ 809,200.00
7	423-82-1129	East	Accounts	6/2/1997	$87,000		Sales	$ 1,181,550.00
5	265-66-9763	East	Customer Relations	7/2/2007	$90,000			
1	189-85-3133	East	Human Resources	9/18/1994	$180,000			
9	201-90-1901	East	Human Resources	7/30/1987	$62,000			

SumIfs Example

L12			fx	=SUMIFS(G4:G43,D4:D43,I12,E4:E43,J12)								
	A	B	C	D	E	F	G	H	I	J	K	L
1	**Employee List**											
2												
3	*Name*	*Emp code*	*SSN*	*Region*	*Department*	*Hire Date*	*Salary*					
4	Andrew Lewis	37	467-29-9320	East	Accounts	3/4/1972	$73,500		SumIf	Results		
5	Melissa Jameson	7	423-82-1129	East	Accounts	6/2/1997	$87,000		North	$ 809,200.00		
6	Ronnie Williams	5	265-66-9763	East	Customer Relations	7/2/2007	$90,000		Sales	$ 1,181,550.00		
7	Ben Pius	11	189-85-3133	East	Human Resources	9/18/1994	$180,000					
8	James Morlock	19	201-90-1901	East	Human Resources	7/30/1987	$62,000					
9	Mike Peterson	1	133-30-3891	East	Human Resources	2/10/1997	$72,000					
10	Gianna Fanelli	30	372-12-7281	East	Marketing	12/13/2005	$60,000					
11	Greg Sintow	33	816-13-3129	East	Marketing	12/9/2007	$65,000		SumIfs			Results
12	Sonia Martinez	40	187-01-9192	East	Operations	9/11/2008	$78,000		West	Accounts		$ 614,000.00
13	Wendy Halpern	34	111-90-2730	East	Operations	10/3/2004	$105,000					
14	Kathy Jonas	16	101-12-9111	East	Sales	9/9/2001	$144,000		East	Sales		$ 524,050.00
15	Wilma Marshall	9	612-20-9800	East	Sales	2/18/2010	$380,050					
16	Sarah Lawrence	15	213-44-5487	North	Accounts	5/24/2005	$100,000		>100000	<200000		$ 1,824,200.00
17	Benjamin Peters	38	631-10-1786	North	Customer Relations	2/11/2002	$150,200					
18	Paul Warfield	22	876-07-1750	North	Customer Relations	11/21/1999	$94,000		West	Accounts	>85000	$ 376,000.00
19	Adam Li	18	640-62-8586	North	Operations	9/10/2003	$90,000					
20	Mary Bergquist	8	193-33-3314	North	Operations	5/9/2000	$104,000					

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Statistical Functions

There are an extensive range of statistical functions available in Excel. The If's functions were added in the 2007 version of Excel and have simplified using multiple criteria sections like with database functions.

Open the file "Statistical Functions:

Common Statistical Functions:

Average

Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays or references that contain numbers.

Average IF

Finds average (arithmetic men) for the cells specified by a given condition or specified criteria.

Average If's

Finds average (arithmetic men) for the cells specified by a given <u>set of</u> conditions or specified criteria.

Count

Counts the number of cells in a range that contain numbers.

CountIf

Counts the number of cells within a range that meet the given condition.

CountIfs

Counts the number of cells specified by a given <u>set of</u> conditions or criteria.

Average, Averageif, Averageifs

Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays or references that contain numbers.

There are many variations of the Average function. AVERAGE, AVERAGEIF, AVERAGEIFS.

1) The basic **Average** function has a simple argument requesting only the range of cells to give you the average.
2) The **Average IF** function includes the option to select a criterion, like a person's name, to analyze within a range of cells and bring back results specific to the criteria.
3) The **Average IF's** function includes the options to select multiple criteria, like a person's name and product group and bring you the results for the criteria that match.

AVERAGEIF Example:

I2			fx	=AVERAGEIF(B2:B800,"carney",F2:F800)					
	A	B	C	D	E	F	G	H	I	J

	Order Number	Account Rep	Order Date	Product Group	Country	Sale Amount		Average	Average IF	Average IF'S
2	201500	Carney	1/16/2017	Wind & Brass	Ireland	$195,733.33		$ 173,426.95	$ 148,118.02	$ 160,855.91
3	201501	Forrester	1/1/2017	Wind & Brass	Austria	$207,633.33				
4	201502	Delvechio	1/3/2017	Wind & Brass	USA	$290,933.33				
5	201503	Delvechio	1/3/2017	Wind & Brass	USA	$80,983.33				
6	201504	Soto	1/3/2017	Percussion	Venezuela	$270,533.33				
7	201505	Delvechio	1/6/2017	Wind & Brass	Germany	$256,083.33				
8	201506	Billingsley	1/2/2017	Percussion	Portugal	$131,133.33				
9	201507	Forrester	1/9/2017	Wind & Brass	USA	$286,683.33				
10	201508	Carney	1/8/2017	Wind & Brass	Denmark	$244,183.33				
11	201509	Delvechio	1/16/2017	Wind & Brass	UK	$303,683.33				
12	201510	Delvechio	1/10/2017	Percussion	USA	$316,433.33				
13	201511	Carney	1/10/2017	String	Austria	$294,333.33				
14	201512	Powell	1/9/2017	Wind & Brass	Austria	$154,083.33				
15	201513	Forrester	1/8/2017	Percussion	Italy	$229,733.33				
16	201514	Delvechio	1/22/2017	Percussion	Venezuela	$74,183.33				
17	201515	Kilgore	1/13/2017	Percussion	Brazil	$250,983.33				
18	201516	Forrester	1/30/2017	String	Germany	$182,983.33				
19	201517	Carney	1/14/2017	Percussion	France	$231,433.33				
20	201518	Lawson	1/14/2017	Percussion	Argentina	$54,633.33				
21	201519	Lawson	1/15/2017	Wind & Brass	Canada	$142,183.33				
22	201520	Dunstin	1/21/2017	Wind & Brass	Canada	$166,833.33				
23	201521	Carney	1/15/2017	String	Finland	$60,583.33				
24	201522	Lawson	1/16/2017	String	France	$271,383.33				
25	201523	Forrester	1/17/2017	Wind & Brass	Brazil	$37,633.33				
26	201524	Lawson	1/24/2017	Percussion	USA	$17,233.33				
27	201525	Carney	1/27/2017	Wind & Brass	Finland	$133,683.33				
28	201526	Powell	1/28/2017	Wind & Brass	Denmark	$341,933.33				
29	201527	Powell	1/24/2017	Percussion	Germany	$248,433.33				
30	201528	Powell	1/30/2017	String	Switzerland	$269,683.33				
31	201529	Lawson	1/27/2017	Percussion	Brazil	$240,783.33				
32	201530	Carney	1/27/2017	Percussion	Brazil	$183,833.33				
33	201531	Forrester	1/31/2017	Percussion	Italy	$8,733.33				

Count, CountIf, CountIfs

Counts the number of cells in a range that contain numbers.

Just like the previous function the COUNT function has many variations.

1) The basic Count function has a simple argument requesting only the range of cells to give you the count of numbers in a range of cells.
2) The CountIf function includes the option to select a criterion, like a person's name, to analyze the count from within a range of cells and bring back the results specific to the criteria.
3) The CountIfs function includes the options to select multiple criteria, like a person's name and product group and bring you the results for the criteria that match.

COUNTIFS Example:

J2   fx   =COUNTIFS(B2:B800,"carney",D2:D800,"wind & brass")

	A	B	C	D	E	F	G	H	I	J
1	Order Number	Account Rep	Order Date	Product Group	Country	Sale Amount		Count	CountIF	CountIFS
2	201500	Carney	1/16/2017	Wind & Brass	Ireland	$195,733.33		799	111	31
3	201501	Forrester	1/1/2017	Wind & Brass	Austria	$207,633.33				
4	201502	Delvechio	1/3/2017	Wind & Brass	USA	$290,933.33				
5	201503	Delvechio	1/3/2017	Wind & Brass	USA	$80,983.33				
6	201504	Soto	1/3/2017	Percussion	Venezuela	$270,533.33				
7	201505	Delvechio	1/6/2017	Wind & Brass	Germany	$256,083.33				
8	201506	Billingsley	1/2/2017	Percussion	Portugal	$131,133.33				
9	201507	Forrester	1/9/2017	Wind & Brass	USA	$286,683.33				
10	201508	Carney	1/8/2017	Wind & Brass	Denmark	$244,183.33				
11	201509	Delvechio	1/16/2017	Wind & Brass	UK	$303,683.33				
12	201510	Delvechio	1/10/2017	Percussion	USA	$316,433.33				
13	201511	Carney	1/10/2017	String	Austria	$294,333.33				
14	201512	Powell	1/9/2017	Wind & Brass	Austria	$154,083.33				
15	201513	Forrester	1/8/2017	Percussion	Italy	$229,733.33				
16	201514	Delvechio	1/22/2017	Percussion	Venezuela	$74,183.33				
17	201515	Kilgore	1/13/2017	Percussion	Brazil	$250,983.33				
18	201516	Forrester	1/30/2017	String	Germany	$182,983.33				
19	201517	Carney	1/14/2017	Percussion	France	$231,433.33				
20	201518	Lawson	1/14/2017	Percussion	Argentina	$54,633.33				

