ncaCPA®

The Must Know Excel Features

Developed by Bryan L. Smith, CPA.CITP, CISA

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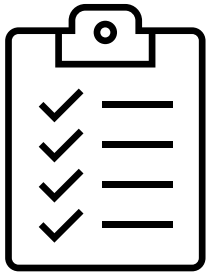
- Owner DataSmithPro, LLC
- Co-founder of CPA Crossings, LLC
- Strategic technology advisor to CPAs w/ 40+ years of experience
- Nationally recognized author and presenter on CPA technology
- Extensive knowledge and experience in proper Excel design techniques as well as helping CPAs build spreadsheets that are accurate
- As a Certified Information Systems Auditor (CISA), spent a considerable amount of time auditing and validating thousands of Excel spreadsheets
- Developed various data analysis and Microsoft Power BI courses and has worked with multiple organizations to train and coach staff on proper data analysis techniques
- Masters of Science in Information Assurance (MSIA)

Presentation Outline

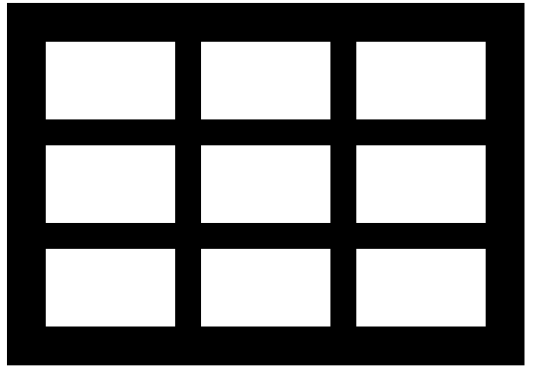
Click links to navigate to specific section ---------- >



The slides in this presentation contain many screenshots of the Excel application in order to demonstrate particular features and functionality. These screenshots were taken during the development of this course. However, Microsoft updates the apps regularly and it becomes difficult to constantly update the screenshots. Therefore, please note that screenshots may vary from your actual version, but the overall functionality remains the same.

Note About Screen Shots

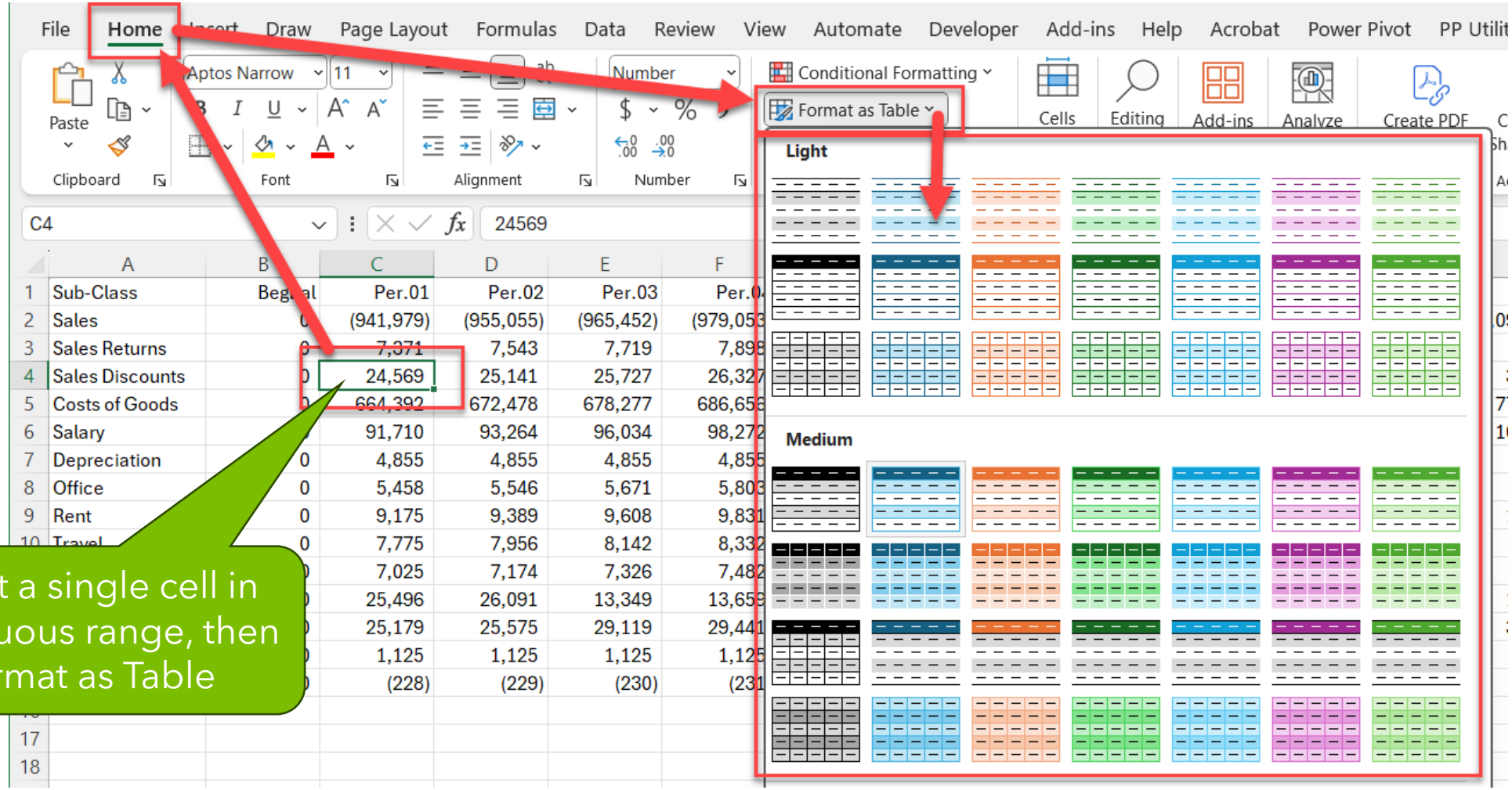
Excel Tables



Excel Tables – Defined

- A feature added in Excel 2007 – "Format as Table"
- Should not be confused with What-If Analysis "Data Tables"
- Structured range of data
- Typically contains related data in a series of Rows / Columns
- A way to organize and analyze data