Text Functions

Text formulas are good for combining text strings together. Like the Concatenate function. You can use them to extract pieces of a text string and build a linked value from those pieces. An example would be to join the first name and last name together for a complete full name column.
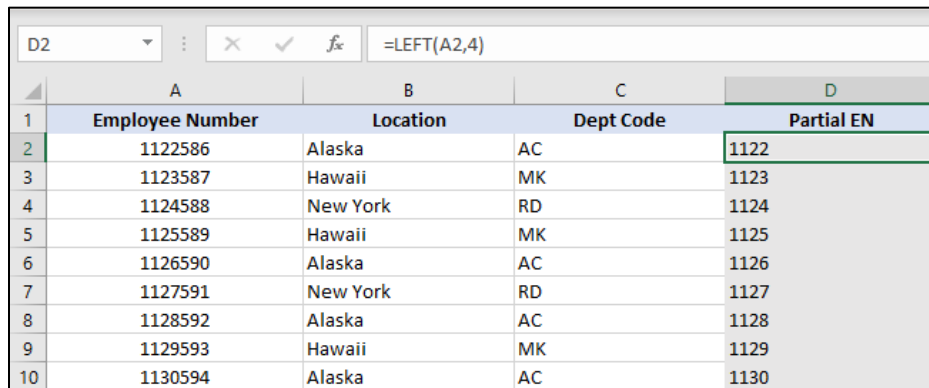
The LEFT and RIGHT functions are great for extracting pieces of a text string that can be applied to other text strings for later use. Like 4 characters from the right of a text string to retrieve the last for characters of a credit card number for verification purposes.

Often when you download data from a database the information you need is not broken down or formatted as needed. Text functions help you perform global cut and paste type actions that can save you hours of time.

Open the file "Excel Text Functions". Save it as "My Excel Text Functions".

Left Function Example: 1st four characters from the left of the text string in cell A2.

=LEFT(A2,4)
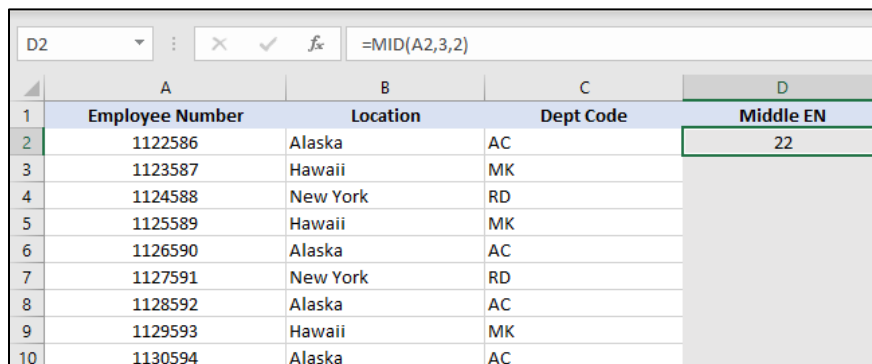
	D2		▼	⋮	✕	✓	*fx*	=LEFT(A2,4)	
		A			B		C		D
1	Employee Number			Location		Dept Code			Partial EN
2	1122586		Alaska			AC			1122
3	1123587		Hawaii			MK			1123
4	1124588		New York			RD			1124
5	1125589		Hawaii			MK			1125
6	1126590		Alaska			AC			1126
7	1127591		New York			RD			1127
8	1128592		Alaska			AC			1128
9	1129593		Hawaii			MK			1129
10	1130594		Alaska			AC			1130

Mid Function Example: 3rd and 4th characters from the middle of the text string in cell A2.

=MID(A2,3,2)

	D2		▼	⋮	✕	✓	*fx*	=MID(A2,3,2)	
		A			B		C		D
1	Employee Number			Location		Dept Code		Middle EN
2	1122586		Alaska			AC		22
3	1123587		Hawaii			MK		
4	1124588		New York			RD		
5	1125589		Hawaii			MK		
6	1126590		Alaska			AC		
7	1127591		New York			RD		
8	1128592		Alaska			AC		
9	1129593		Hawaii			MK		
10	1130594		Alaska			AC		

More Text Functions:

Continuing text functions we will explore the right function.

Right Function Example: Last 2 characters from the right in cell A2.

=RIGHT(A2,2)

	Employee Number	Location	Dept Code	Middle EN	Right Partial EN
1	Employee Number	Location	Dept Code	Middle EN	Right Partial EN
2	1122586	Alaska	AC	22	86
3	1123587	Hawaii	MK	23	
4	1124588	New York	RD	24	
5	1125589	Hawaii	MK	25	
6	1126590	Alaska	AC	26	
7	1127591	New York	RD	27	
8	1128592	Alaska	AC	28	
9	1129593	Hawaii	MK	29	
10	1130594	Alaska	AC	30	
11	1131595	New York	RD	31	
12	1132596	Hawaii	MK	32	
13	1133597	Hawaii	MK	33	
14	1134598	Alaska	AC	34	
15	1135599	Miami	SA	35	
16	1136600	Alaska	AC	36	
17	1137601	New York	RD	37	
18	1138602	Hawaii	MK	38	
19	1139603	New York	RD	39	
20	1140604	Hawaii	MK	40	
21	1141605	Alaska	AC	41	
22	1142606	New York	RD	42	

Len Function Example: The number of characters in cell A2.

=LEN(A2)

	A	B	C	D	E	F
1	Employee Number	Location	Dept Code	Middle EN	Right EN	Length
2	1122586	Alaska	AC	22	86	7
3	1123587	Hawaii	MK	23	87	7
4	1124588	New York	RD	24	88	7
5	1125589	Hawaii	MK	25	89	7
6	1126590	Alaska	AC	26	90	7
7	1127591	New York	RD	27	91	7
8	1128592	Alaska	AC	28	92	7
9	1129593	Hawaii	MK	29	93	7
10	1130594	Alaska	AC	30	94	7

Find Function Example: Find the first dash in cell A2.

=FIND("-", A2,1)

	A	B	C	D	E	F	G	H
1	Employee Numbe	Location	Dept Code	Middle EN	Right EN	Length	Find 1st Dash	Find 2nd Dash
2	11-22-586	Alaska	AC	-2	86	9	3	6
3	11-22-587	Hawaii	MK	-2	87	9	3	6
4	11-22-588	New York	RD	-2	88	9	3	6
5	11-22-589	Hawaii	MK	-2	89	9	3	6
6	11-22-590	Alaska	AC	-2	90	9	3	6
7	11-22-591	New York	RD	-2	91	9	3	6
8	11-22-592	Alaska	AC	-2	92	9	3	6
9	11-22-593	Hawaii	MK	-2	93	9	3	6
10	11-22-594	Alaska	AC	-2	94	9	3	6

Text Function Practice:

Open the file "More Text Functions"
Save it as "My More Text Functions"

    A.   In cell D2 use the Left function to extract 2 characters from the left of cell C2. (Campus info)
    B.   In cell E2 use the Mid function to extract 2 characters from the middle of cell C2. (Building info)
    C.   In cell F2 use the Right function to extract 4 characters from the right of cell C2. (Floor info)
    D.   In cell G2 use the Concat function to join the first and last names from cells A2 and B2.

Completed Example:

	A	B	C	D	E	F	G
1	First Name	Last Name	Campus/Building/Floor	Campus	Building	Floor	Full Name
2	Mary	Hartmann	C1BAFL01	C1	BA	FL01	Mary Hartmann
3	Pat	Hart	C1BBFL02	C1	BB	FL02	Pat Hart
4	Joel	Jameson	C1BAFL02	C1	BA	FL02	Joel Jameson
5	Sergio	Mendez	C1BBFL03	C1	BB	FL03	Sergio Mendez
6	Thuong	Duong	C1BAFL03	C1	BA	FL03	Thuong Duong
7	Rosco	Millwood	C1BCFL01	C1	BC	FL01	Rosco Millwood
8	John	Vlkovic	C1BCFL02	C1	BC	FL02	John Vlkovic
9	Velma	Garcia	C1BCFL03	C1	BC	FL03	Velma Garcia

Logical Functions

Open the file "HR List"
Save it as My HR List.

Logical functions let you ask questions about your data and provide answers for you. The answer to the questions can return one of two values, TRUE or FALSE.

To help ask the questions you need there are comparison operators like:

=   Equal to

>   Greater than

<   Less than

>=   Greater than or equal to

<=   Less than or equal to

<>   Not equal to

Common Logical Functions

IF, AND, OR, TRUE, FALSE, IFERROR

IF Function

Checks whether a condition is met, and returns one value if TRUE, and another value if FALSE.