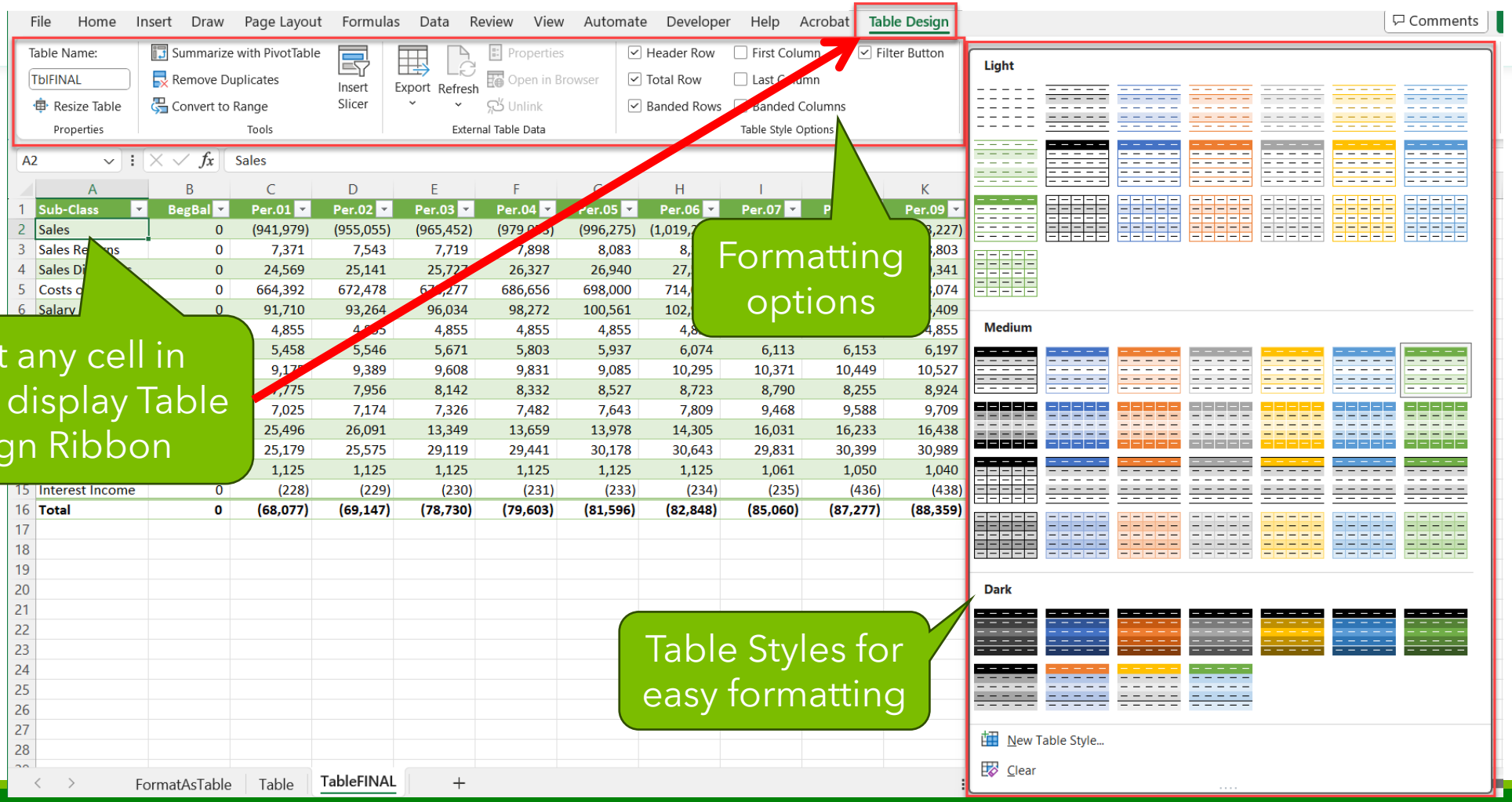
Format As Table



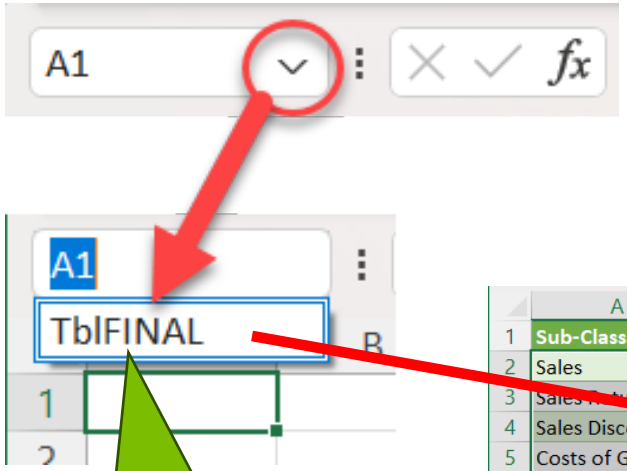
Productivity Gain Topics

Easily change Table formatting	**Navigate directly to Tables**	**Auto filters headers that stay visible**	Easily reorder rows and columns	**Auto expands with new data and maintains cell formatting**
Calculated columns keeps formulas consistent	**Total row with drop down list for quick calculations**	Structured references in formulas	Use a Table with a PivotTable	Use Slicers with a Table

Easily Change Table Formatting



Navigate Directly to Tables

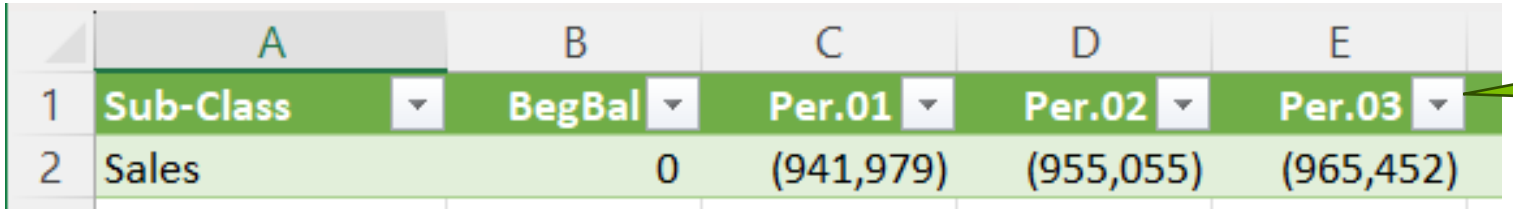


Navigates to the Table, even if it's on a different sheet

This is why it's important to name Tables

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Sub-Class	BegBal	Per.01	Per.02	Per.03	Per.04	Per.05	Per.06	Per.07	Per.08	Per.09	Per.10	Per.11	Per.12	Per.YTD
2	Sales	0	(941,979)	(955,055)	(965,452)	(979,053)	(996,275)	(1,019,266)	(1,046,016)	(1,063,650)	(1,083,227)	(1,095,751)	(1,095,153)	(1,106,068)	(12,346,945)
3	Sales Returns	0	7,371	7,543	7,719	7,898	8,083	8,271	8,445	8,622	8,803	8,987	9,177	9,370	100,289
4	Sales Discounts	0	24,569	25,141	25,727	26,327	26,940	27,568	28,147	28,738	29,341	29,958	30,587	31,229	334,272
5	Costs of Goods	0	664,392	672,478	678,277	686,656	698,000	714,080	734,346	747,900	763,074	772,374	770,746	778,698	8,681,021
6	Salary	0	91,710	93,264	96,034	98,272	100,561	102,904	103,733	104,567	105,409	106,260	107,118	107,986	1,217,818
7	Depreciation	0	4,855	4,855	4,855	4,855	4,855	4,855	4,855	4,855	4,855	5,155	5,155	5,155	54,160
8	Office	0	5,458	5,546	5,671	5,803	5,937	6,074	6,113	6,153	6,197	6,240	6,288	6,336	71,816
9	Rent	0	9,175	9,389	9,608	9,831	9,085	10,295	10,371	10,449	10,527	10,606	10,684	10,766	120,786
		0	7,775	7,956	8,142	8,332	8,527	8,723	8,790	8,255	8,924	8,993	9,062	9,129	103,209
	sing	0	7,025	7,174	7,326	7,482	7,643	7,809	9,468	9,588	9,709	9,832	9,956	10,082	103,094
	ssions	0	25,496	26,091	13,349	13,659	13,978	14,305	16,031	16,233	16,438	16,646	16,855	17,068	206,149
	e Tax	0	25,179	25,575	29,119	29,441	30,178	30,643	29,831	30,399	30,989	31,187	30,466	31,088	354,095
	st Expense	0	1,125	1,125	1,125	1,125	1,125	1,125	1,061	1,050	1,040	1,029	1,019	1,009	12,958
15	Interest Income	0	(228)	(229)	(230)	(231)	(233)	(234)	(235)	(436)	(438)	(440)	(444)	(445)	(3,823)
16	**Total**	**0**	**(68,077)**	**(69,147)**	**(78,730)**	**(79,603)**	**(81,596)**	**(82,848)**	**(85,060)**	**(87,277)**	**(88,359)**	**(88,924)**	**(88,484)**	**(88,597)**	**(991,101)**

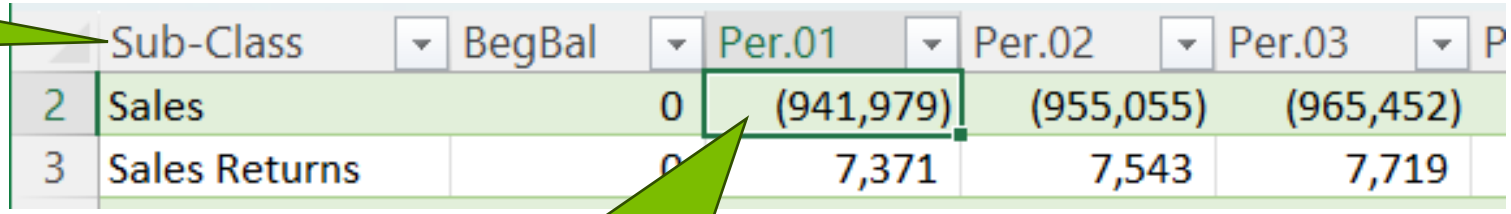
Auto Filters Headers That Stay Visible



	A	B	C	D	E
1	Sub-Class	BegBal	Per.01	Per.02	Per.03
2	Sales	0	(941,979)	(955,055)	(965,452)

Automatically adds filters to Table headers

Scroll down and filters/column names replace column letters



	Sub-Class	BegBal	Per.01	Per.02	Per.03	P
2	Sales	0	(941,979)	(955,055)	(965,452)	
3	Sales Returns		7,371	7,543	7,719	

Only works if a cell within the Table is selected

Auto Expands with New Data

9	Travel	103,209	0	7,775	7,956	8,142	8,332	8,527	8,723	8,790	8,255	8,924	8,993	9,062	9,129
10	Advertising	103,094	0	7,025	7,174	7,326	7,482	7,643	7,809	9,468	9,588	9,709	9,832	9,956	10,082
11	Commissions	206,149	0	25,496	26,091	13,349	13,659	13,978	14,305	16,031	16,233	16,438	16,646	16,855	17,068
12	Depreciation	54,160	0	4,855	4,855	4,855	4,855	4,855	4,855	4,855	4,855	4,855	5,155	5,155	5,155
13	Income Tax	354,095	0	25,179	25,575	29,119	29,441	30,178	30,643	29,831	30,399	30,989	31,187	30,466	31,088
14	Interest Expense	12,958	0	1,125	1,125	1,125	1,125	1,125	1,125	1,061	1,050	1,040	1,029	1,019	1,009
15	Interest Income	(3,823)	0	(228)	(229)	(230)	(231)	(233)	(234)	(235)	(436)	(438)	(440)	(444)	(445)
16	Advertising	103,094	0	7,025	7,174	7,326	7,482	7,643	7,809	9,468	9,588	9,709	9,832	9,956	10,082
17	Commissions	206,149	0	25,496	26,091	13,349	13,659	13,978	14,305	16,031	16,233	16,438	16,646	16,855	17,068
18	Depreciation	54,160	0	4,855	4,855	4,855	4,855	4,855	4,855	4,855	4,855	4,855	5,155	5,155	5,155
19	Income Tax	354,095	0	25,179	25,575	29,119	29,441	30,178	30,643	29,831	30,399	30,989	31,187	30,466	31,088
20	Interest Expense	12,958	0	1,125	1,125	1,125	1,125	1,125	1,125	1,061	1,050	1,040	1,029	1,019	1,009
21	Interest Income	(3,823)	0	(228)	(229)	(230)	(231)	(233)	(234)	(235)	(436)	(438)	(440)	(444)	(445)

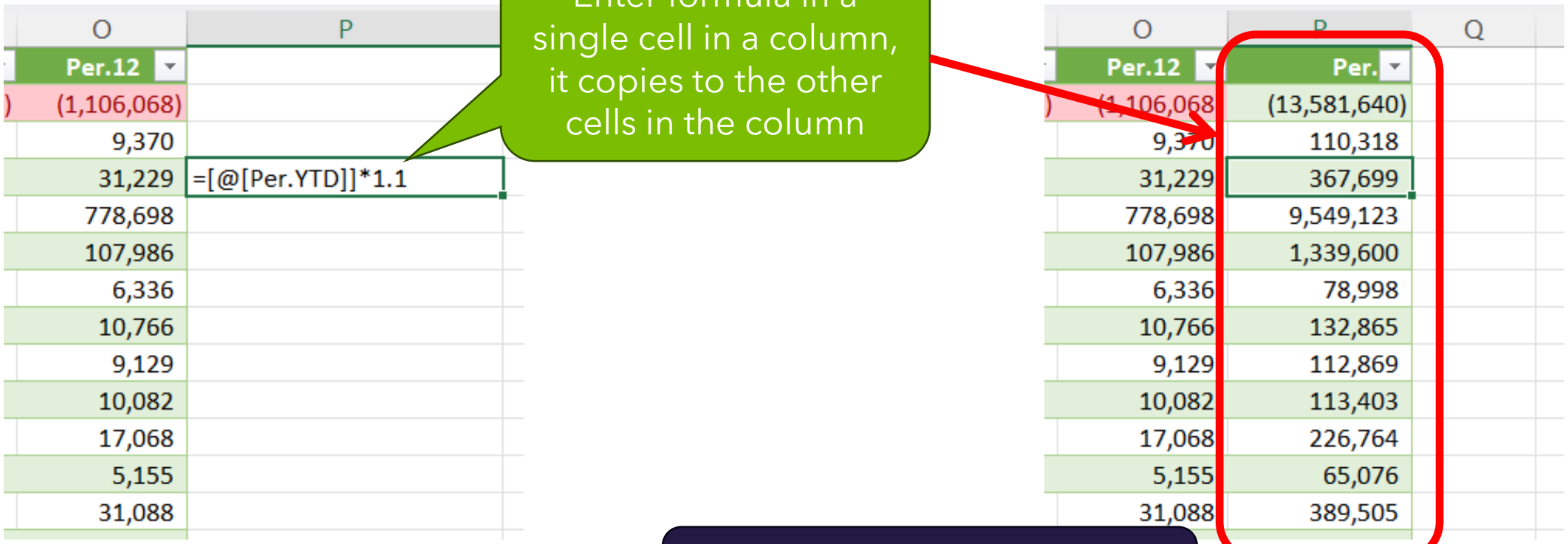
Copy & Paste Values auto expands the Table range

Can also paste over Table Total row

20	Interest Expense	12,958	0	1,125	1,125
21	Interest Income	(3,823)	0	(228)	(229)
22	Investment Income				

Also expands if you type new data on the row right under the Table

Calculated Columns Keeps Formulas Consistent – New Formula



Note: Conditional Formatting doesn't copy to auto column

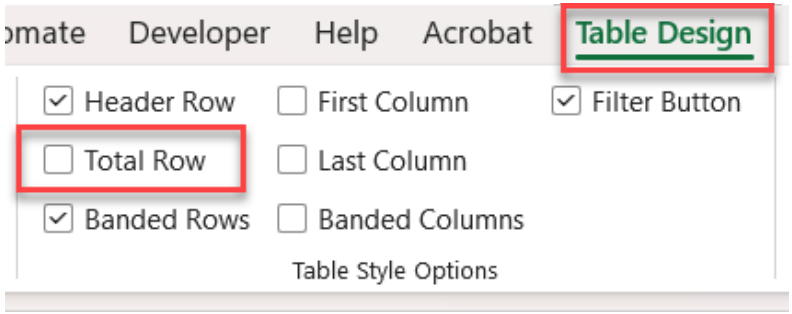
Calculated Columns Keeps Formulas Consistent – Change Formula

O	P
Per.12	Per.
(1,106,068)	(13,581,640)
9,370	110,318
31,229	=[@[Per.YTD]]*1.15
778,698	9,549,123
107,986	1,339,600
6,336	78,998
10,766	132,865
9,129	112,869
10,082	113,403
17,068	226,764
5,155	65,076
31,088	389,505

Change formula in a single cell in a column, it changes all formulas in the column

O	P	Q
Per.12	Per.	
(1,106,068)	(14,198,987)	
9,370	115,332	
31,229	384,413	
778,698	9,983,174	
107,986	1,400,491	
6,336	82,588	
10,766	138,904	
9,129	117,999	
10,082	118,558	
17,068	237,071	
5,155	68,034	
31,088	407,209	

Total Row for Quick Calculations



22	Income Tax	79,873	90,262	91,219	92,741	354,095
23	Interest Expense	3,375	3,375	3,151	3,057	12,958
24	Interest Income	(687)	(698)	(1,109)	(1,329)	(3,823)
25	**Total**					**0**