AND Function

Checks whether all arguments are TRUE and returns TRUE if all arguments are true.

OR Function

Checks whether any of the arguments are true and returns TRUE or FALSE.

TRUE Function

Returns the logical value TRUE

FALSE Function

Returns the logical value FALSE

IFERROR Function

Returns a value if an expression returns an error

IF Function:

The IF Function is a conditional formula that returns one value if the condition is true and another value if the condition is false.

The proper syntax is: =IF (Logical Test, value if true, value if false)

Example: If the employee has been employed more than 5 years, they are 401K eligible. Yes/No

To Locate the IF function:

A.   Select the Formulas tab.
B.   In the function library choose the Logical group.
C.   Select the IF function.

Or:

A.   Type =IF and view the auto complete menu that appears.
B.   When the If function is highlighted use the tab key to select it.
C.   Click the fx function command next to the formula bar to activate the formula arguments box.
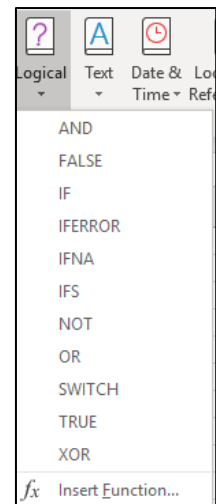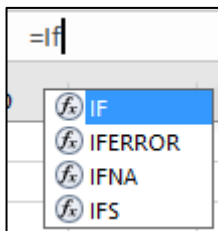
IF Function Practice:

A. Open the HR List file. Save it as My HR List

B. Select the sheet tab Retirement.

C. In cell G5 create an IF function to determine the 401K eligibility after 5 years of service.

D. =IF(F5>=5,"Yes","No")

E. Save your work.

Function Arguments dialog

Function Arguments   ?   ✕

IF

Logical_test	F5>=5	⬆	=	FALSE
Value_if_true	"Yes"	⬆	=	"Yes"
Value_if_false	"No"	⬆	=	"No"

= "No"

Checks whether a condition is met, and returns one value if TRUE, and another value if FALSE.

         Logical_test is any value or expression that can be evaluated to TRUE or FALSE.

Formula result = No

Help on this function   OK   Cancel

G5   ⌄   ⋮ ✕ ✓ *fx*   =IF(F5>=5,"Yes","No")
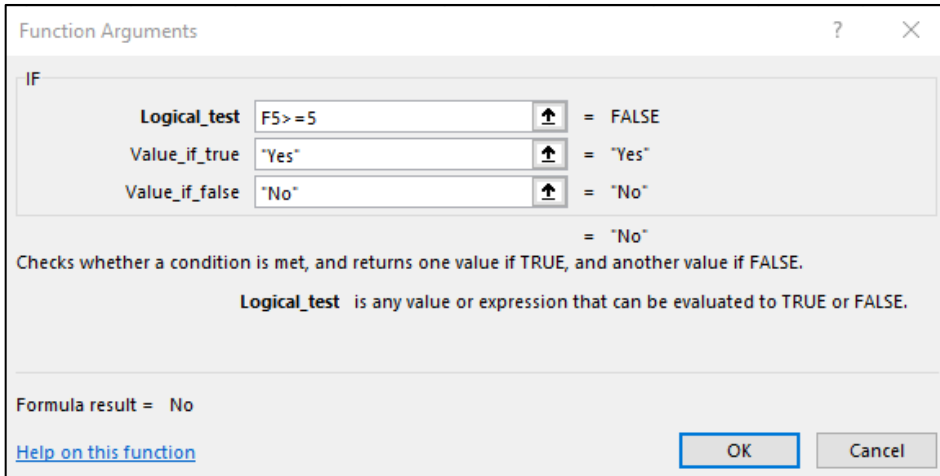
	A	B	C	D	E	F	G	H
1				**Crystal Fresh Water Company**				Today's Date:
2								11/24/2023
3								
4	**Employee Id**	**Last Name**	**First Name**	**Date of Hire**	**Days Employed**	**Years Employed**	**401 K Eligible**	
5	0110-20-3330	Lee	Tina	12/3/2021	721	2	No	
6	0220-30-4440	Smith	Janet	5/22/2020	1281	4	No	
7	0330-40-5550	Kearney	Johnny	2/21/2023	276	1	No	
8	0440-50-6660	Valladao	Ricardo	4/15/2021	953	3	No	
9	0550-60-7770	Saunders	Thelma	8/23/2023	93	0	No	
10	0660-70-8880	Packard	Sheila	10/23/2021	762	2	No	
11	0770-80-9990	Bernstein	Charles	2/23/2023	274	1	No	
12	0880-91-1100	Smith	Marion	3/14/2021	985	3	No	
13	0991-01-2210	Wallace	Bruce	3/14/2021	985	3	No	
14	1101-11-3320	Garcia	Pablo	10/23/2021	762	2	No	
15	1211-21-4430	Leong	Patricia	2/3/2018	2120	6	Yes	
16	1321-31-5540	Nobriga	Greg	7/7/2018	1966	5	Yes	
17	1431-41-6650	Brown	Wayona	2/3/2018	2120	6	Yes	
18	1541-51-7760	Smith	Alan	12/3/2021	721	2	No	
19	1651-61-8870	Toussaint	Marty	4/15/2021	953	3	No	
20	1761-71-9980	Johnson	Ralph	12/3/2021	721	2	No	
21	1871-82-1090	Anderson	Lou	2/14/2018	2109	6	Yes	
22	1981-92-2200	Mayflower	Margo	10/23/2021	762	2	No	
23	2092-02-3310	Duong	Thuong	2/14/2018	2109	6	Yes	
24	2202-12-4420	Carmichael	Jesse	5/22/2020	1281	4	No	
25	2312-22-5530	Hill	Gail	5/22/2020	1281	4	No	

AND Function

Checks whether all arguments are TRUE and returns TRUE if all arguments are true. The AND function is also commonly used as a nested function to add multiple criteria to the IF function.

Example from Excel's Help screen.

	A	B
	A4	=AND(A2>1,A2<100)
1	Values	
2	50	
3	100	
4	TRUE	Displays TRUE if A2 is greater than 1 AND less than 100, otherwise it displays FALSE.
5	50	Displays the value in cell A2 if it's less than A3 AND less than 100, otherwise it displays the message "The value is out of range".
6	The value is out of range	Displays the value in cell A3 if it is greater than 1 AND less than 100, otherwise it displays a message. You can substitute

AND Practice:

A. **Create a spreadsheet using the example below.**
B. **Use an AND function to determine their 401K eligibility.**
   a. **Employees must have 5 years of employment to start 401 K's.**
   b. **Employees can't work past 50 years with company.**

Completed Example:

	A	B
1	Employee Years Employed	401K Eligible
2	12	TRUE
3	4	FALSE
4	2	FALSE
5	40	TRUE
6	22	TRUE
7	25	TRUE
8	14	TRUE
9	16	TRUE
10	8	TRUE
11	20	TRUE

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OR Function

Checks whether any of the arguments are TRUE and returns TRUE if any of the arguments are true. The OR function is also commonly used as a nested function to add multiple criteria to the IF function.

Example from Excel's Help screen.

	A	B
1	**Values**	
2	50	
3	100	
4	**Formula**	**Description**
5	TRUE	Displays TRUE if A2 is greater than 1 **OR** less than 100, otherwise it displays FALSE.
6	50	Displays the value in cell A3 if it is greater than 1 **OR** less than 100, otherwise it displays the message "The value is out of range".
7	The value is out of range	Displays the value in cell A2 if it's less than 0 **OR** greater than 50, otherwise it displays a message.

OR Practice:

 A. Create a spreadsheet using the example below.
 B. Use an OR function to determine how many team members choose Green and Red for team colors.

Completed Example:

	A	B
1	**Team Colors**	**Member Choices**
2	Green	TRUE
3	Blue	FALSE
4	Red	TRUE
5	Orange	FALSE
6	Red	TRUE
7	Orange	FALSE
8	Blue	FALSE
9	Green	TRUE
10	Yellow	FALSE
11	Green	TRUE
12	Orange	FALSE
13	Blue	FALSE
14	Green	TRUE
15	Blue	FALSE

TRUE and FALSE Functions:

Select the True False sheet tab

True: Returns the logical value TRUE
False: Returns the logical value FALSE

=A11=B11 displays TRUE

	A	B	C	D
	D11			fx =A11=B11
1	**Debits**	**Credits**		
2	57	57		
3	106	106		
4	84	84		
5	14	14		
6	55	55		
7	68	68		
8	25	25		
9				
10				**Logical Function**
11	409	409		**TRUE**
12				
13				**IF Function**
14				**In Balance**

=A11-B11 displays FALSE

	A	B	C	D
	D11			fx =A11=B11
1	**Debits**	**Credits**		
2	57	57		
3	106	106		
4	84	84		
5	14	14		
6	55	54		
7	68	68		
8	25	25		
9				
10				**Logical Function**
11	409	408		**FALSE**
12				
13				**IF Function**
14				**You Messed Up**

IFRRROR Function:

The IF ERROR function returns a value if the expression is an error and a value of the expression otherwise.