Adds a total to the rightmost cell that contain values

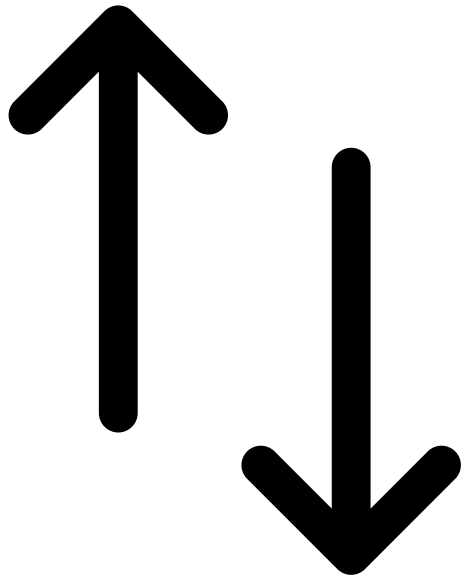
Total Row with Drop-Down List for Quick Calculations

	Sub-Class	Qtr1	Qtr2	Qtr3
16	Depreciation	14,565	14,565	14
17	Office	16,675	17,814	18
18	Rent	28,172	29,211	31
19	Travel	23,873	25,582	26
20	Advertising	21,525	22,934	28
21	Commissions	64,936	41,942	48
22	Income Tax	79,873	90,262	91
23	Interest Expense	3,375	3,375	3
24	Interest Income	(687)	(698)	(1
25	**Total**			
26				
27				
28				
29				
30				
31				
32				
33				

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

Drop-down list to select a Function. Can use ANY function. Turning Total Row off/on it remembers the formula

Custom Sorting



Custom Sorting

Built-In sorting order in Excel

- Ascending
- Descending
- Dates (date, month, day of week)
- Color in Excel Table

Custom Lists allows user-defined order

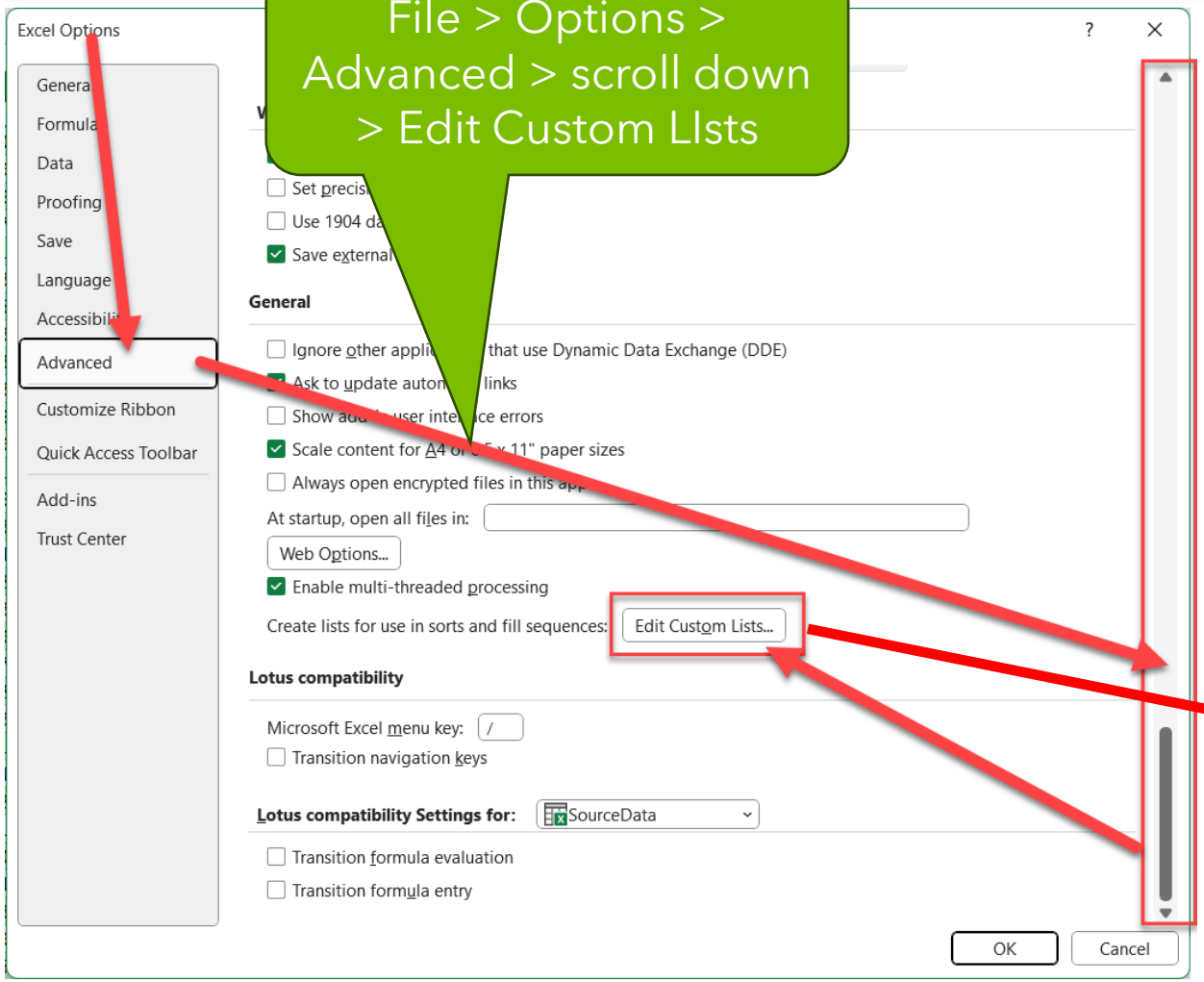
- List must contain text or text with numbers
- Numbers only must come from a list formatted as text

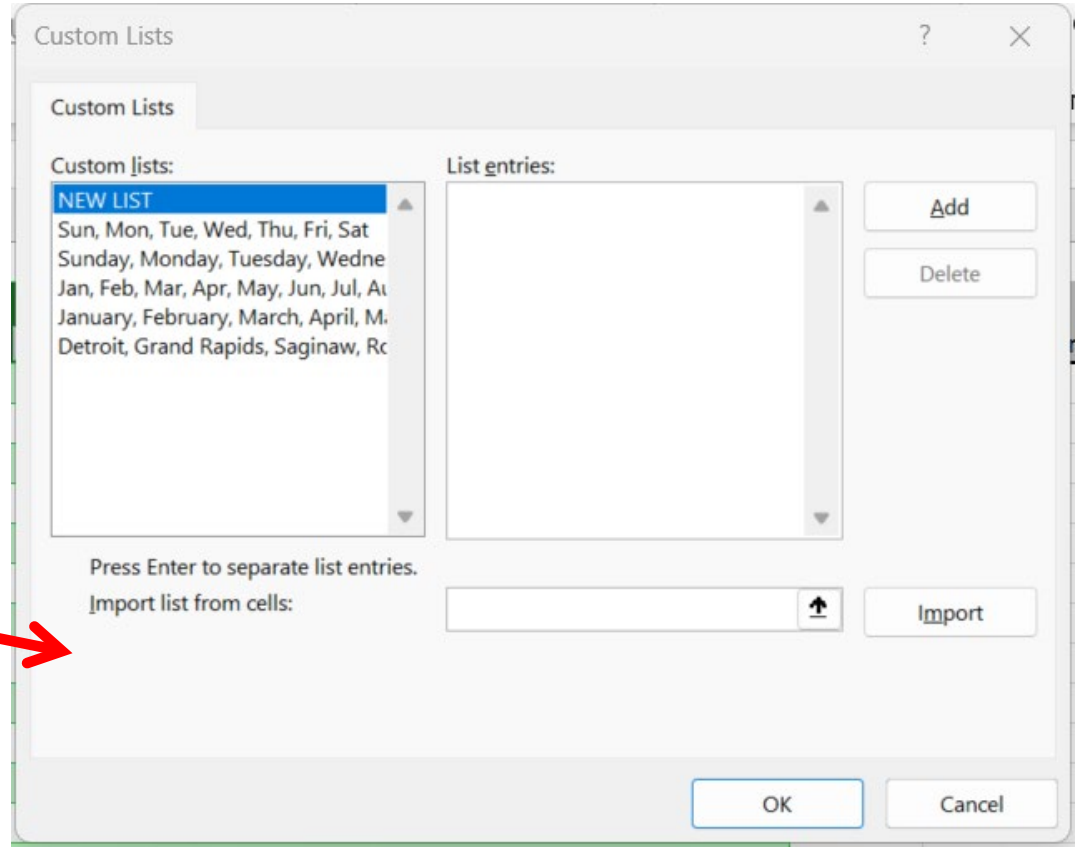
Example of Custom Lists

- High, Medium, Low
- Large, Medium, Small
- North, South, East, West
- Senior Manager, Regional Manager, Department Manager, Sales Representative