The example below uses the MATCH function to compare two lists, column G and Column A. It returns the #N/A error when there is no match. When there is a match it returns the position, it is on the list.

Using the IFERROR function you can use whatever words you choose to display instead of the error. Such as: No Match.

IFERROR Example:

E7	▼	⋮	✕	✓	*fx*	=IFERROR(MATCH(F7,$A$2:$A$7,0),"Not on List")		

	A	B	C	D	E	F	G
1	**Products**	**Unit Price**		**MATCH**	**IFERROR**	**Products**	**Unit Price**
2	Montors	$125.00		1	1	Montors	$125.00
3	CPU's	$225.00		2	2	CPU's	$225.00
4	Mouse	$25.00		3	3	Mouse	$25.00
5	Keyboard	$20.00		4	4	Keyboard	$20.00
6	Mouse Pad	$5.00		5	5	Mouse Pad	$5.00
7	Cell Phone	$450.00		#N/A	Not on List		$450.00

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Date & Time Functions

Open the "Dates" file.

Microsoft Excel stores dates as sequential numbers that are called serial values. For example, January 1, 1900 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,447 days after January 1, 1900. If you format a cell that contains a date with the "General" format it will display the serial number.

A	B	C	D
Date	Serial Value	Date	Serial Value
1/1/1900	1	1/1/2008	39448

Often you will want to find the difference between ranges of dates. Like how many years of employment or how many days' shipments are taking. This can be done with simple formulas and enhanced with date functions.

=B2-A2

A	B	C
Date of Hire	Todays Date	Days Employed
10/10/2008	1/12/2010	459

Common Date Functions:
- Today   Displays the date only   =Today()
- Now   Displays the date and time   =Now()

The Today and Now functions update the current date when the file is opened or modified.

Date Formula and Function Practice:

Class Group Exercise:

A. Open the My HR List file and select the Employment sheet.
B. Link the "Date of Hire" column with the same column on the Payroll sheet. Copy to row 50.
C. Select all the dates for the "Date of Hire" column and format them as a General format to view the serial numbers. Format them again as any date format of your choice.
D. In cell H2 use the Today function to create an updating current date.
E. In cell E5 create a formula to figure days employed using today's date and the hire date. Use the fill handle to copy the formula to row 50. (Hint: Must use absolute references)
F. In cell F5 create a formula to figure years employed.

Completed Sample:

	A	B	C	D	E	F	G	H
								Today's Date:
	H2				=TODAY()			
1			Crystal Fresh Water Company					
2								7/9/2019
3								
4	Employee Id	Last Name	First Name	Date of Hire	Days Employed	Years Employed		
5	2422-32-6640	Aarabi	Ali	03-Dec-13	2044	6		
6	4514-24-7730	Alcosta	Cathlene	22-May-16	1143	3		
7	1871-82-1090	Anderson	Lou	21-Feb-19	138	0		
8	3633-43-8850	Auser	Ken	15-Apr-13	2276	6		
9	0770-80-9990	Bernstein	Charles	23-Aug-15	1416	4		
10	1431-41-6650	Brown	Wayona	23-Oct-13	2085	6		
11	3853-64-1070	Calderone	Jorge	23-Feb-15	1597	4		
12	2202-12-4420	Carmichael	Jesse	14-Mar-17	847	2		
13	4844-55-1060	Carney	Ben	14-Mar-17	847	2		
14	2752-62-9970	Clark	Andrew	23-Oct-13	2085	6		
15	2092-02-3310	Duong	Thuong	03-Feb-14	1982	5		
16	1101-11-3320	Garcia	Pablo	07-Jul-18	367	1		
17	4734-44-9950	Grant	Amy	03-Feb-14	1982	5		
18	3743-53-9960	Hicks	Jimmy	03-Dec-13	2044	6		
19	2312-22-5530	Hill	Gail	15-Apr-13	2276	6		
20	5064-75-3280	Hunt	Mel	03-Dec-13	2044	6		
21	4404-14-6620	Itow	Aki	14-Feb-18	510	1		
22	3082-93-3300	Johnson	Maria	23-Oct-17	624	2		
23	1761-71-9980	Johnson	Ralph	14-Feb-18	510	1		
24	3193-03-4410	Jones	George	22-May-16	1143	3		
25	0330-40-5550	Kearney	Johnny	22-May-16	1143	3		

Module 3 – Conditional Formatting with Formulas:

- Compare data outside the conditional formatting range
- Use icons for key performance indicators (KPI)

Compare Data Outside the Conditional Formatting Range

Open "Conditional Formatting" file
Save as "My Conditional Formatting"

You can use a formula to apply conditional formatting to a range of cells based on data entered in other cells.

- A. Choose the "Annual Total" sheet tab.
- B. Select cells A4 through A13 and create a New conditional format for the selected range.
- C. Choose the rule type "Create a formula to determine which cells to format.
- D. Enter the formula   =$B4>3000000
- E. Format as a red font.
- F. Click OK
- G. Quarter 2 through Quarter 4 should be a red font.

Use Icons for Key Performance Indicators:

Use conditional formatting to set up Key Performance Indicators from one quarter to the next to see progress.

| D4 | | fx | =C4 | | | | | | | | | | |

▲	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1					2023 Sales									
2					Gross Profit in Millions.									
3	Water	Qtr 4 -2022	Qtr 1	Status	Trend	Qtr 2	Status	Trend	Qr 3	Status	Trend	Qtr 4	Status	Trend
4	1 pt. bottles	$36.00	$38.00 ✖		⇨	$82 ✔	82 ⬆		$71 ✔	$71 ⬇		$56.00 ✔		⬇
5	1 pt. cases	$28.00	$31.00 ✖		⇨	$33 ✖	33 ⇨		$46 ❗	$46 ⬆		$65.00 ✔		⬆
6	1 gal. bottles	$48.00	$67.00 ✔		⬆	$72 ✔	72 ⬆		$42 ✖	$42 ⬇		$62.00 ✔		⬆
7	3 gal. bottles	$25.00	$66.00 ✔		⬆	$76 ✔	76 ⬆		$33 ✖	$33 ⬇		$45.00 ❗		⬆
8	5 gal. bottles	$12.00	$65.00 ✔		⬆	$66 ✔	66 ⇨		$34 ✖	$34 ⬇		$77.00 ✔		⬆

Module 4 – Linking Formulas:

- **Linking within a workbook**
- **External linking with workbooks**
- **3D formula linking**

Linking within a workbook

Open the file "3D Formulas."
Save as "My 3D Formulas"

    A.   Select cell B5 in the Summary sheet tab.

    B.   Start a SUM function.   =SUM (

    C.   Click on the QTR 1 sheet tab and choose cell B5.

    D.   Hold down the Shift key.

    E.   Select the Qtr 4 sheet tab.

    F.   Click enter to complete the formula.

Completed Example:

External Links to Link Workbooks

Open the file "External Links"
Save as "My External Links"
Open Qtr 1 through Qtr 4 Workbooks
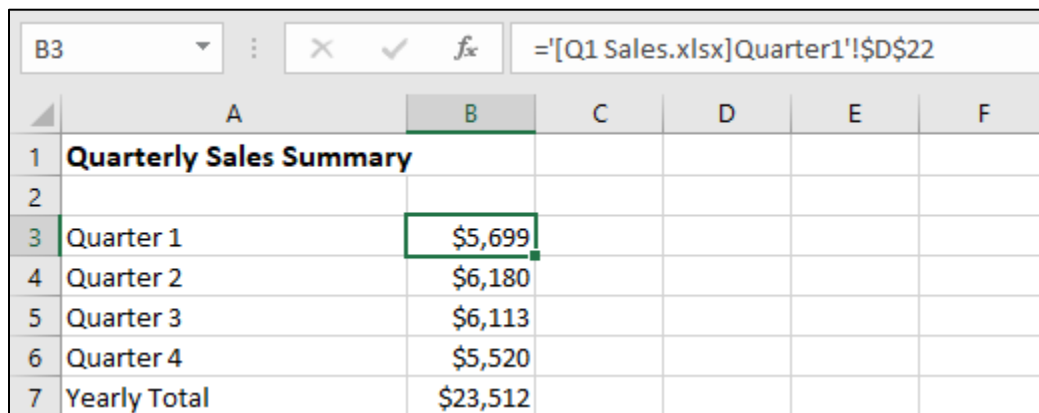
Note: The external links are created in the Destination file ("External Links")
The Qtr1 thru Qtr4 files are source files.

    A.   Select the Summary sheet tab in the External Links file.
    B.   Begin the link by typing =.in cell B3.
    C.   Select the Qtr 1 file from the taskbar and select cell D22. (Total)
    D.   Click enter to complete the link.
    E.   Link the remaining 3 quarters.