Creating a Custom List

File > Options > Advanced > scroll down > Edit Custom LIsts





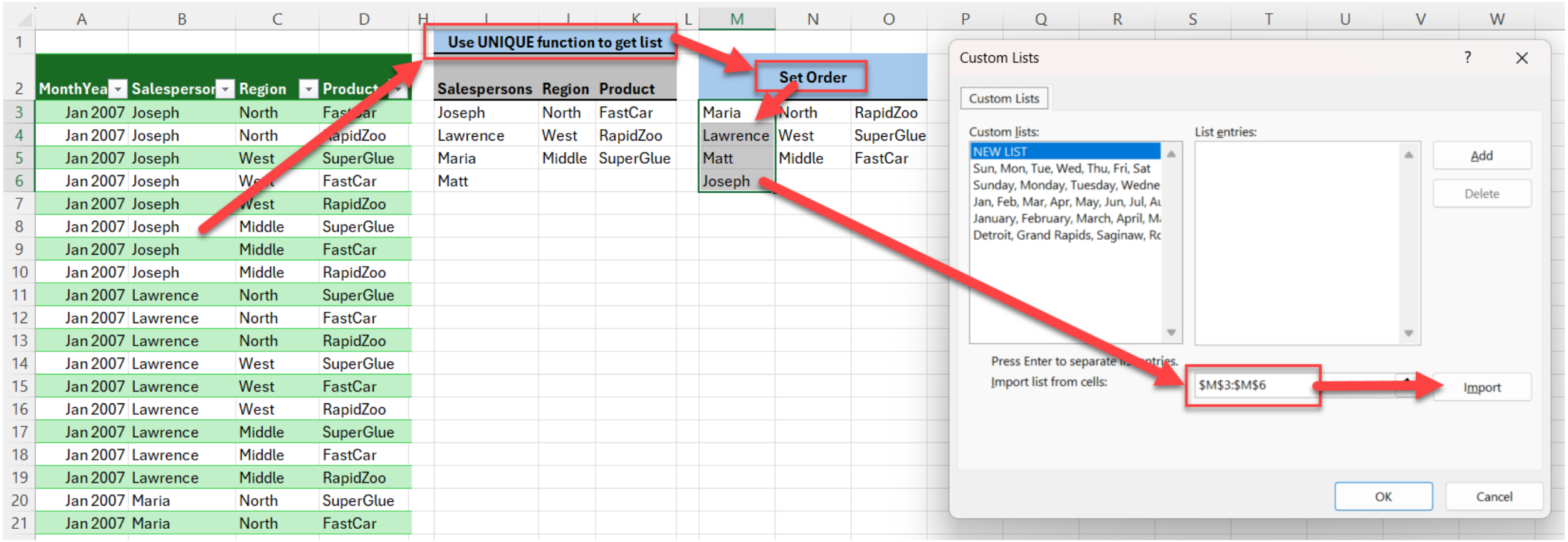
Setting Up Custom List

You can manually enter

You can create from range

- Use UNIQUE function to get list
- Copy & Paste Values, then Set order
- Select range
- Open Custom Lists
- Range should be in “Import list from cells”

Creating Custom List from Range

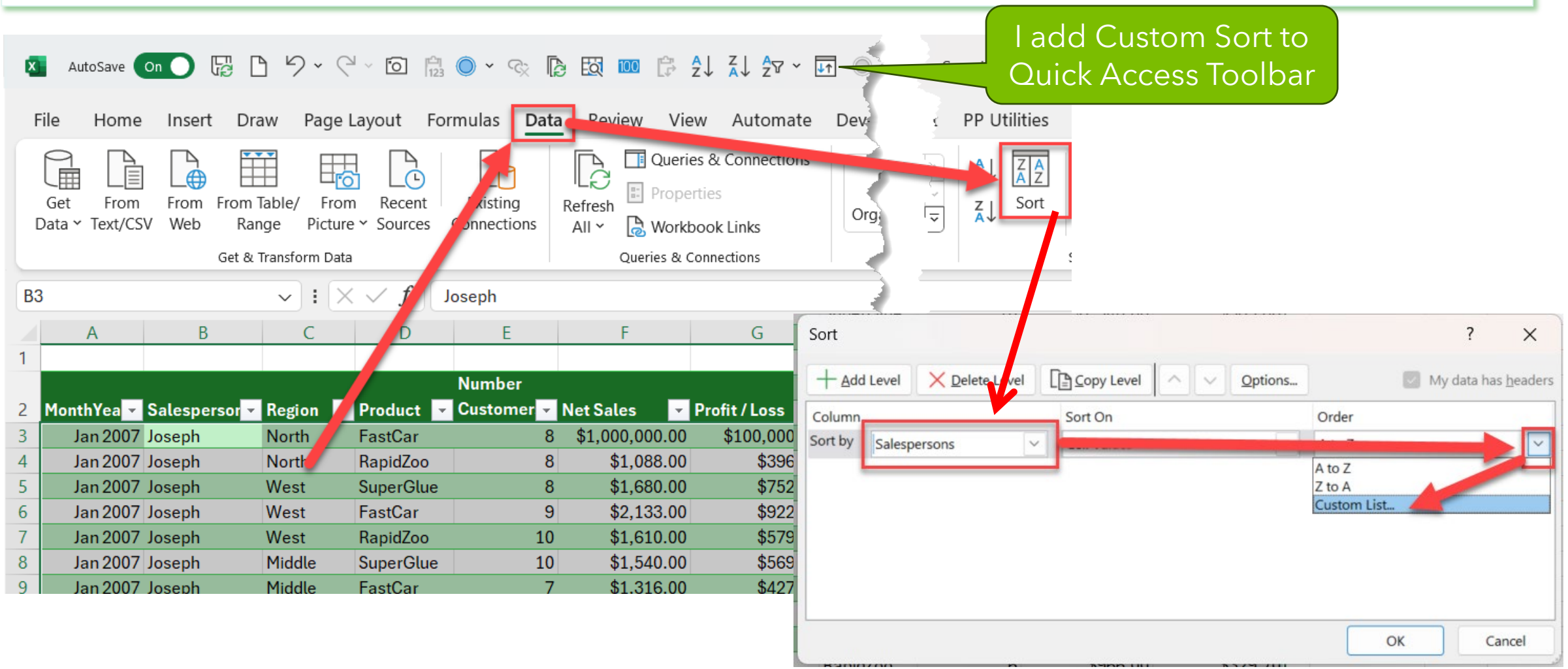


MonthYear	Salesperson	Region	Product
Jan 2007	Joseph	North	FastCar
Jan 2007	Joseph	North	RapidZoo
Jan 2007	Joseph	West	SuperGlue
Jan 2007	Joseph	West	FastCar
Jan 2007	Joseph	West	RapidZoo
Jan 2007	Joseph	Middle	SuperGlue
Jan 2007	Joseph	Middle	FastCar
Jan 2007	Joseph	Middle	RapidZoo
Jan 2007	Lawrence	North	SuperGlue
Jan 2007	Lawrence	North	FastCar
Jan 2007	Lawrence	North	RapidZoo
Jan 2007	Lawrence	West	SuperGlue
Jan 2007	Lawrence	West	FastCar
Jan 2007	Lawrence	West	RapidZoo
Jan 2007	Lawrence	Middle	SuperGlue
Jan 2007	Lawrence	Middle	FastCar
Jan 2007	Lawrence	Middle	RapidZoo
Jan 2007	Maria	North	SuperGlue
Jan 2007	Maria	North	FastCar