Completed Example:

B3			X	✓	*fx*	='[Q1 Sales.xlsx]Quarter1'!$D$22		
	A		B	C	D	E	F	
1	Quarterly Sales Summary							
2								
3	Quarter 1		$5,699					
4	Quarter 2		$6,180					
5	Quarter 3		$6,113					
6	Quarter 4		$5,520					
7	Yearly Total		$23,512					

Warning!   If you change the name of any of the source files you can break the link.

Troubleshoot External Links

Close the file" Qtr 1Sales".
Rename the file "Quarter 1 Sales".

When you rename a source file it will break any link it has to the destination files.

A. In the "External Links" file on the Summary sheet tab, select the Data command tab.
B. In the "Queries and Connections" group, select the Edit Links command.
C. Try to open the Qtr 1 source file. You will get an error.
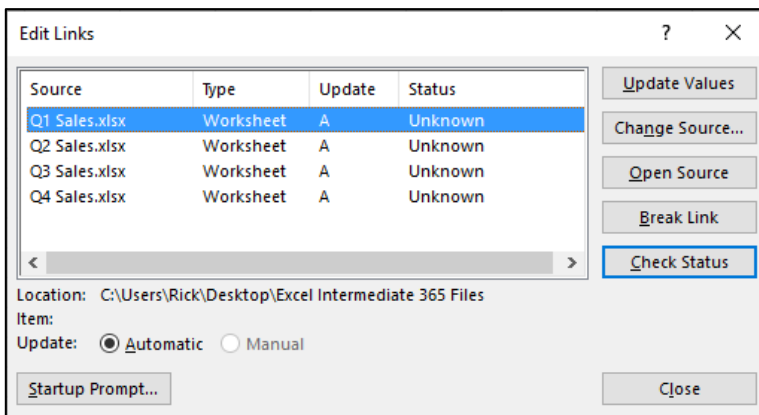
D. Since the file name was changed the link was broken.
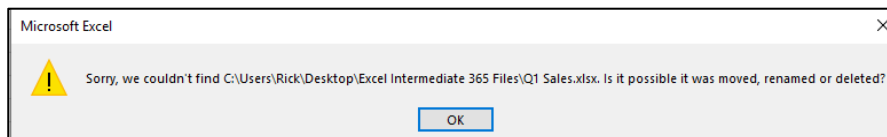
E. Change the source file from Q1 Sales to Quarter 1 Sales

Completed Example:
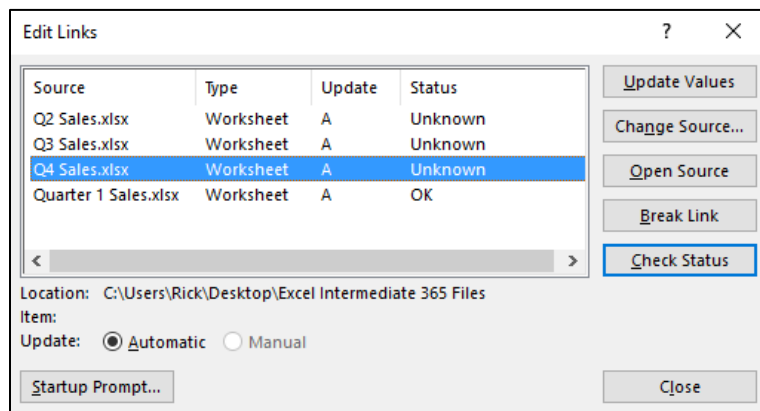
Module -5- Data Analysis Tools

- Data Tables
- Goal Seek
- Solver
- Data Analysis add-ins
- Sampling
- Histogram

Data Tables

Open the "Data Tables" file
Save as 'My Data Tables

Two Variable Data Table
A. Link cell A8 with C6 (Where the PMT function is)
B. Select A8 through K18.
C. From the Data tab in the Forecast group click the What-if-Analysis arrow and choose Data Table.
D. Select cell C4 for the Row input cell.
E. Select C3 for the Column input cell.
F. Click Ok.

Completed Example:

One Variable Data Table
A. Link cell E8 with C6 (Where the PMT function is)
B. Select D8 through E18
C. From the Data tab in the Forecast group click the What-if-Analysis arrow and choose Data Table.
D. Select C4 for the Column input cell.
E. Click Ok.

Goal Seek

Open the "Goal Seek and Solver" file
Save as My Goal Seek and Solver

Goal Seek allows you to calculate the value of one input in order to arrive at a specific outcome. If you knew you could only afford $600.00 for your monthly payment on a loan you may attempt a trial and error process by changing the Principle Amount, the interest rate, or terms in months to set the monthly payment to what you can afford. This could be very time consuming. With Goal Seek you can set the monthly payment to a value of $600 and pick one changing cell and Goal Seek will find a solution for you.

A. Select cell F4
B. Navigate to the Data tab and What-if-Analysis command and choose Goal Seek.
C. Set Cell is F4
D. Value is 600
E. Changing cell is D3
F. Click OK

Completed Example:

Work with Solver

With Goal Seek it has limitations. It can solve only for a single value for a single variable. Excel has another tool that comes loaded with Excel but is not activated by default. To activate the solver tool, go to File, Options, then Add-Ins. At the bottom of the screen where it shows the Manage Excel Add-ins click the Go command. Check the box for the Solver Add-in.
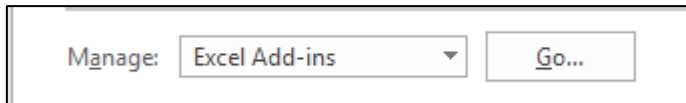
Look for the Solver tool on the Data tab in the Analyze group.
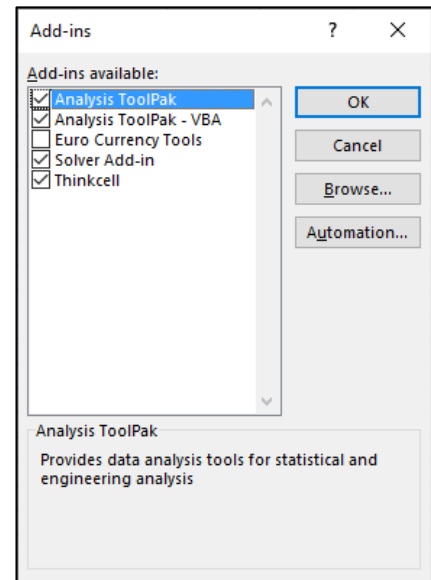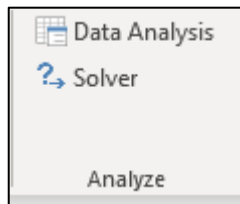
A. Select cell F4
B. Navigate to the Data tab and Analyze group and choose Solver.
C. Set Cell is F4
D. Value is 600
E. Changing cell is D3, D5
F. Add a Constraint. $D$5<=40
G. Click OK
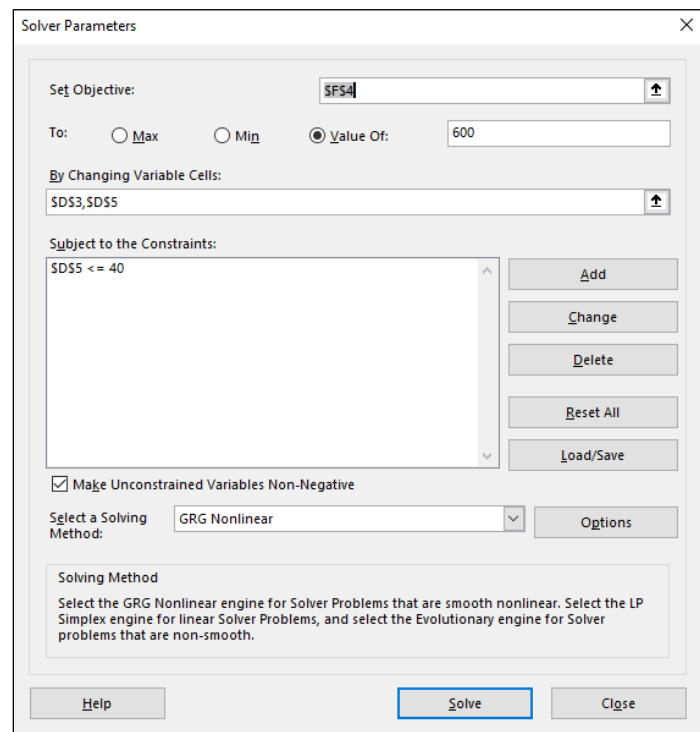
Data Analysis Add-Ins
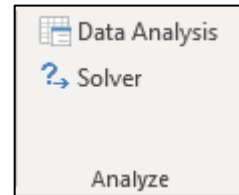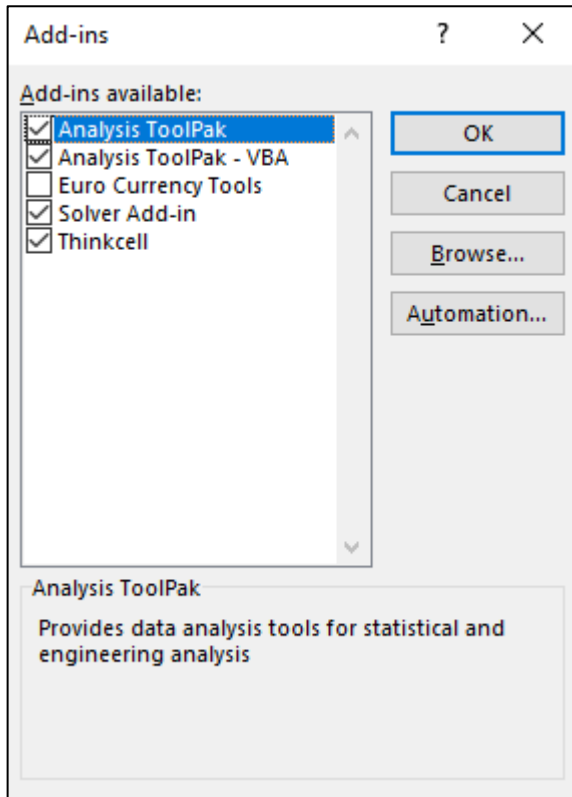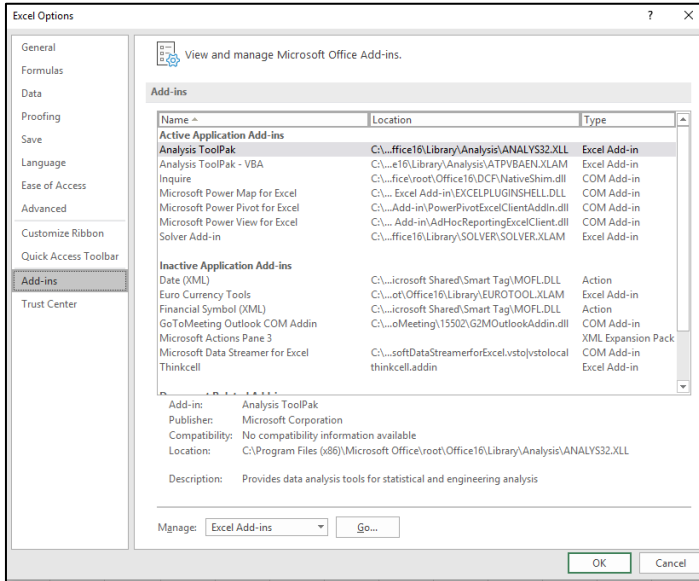
Sampling