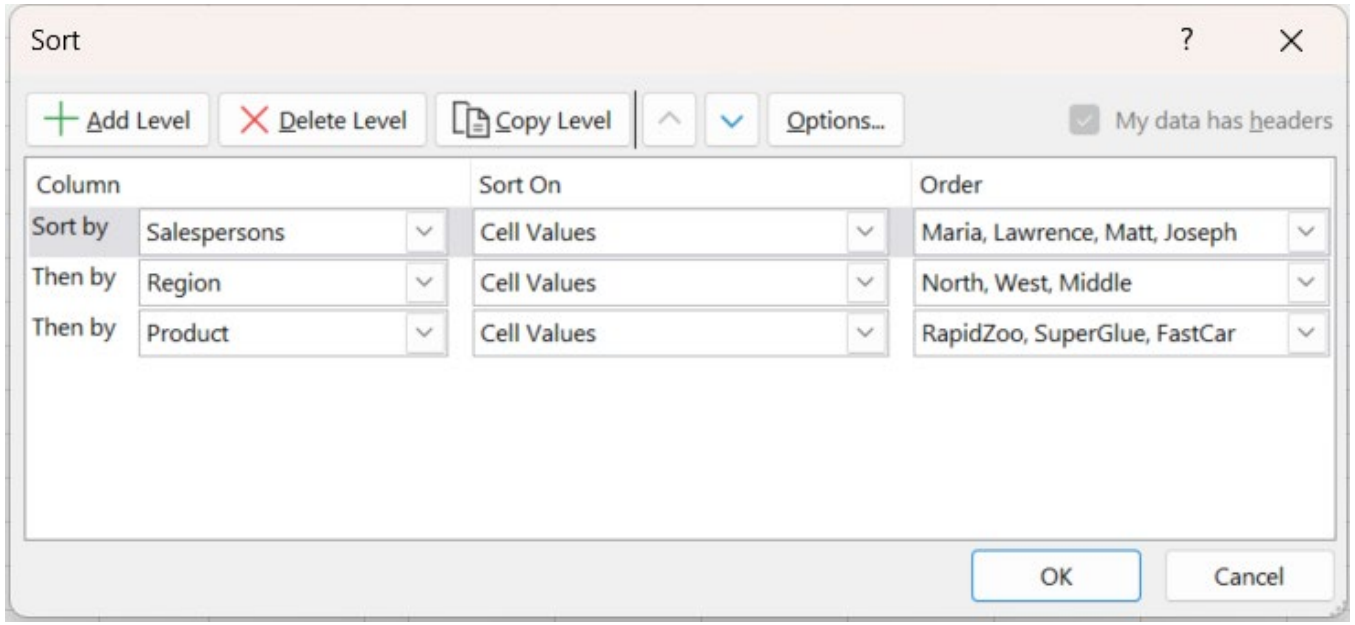
Salespersons	Region	Product
Joseph	North	FastCar
Lawrence	West	RapidZoo
Maria	Middle	SuperGlue
Matt		

Maria	North	RapidZoo
Lawrence	West	SuperGlue
Matt	Middle	FastCar
Joseph		

Sort with Custom List

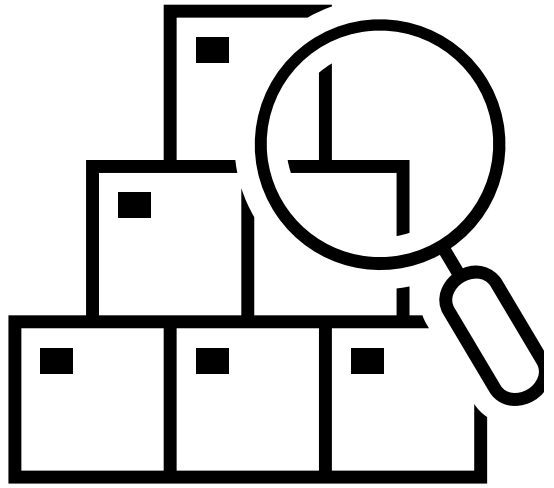


Results of Custom Sort



MonthYea	Salesperson	Region	Product	Number Customer	Net Sa
Jan 2007	Maria	North	RapidZoo	6	
Feb 2007	Maria	North	RapidZoo	6	
Mar 2007	Maria	North	RapidZoo	6	
Apr 2007	Maria	North	RapidZoo	7	
May 2007	Maria	North	RapidZoo	6	
Jun 2007	Maria	North	RapidZoo	8	
Jul 2007	Maria	North	RapidZoo	10	
Aug 2007	Maria	North	RapidZoo	10	
Sep 2007	Maria	North	RapidZoo	10	
Oct 2007	Maria	North	RapidZoo	9	
Nov 2007	Maria	North	RapidZoo	9	

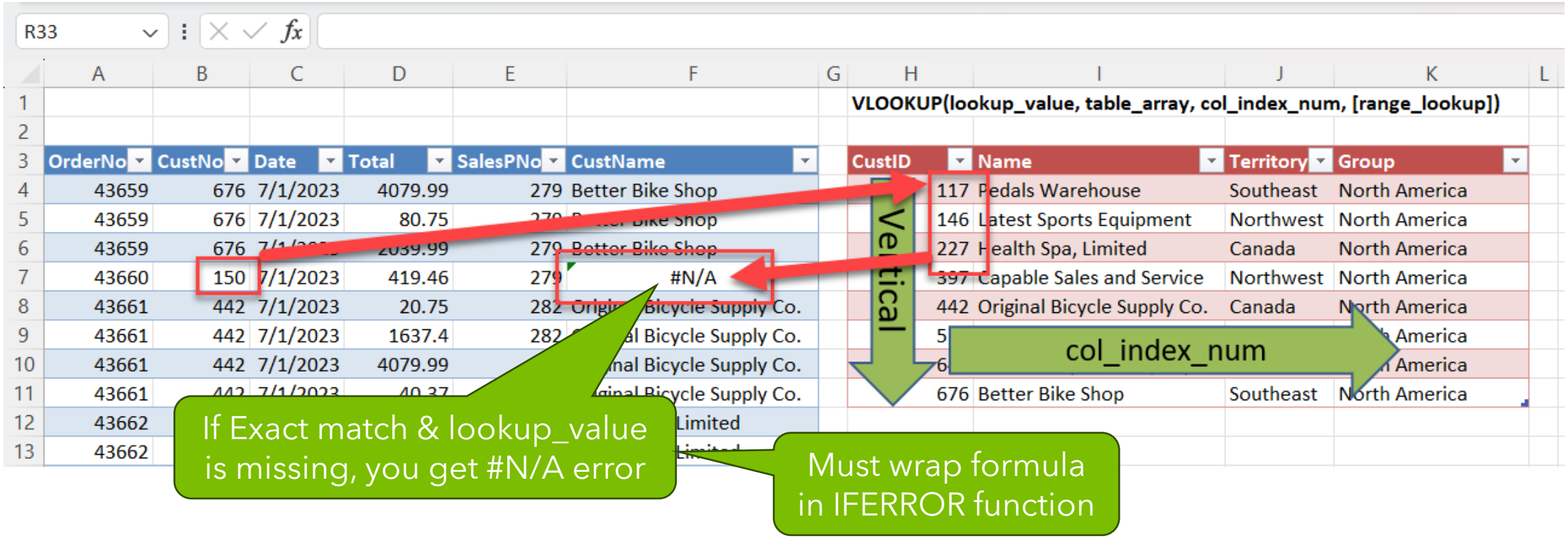
XLOOKUP



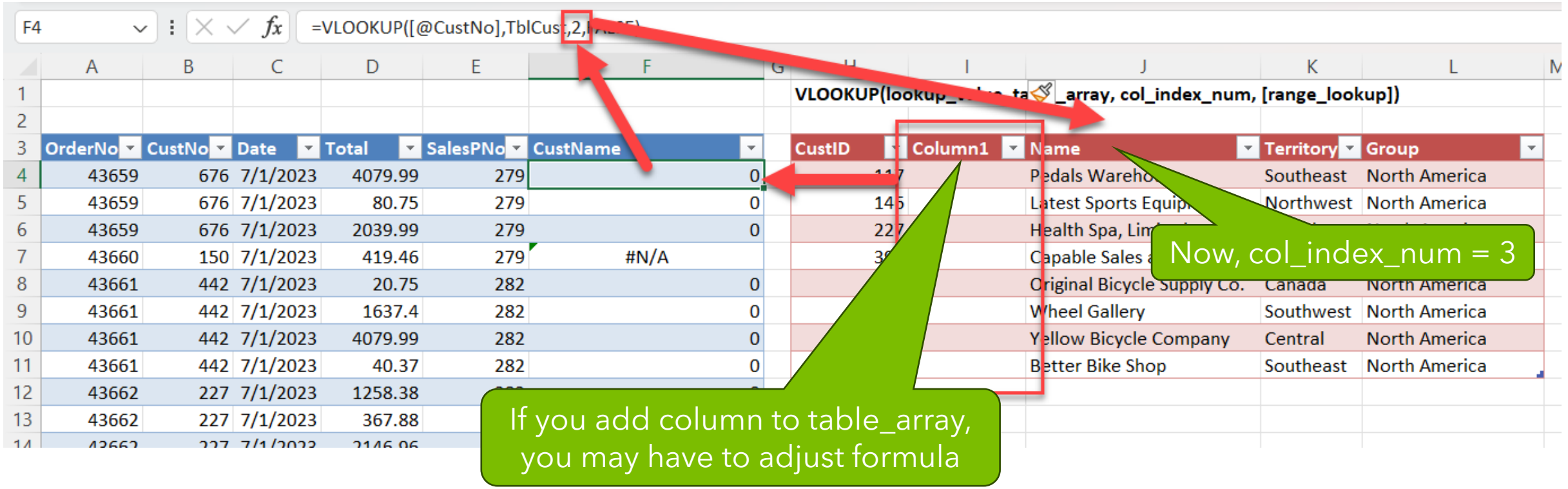
VLOOKUP / HLOOKUP

- The traditional “lookup” functions
- Looks for a value in array (list) and return a value from that array
- V – looks down a column in a list to find a value
- H – looks across a row in a list to find a value
- Can be inefficient in older versions of Excel
- **XLOOKUP was created to replace these 2 functions**

Issue #1 with VLOOKUP / HLOOKUP



Issue #2 with VLOOKUP & HLOOKUP



OrderNo	CustNo	Date	Total	SalesPNo	CustName
43659	676	7/1/2023	4079.99	279	0
43659	676	7/1/2023	80.75	279	0
43659	676	7/1/2023	2039.99	279	0
43660	150	7/1/2023	419.46	279	#N/A
43661	442	7/1/2023	20.75	282	0
43661	442	7/1/2023	1637.4	282	0
43661	442	7/1/2023	4079.99	282	0
43661	442	7/1/2023	40.37	282	0
43662	227	7/1/2023	1258.38		
43662	227	7/1/2023	367.88		

CustID	Column1	Name	Territory	Group
		Pedals Wareho	Southeast	North America
		Latest Sports Equip	Northwest	North America
		Health Spa, Lim		
		Capable Sales		
		Original Bicycle Supply Co.	Canada	North America
		Wheel Gallery	Southwest	North America
		Yellow Bicycle Company	Central	North America
		Better Bike Shop	Southeast	North America

Issue #3 with VLOOKUP & HLOOKUP

Name	CustID	Territory	Group
Pedals Warehouse	117	Southeast	North America
Latest Sports Equipm	146	Northwest	North America
Health Spa, Li	227	Canada	North America
	397	Northwest	North America
	442	Canada	North America
	511	Southwest	North America
Yellow Bicycle Company	646	Central	North America
Better Bike Shop	676	Southeast	North America

Lookup_value must be in the first column/row of table_array

Otherwise, must use the more complicated INDEX and MATCH functions

XLOOKUP to the Rescue

XLOOKUP(lookup_value, lookup_array, return_array, [if_not_found], [match_mode], [search_mode])

Argument	Description
lookup_value	The lookup value
lookup_array	The array or range to search
return_array	The array or range to return
[if_not_found]	Where a valid match is not found, return the [if_not_found] text you supply
	If a valid match is not found, and [if_not_found] is missing, #N/A will be returned
[match_mode]	Specify the match type:
	0 - Exact match. If none found, return #N/A. (default)
	-1 - Exact match. If none found, return the next smaller item
	1 - Exact match. If none found, return the next larger item
	2 - A wildcard match where *, ?, and ~ have special meaning
[search_mode]	Specify the search mode to use:
	1 - First to last (default)
	-1 - Last to first
	2 - Binary search, first to last (relies on lookup_array being sorted in ascending order) (faster search mode)
	-2 - Binary search, last to first (relies on lookup_array being sorted in descending order) (faster search mode)

Look_array and return_array, so lookup_value doesn't have to be 1st column/row

Ability to handle no match

Defaults to Exact match

Main Benefits of XLOOKUP

- Has all the speed improvements released to VLOOKUP in 2018
- No longer relies on col_index_num
  - Can select any column (left or right of lookup_array), eliminate most uses of INDEX/MATCH
  - Won't break if someone inserts or deletes columns in lookup_array
- Performance improvements because only need to specify 2 cloumns instead of the whole table_array
- Defaults to an exact match
- Provides array capabilities…it returns a range instead of a value
- Search_mode option
- Can allow wildcard matches in search

XLOOKUP Example

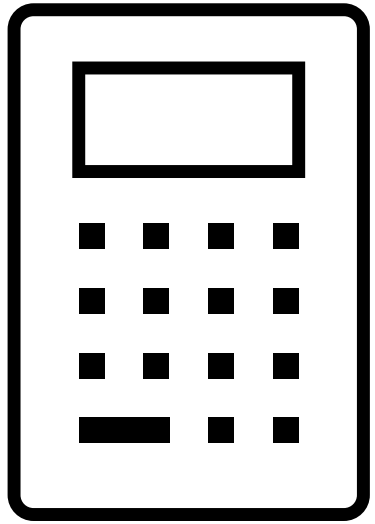
F4 =XLOOKUP([@CustNo],TblCustX[CustID],TblCustX[Name],"MISSING")

XLOOKUP(lookup_value, lookup_array, return_array, [if_not_found], [match_mode], [search_mode])

OrderNo	CustNo	Date	Total	SalesPNo	CustName	CustName TblCust2X
43659	676	7/1/2023	4079.99	279	Better Bike Shop	Better Bike Shop
43659	676	7/1/2023	80.75	279	Better Bike Shop	Better Bike Shop
43659	676	7/1/2023	2039.99	279	Better Bike Shop	Better Bike Shop
43660	150	7/1/2023	419.46	279	MISSING	MISSING
43661	442	7/1/2023	20.75	282	Original Bicycle Supply Co.	Original Bicycle Supply Co.
43661	442	7/1/2023	1637.4	282	Original Bicycle Supply Co.	Original Bicycle Supply Co.
43661	442	7/1/2023	4079.99	282	Original Bicycle Supply Co.	Original Bicycle Supply Co.
43661	442	7/1/2023	40.37	282	Original Bicycle Supply Co.	Original Bicycle Supply Co.
43662	227	7/1/2023	1258.38	282	Health Spa, Limited	Health Spa, Limited
43662	227	7/1/2023	367.88	282	Health Spa, Limited	Health Spa, Limited

CustID	Name	Territory	Group
117	Pedals Warehouse	Southeast	North America
146	Latest Sports Equipment	Northwest	North America
227	Health Spa, Limited	Canada	North America
397	Capable Sales and Service	Northwest	North America
442	Original Bicycle Supply Co.	Canada	North America
511	Wheel Gallery	Southwest	North America
646	Yellow Bicycle Company	Central	North America
676	Better Bike Shop	Southeast	North America

SUBTOTAL



SUBTOTAL & AGGREGATE Functions

- SUBTOTAL(function_num, ref1, ref2, ...)
  - Subtotals values
  - Does NOT include other SUBTOTAL in range
- AGGREGATE(function_num, options, ref1, [ref2], …)
  - Like SUBTOTAL with the option to ignore hidden rows and error values

SUBTOTAL Functions Syntax

SUBTOTAL = SUBTOTAL(function_num, ref1, ref2, ...)