The Sampling analysis tool creates a sample from a population by treating the input range as a population. When the population is too large to process or chart, you can use a representative sample. You can also create a sample that contains only the values from a particular part of a cycle if you believe that the input data is periodic. For example, if the input range contains quarterly sales figures, sampling with a periodic rate of four places the values from the same quarter in the output range.

Completed Example:
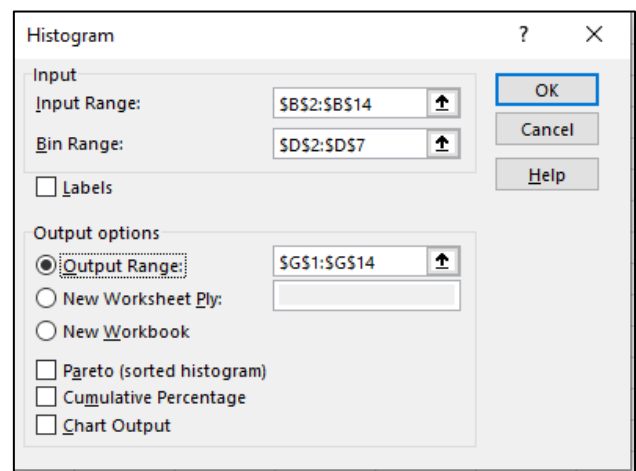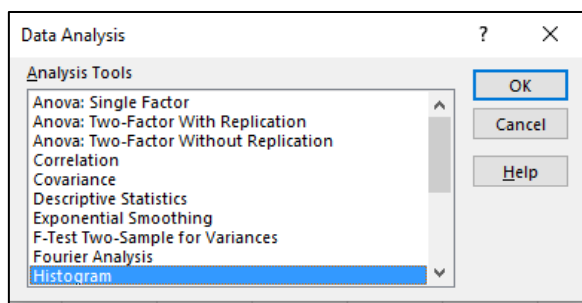
Histogram

Open the file "Histogram"

A. Go to the Data tab and choose the Data Analysis tools in the Analysis group.
B. Select Histogram
C. Click OK.
D. Choose your input Range.
E. Choose your bin Range
F. Choose you output Range

Data Analysis

Analysis Tools	
Anova: Single Factor	OK
Anova: Two-Factor With Replication	Cancel
Anova: Two-Factor Without Replication	
Correlation	Help
Covariance	
Descriptive Statistics	
Exponential Smoothing	
F-Test Two-Sample for Variances	
Fourier Analysis	
Histogram	

Histogram

Input
Input Range: $B$2:$B$14
Bin Range: $D$2:$D$7
☐ Labels

Output options
⦿ Output Range: $G$1:$G$14
◯ New Worksheet Ply:
◯ New Workbook

☐ Pareto (sorted histogram)
☐ Cumulative Percentage
☐ Chart Output

OK   Cancel   Help

Completed Example

|	A	B	C	D	E
1	**Student**	**Marks**		**Bins**	
2	Student 1	68		35	
3	Student 2	86		50	
4	Student 3	76		60	
5	Student 4	66		70	
6	Student 5	87		80	
7	Student 6	78		90	
8	Student 7	68			
9	Student 8	88			
10	Student 9	77			
11	Student 1(	87			
12	Student 1:	78			
13	Student 1:	68			
14	Student 1:	70			

Chart Title
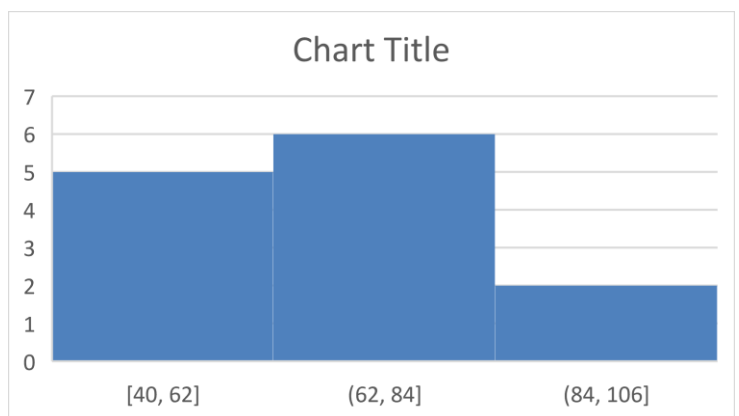
Module 6 – Calculate with PivotTables

PivotTables allow you to summarize large amounts of raw date by pivoting the columns and row data without altering the raw data. You can create them from Excel spreadsheets or other data sources like Access or SAP. They work best with the raw transactional data. Your fields are columns and your records are rows.

Open the file "PivotTables"
Save as "My PivotTables"

Steps:

1. To create a PivotTable, click a single cell inside the source data range.
2. Go to the Insert tab and select the command for PivotTables on the left side of the ribbon
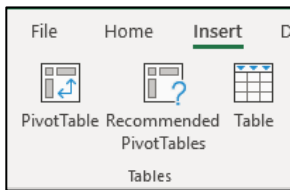
3. Because the data was prepared properly the program picked up the entire range of cells. It shows the Orders Range Sheet along with the selected cells.

4. Click OK to create the PivotTable.
5. Select the necessary fields to analyze.
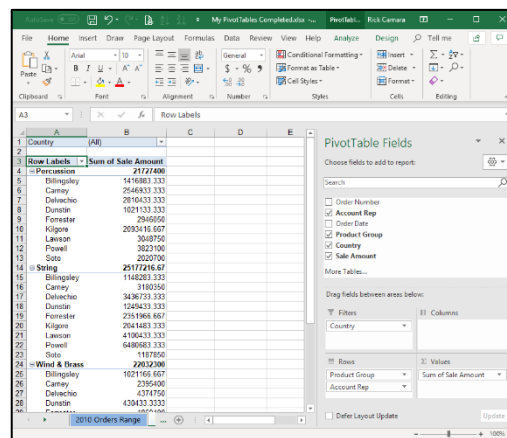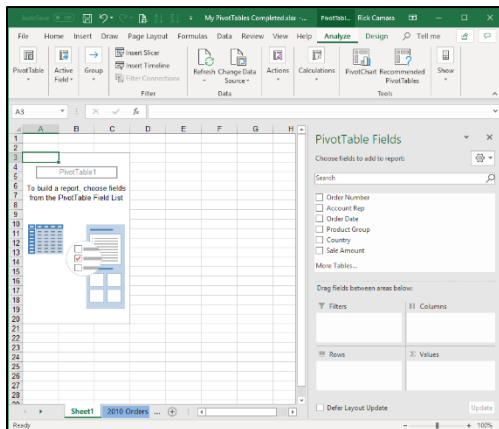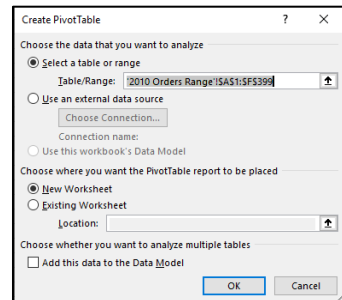
Refresh and change PivotTable data

When data is changed in the original data source you need to refresh the data in you PivotTable. It does not refresh automatically.

Steps:

1. Change the data in your source sheet.
2. Select a single cell in your Pivot Table
3. From the PivotTable tools Analyze tab choose Refresh
4. Watch for the update

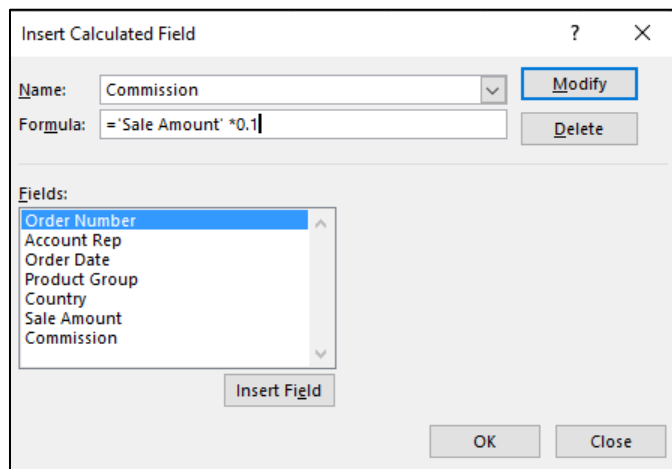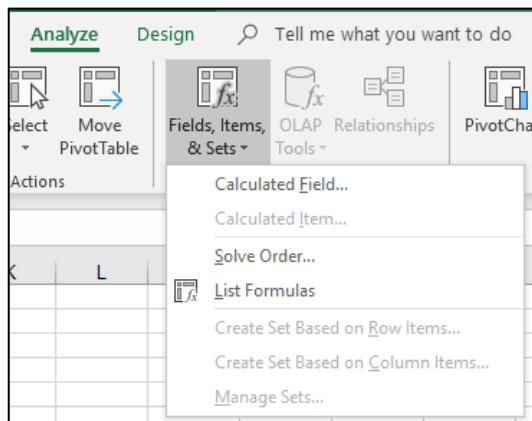|	A	B	C	D	E	F
1	**Order Number**	**Account Rep**	**Order Date**	**Product Group**	**Country**	**Sale Amount**
2	201500	Carney	1/16/2010	Wind & Brass	Ireland	$100,000,000.00
3	201501	Forrester	1/1/2010	Wind & Brass	Austria	$207,633.33
4	201502	Delvechio	1/3/2010	Wind & Brass	USA	$290,933.33
5	201503	Delvechio	1/3/2010	Wind & Brass	USA	$80,983.33
6	201504	Soto	1/3/2010	Percussion	Venezuela	$270,533.33
7	201505	Delvechio	1/6/2010	Wind & Brass	Germany	$256,083.33
8	201506	Billingsley	1/2/2010	Percussion	Portugal	$131,133.33
9	201507	Forrester	1/9/2010	Wind & Brass	USA	$286,683.33
10	201508	Carney	1/8/2010	Wind & Brass	Denmark	$244,183.33
11	201509	Delvechio	1/16/2010	Wind & Brass	UK	$303,683.33
12	201510	Delvechio	1/10/2010	Percussion	USA	$316,433.33
13	201511	Carney	1/10/2010	String	Austria	$294,333.33
14	201512	Powell	1/9/2010	Wind & Brass	Austria	$154,083.33
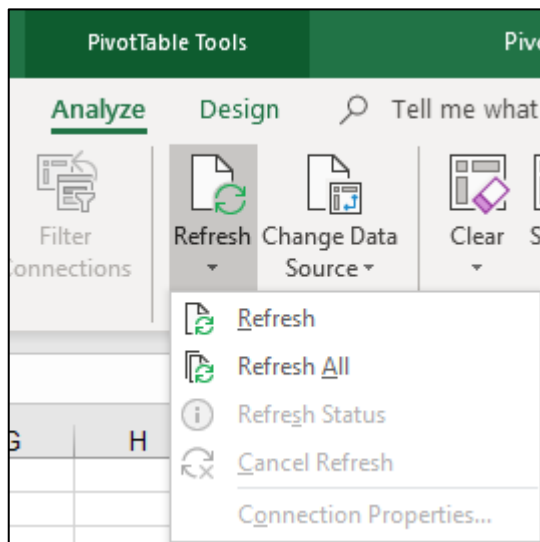
Calculate Fields

After creating PivotTables, you can add Calculated Fields to it. From the Analyze tab for PivotTable tools, look in the command Fields, Items, & Sets in the Calculations group.

Create a new calculated field using the Sale Amount field and call it Commission.

Name: **Commission**

Formula: **='SaleAmount'*.10**

Completed Example:

Appendix A:

Nesting Functions

When you use a function as one of the arguments in a formula that uses a function is called nesting. In this exercise we will nest the IF and AND functions together. The IF function has a logical test as part of the argument. In most cases in the exercise we will nest the AND function with the IF function to allow us to have more than one logical test for the formula.

Open the file "My Logical Functions".

- Select the sheet tab IF Function Practice
- In cell C3 create an IF function to show the A grade in column C.
- Use the Fill handle to copy the formula to row 13.

	C3	∨ : ✕ ✓ *fx*	=IF(B3>=90,"A","")						
	A	B	C	D	E	F	G	H	I
1	Student	Grade Point	A	B	C	D	F	Nested If Grade	Vlookup Grade
3	Scianna	90.00	A						
4	Anderson	87.60							
5	O'Farrell	75.30							
6	Gallegos	93.00	A						
7	Carney	65.40							
8	Brenner	72.50							
9	Vlkovic	73.20							
10	Manina	81.00							
11	Lee	80.00							
12	Conte	59.50							
13	Selby	70.00							
14									

In cell D3 create a nested IF function to show the B grade in column D.

To do this you need to nest the AND function with the IF function to be able to have 2 logical tests.

There are 2 ways to do this.

1. Type the formula in with all the correct syntax. =IF(B3<90,B3>=80,"B","")
2. Use the Function Arguments box to nest the AND function to the IF.

Using the Function Arguments Box.

Start with the IF function.

Click in the Logical test text box.
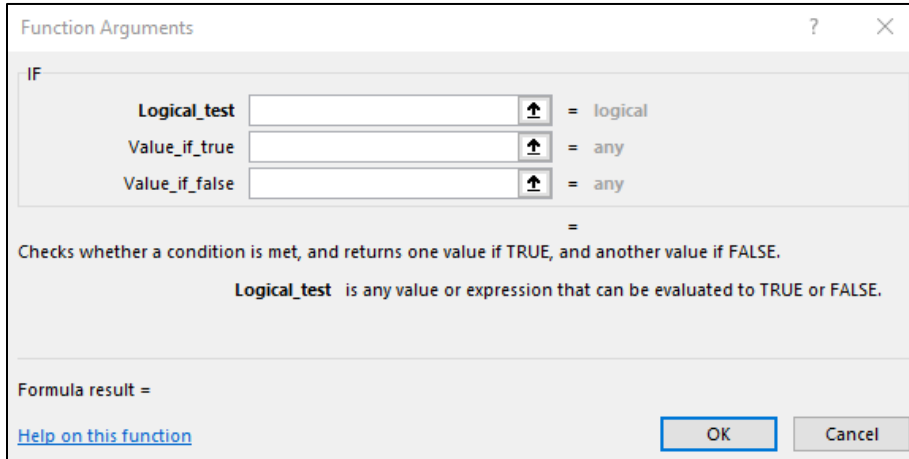
Go to the Name Box, now acting as a function box.

Select the AND function, or click on more functions to find the AND function.

Now the AND function is nested with the IF function.
In the AND function box enter the 2 logical tests.

Do not click OK.

To complete the nesting for grade B you need to finish the IF function argument.

In order to get back to the IF function, click on the word IF in the formula bar.

| B3 | | fx | =IF(AND(B3<90,B3>=80)) |

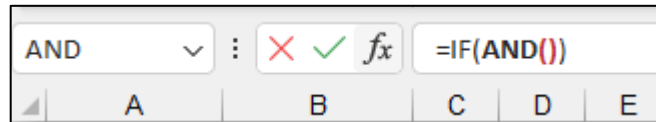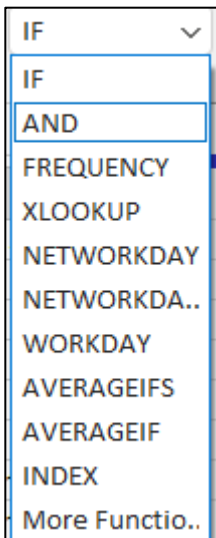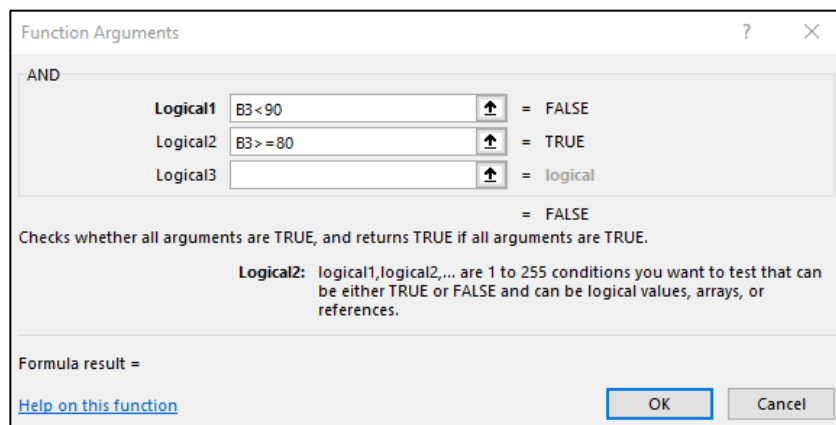|	A	B	C	D	E	F	G	H	I	J	K
1	Student	Grade Point	A	B	C	D	F	Nested If Grade	Vlookup Grade		
3	Scianna	90.(=IF(AND(B3<90,B3>=80))									
4	Anderson	87.60									
5	O'Farrell	75.30									
6	Gallegos	93.00	A								
7	Carney	65.40									
8	Brenner	72.50									
9	Vlkovic	73.20									
10	Manina	81.00									
11	Lee	80.00									
12	Conte	59.50									
13	Selby	70.00									
14											
15											
16											
17											
18	Grade Point	Grade									
19	50	F									
20	60	D									

Function Arguments dialog:

IF

Logical_test   AND(B3<90,B3>=80)   = FALSE
Value_if_true   = any
Value_if_false   = any

Checks whether a condition is met, and returns one value if TRUE, and another value if FALSE.

Value_if_true is the value that is returned if Logical_test is TRUE. If omitted, TRUE is returned. You can nest up to seven IF functions.

Formula result =

Help on this function   OK   Cancel

Fill in the Value if true text box with a B grade.

Fill in the value if false with 2 quotation marks with no spaces.

Click OK and use the fill handle to copy the formula to row 13.

Use the same process to nest the C grade and the D grade.

Use a regular IF function for the F grade.

| H3 | | fx | =IF(B3>=90,"A",IF(B3>=80,"B",IF(B3>=70,"C",IF(B3>=60,"D","F")))) |

	A	B	C	D	E	F	G	H	I
1	Student	Grade Point	A	B	C	D	F	Nested If Grade	Vlookup Grade
3	Scianna	90.00	A					A	A
4	Anderson	87.60		B				B	B
5	O'Farrell	75.30			C			C	C
6	Gallegos	93.00	A					A	A
7	Carney	65.40				D		D	D
8	Brenner	72.50			C			C	C
9	Vlkovic	73.20			C			C	C
10	Manina	81.00		B				B	B
11	Lee	80.00		B				B	B
12	Conte	59.50					F	F	F
13	Selby	70.00			C			C	C
14									
15									
16									
17									
18	Grade Point	Grade							
19	50	F							
20	60	D							
21	70	C							
22	80	B							
23	90	A							

56

Appendix B:

Range Names:

Naming ranges in formulas help you read a formula or function a little more naturally since many of the names refer to current titles in the worksheet.

- Create range names
- Apply and modify range names

Use Range Names in Formulas

An example would be

1) Range of cells   **=Sum (G2:G234)**
2) Named range   =Sum (January)

Open the file "Range Names"
Save as "My Range Names"

Practice:

A. Select the Names sheet tab.
B. Create named ranges for each of the months.
C. Create a named range for the commission rate in cell H3.
D. Use the sum function to total all the months using the named ranges for the argument.

Completed Example:

| C10 | | fx | =SUM(January) | | | | | | |

	A	B	C	D	E	F	G	H	I
1						**EconoBooks**			
2									
3						Commission Rate:		17%	
4									
5		Employee	January	February	March	April	YTD Total	YTD Commission	
6		Davis	110.25	175.65	140.96	135.15	562.01	95.54	
7		Smith	200.75	210.63	240.82	205.79	857.99	145.86	
8		Jones	210.34	185.11	195.14	310.44	901.03	153.18	
9		Baker	220.15	195.37	185.66	250.15	851.33	144.73	
10		**Monthly Totals**	741.49	766.76	762.58	901.53	3172.36	539.30	

Common Keyboard Shortcuts in Excel

Workbook Shortcuts:	Does This:
Ctrl + N	Create a new workbook
Ctrl + O	Open a workbook
Ctrl + W	Close a workbook
Ctrl + S	Save a workbook

Ribbon Shortcuts:	Does This:
Alt Key	Opens the Access keys
Ctrl + F1	Expand/Collapse Ribbon

Worksheet Shortcuts:	Does This:
Ctrl + X	Cut selected data
Ctrl + C	Copy selected data
Ctrl + V	Paste selected data
Ctrl + Z	Undo last action
Ctrl + Y	Redo last action

Navigation Shortcuts:	Navigates:
Arrow keys	One cell at a time
Ctrl + Arrow keys	Begin/End of Row/Column
Home	Column A Row 1
Page Up /Down	A screen worth of rows
Tab	Moves right one cell
Shift + Tab	Moves left one cell
Ctrl + Home	Moves to cell A1
Alt + Page Up / Down	Moves 1 screen left/right

Selection Shortcuts:	Selects:
Shift +Arrow keys	One cell at a time
Shift + Ctrl + Arrows	Begin/End of Row/Column
Ctrl + *	Entire "region"
Ctrl + A	Entire worksheet
Shift + Spacebar	Selects entire row
Ctrl + Spacebar	Selects entire column

Function Keys:	Does This:
F1	Displays the Help pane
F2	Edit in the active cell
F3	Displays the Paste Name box
F4	Repeats the last action
F5	Displays the Go To dialog box
F6	Switches between the panes
F7	Displays the Spell Check box
F11	Creates a default chart
F12	Displays the Save As box

Formatting Shortcuts:	Does This:
Ctrl+1	Opens the Format box
Ctrl+ B	Bolds the text
Ctrl+ I	Italicizes the text
Ctrl+ U	Underlines the text
Ctrl + Shift + $	Applies currency format

| Misc.: Shortcuts:	Does This:
F4 Key in Formulas	Applies absolute reference
Ctrl + Shift + semi-colon	Inserts current date
Ctrl + Shift + colon	Inserts current time
Ctrl + Enter	Complete entry and stay in same cell
Alt + Enter	Start a new line in same cell.
Esc	Cancel an entry in cell

Data Entry Shortcuts:	Navigate in active ranges
Tab	→
Shift + Tab	←
Enter	↓
Shift + Enter	↑

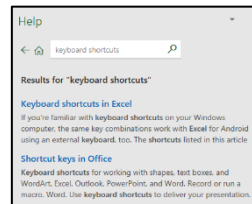# Using Help to List All Excel Keyboard Shortcuts

Note: To use Help you must be connected to the internet.

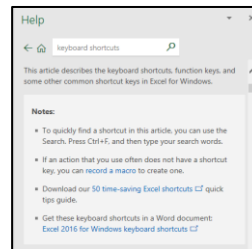To find all the keyboard shortcuts for Excel 365 use the F1 function key to open Help.

You can also click on the Help tab and choose the Help command.
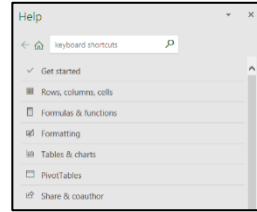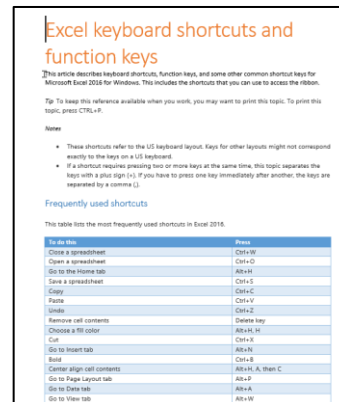

Select the link for "Keyboard Shortcuts in Excel"

Scroll down to the second Notes section and select the link for" Excel 2016 for Windows Keyboard Shortcuts".

It will open a Word document with all the keyboard shortcuts for Excel 365.

Notes:

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