Used to calculate a range that is filtered

Function_num (includes hidden values)	Function_num (ignores hidden values)	Function
1	101	AVERAGE
2	102	COUNT
3	103	COUNTA
4	104	MAX
5	105	MIN
6	106	PRODUCT
7	107	STDEV
8	108	STDEVP
9	109	SUM
10	110	VAR
11	111	VARP

Designed for Columns NOT Rows

AGGREGATE Function Syntax

AGGREGATE(function_num, options, ref1, [ref2], …)

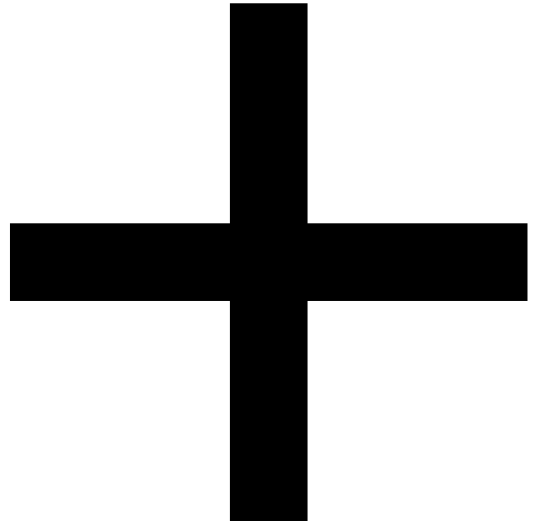
More options than the SUBTOTAL function

AGGREGATE(function_num, options, ref1, [ref2], …)			
Function_num	**Function**	**Options**	**Behavior**
1	AVERAGE	0 or omitted	Ignore nested SUBTOTAL and AGGREGATE functions
2	COUNT	1	Ignore hidden rows, nested SUBTOTAL and AGGREGATE functions
3	COUNTA	2	Ignore error values, nested SUBTOTAL and AGGREGATE functions
4	MAX	3	Ignore hidden rows, error values, nested SUBTOTAL and AGGREGATE functions
5	MIN	4	Ignore nothing
6	PRODUCT	5	Ignore hidden rows
7	STDEV.S	6	Ignore error values
8	STDEV.P	7	Ignore hidden rows and error values
9	SUM		
10	VAR.S		
11	VAR.P		
12	MEDIAN		
13	MODE.SNGL		
14	LARGE		
15	SMALL		
16	PERCENTILE.INC		
17	QUARTILE.INC		
18	PERCENTILE.EXC		
19	QUARTILE.EXC		

SUBTOTAL & AGGREGATE Examples

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	AGGREGATE(function_num, options, ref1, [ref2], ...)				**Aggregate OPTIONS:**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2						#DIV/0!	#DIV/0!	24,673	24,673	#DIV/0!	#DIV/0!	24,673	24,673
3													
4					**Math Function:**	#DIV/0!	(289)	63	429,273				
6					**Subtotal Function:**	**Sum**	**Avg**	**Count**	**Max**				
7	SUBTOTAL(function_num, ref1, ref2, ...)					#DIV/0!	(289)	63	429,273				
8													
9	**Desc**	**Location**	**Department**	**Class**	**Sub-Class**	**Qtr_01**	**Qtr_02**	**Qtr_03**	**Qtr_04**				
10	Sales-Retail-Denver	Denver	Retail	Revenue	Sales	(137,258)	(140,456)	(143,729)	(147,078)				
11	Sales-Wholesale-Denver	Denver	Wholesale	Revenue	Sales	#DIV/0!	(44,002)	(45,027)	(46,076)				
12	Sales-Wholesale IC	Denver	Wholesale IC	Revenue	Sales	(509,030)	(512,018)	(512,103)	(515,128)				
13	Sales-Retail-S.F.	San Francisco	Retail	Revenue	Sales	(124,581)	(127,484)	(130,454)	(133,494)				
14	Sales-Wholesale-S.F.	San Francisco	Wholesale	Revenue	Sales	(41,760)	(42,733)	(43,729)	(44,748)				
15	Sales-Service-Lab-S.F.	San Francisco	Lab	Revenue	Sales	(22,600)	(23,127)	(23,655)	(24,217)				
16	Sales-Service-Studio-S.F.	San Francisco	Studio	Revenue	Sales	(14,000)	(14,326)	(14,660)	(15,002)				
17	Sales-Wholesale IC (Elimination)	Denver	Wholesale IC	Revenue	Sales	-	-	-	-				
18	Sales Returns-Retail-Denver	Denver	Retail	Revenue	Sales Returns	3,850	3,940	4,032	4,125				
19	Sales Returns-Retail-S.F.	San Francisco	Retail	Revenue	Sales Returns	3,521	3,603	3,687	3,773				
20	Sales Discounts-Retail-Denver	Denver	Retail	Revenue	Sales Discounts	12,832	13,131	13,437	13,750				
21	Sales Discounts-Retail-S.F.	San Francisco	Retail	Revenue	Sales Discounts	11,737	12,010	12,290	12,577				
22	COGS-Retail-Denver	Denver	Retail	Costs of Goods	Costs of Goods	94,200	96,395	98,641	100,939				
23	COGS-Wholesale-Denver	Denver	Wholesale	Costs of Goods	Costs of Goods	29,500	30,187	30,891	31,610				
24	COGS-Wholesale IC	Denver	Wholesale IC	Costs of Goods	Costs of Goods	424,192	426,682	426,753	429,273				
25	COGS-Retail-S.F.	San Francisco	Retail	Costs of Goods	Costs of Goods	85,300	87,287	89,321	91,402				
26	COGS-Wholesale-S.F.	San Francisco	Wholesale	Costs of Goods	Costs of Goods	31,200	31,927	32,671	33,432				

SUMIF(S)



Math Functions

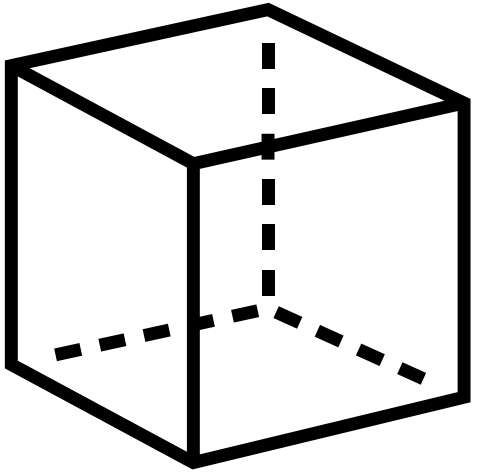
- SUMIF(range, criteria, [sum_range])
  - Adds the cells specified by a given criteria
- SUMIFS(sum_range, criteria_range1, criteria1, [criteria_range2, criteria2], …)
  - Adds the cells in a range that meet multiple criteria

SUMIF(S) Example

	A	B	C	D
1	**SUMIF Math Functions**			
2	**Function**	**Syntax**	**FORMULATEXT**	**Result**
3	SUMIF	SUMIF(range, criteria, [sum_range])	=SUMIF(H3:H28,"=Marketing",J3:J28)	$ 165,427
4			=SUMIF(I3:I28,"=Part-Time",J3:J28)	$ 110,000
5			=SUMIF(L3:L28,2019,J3:J28)	$ 375,939
6			=SUMIF(J:J,">100000")	$ 225,321
7				
8	SUMIFS	SUMIFS(sum_range, criteria_range1, criteria1, [criteria_range2, criteria2], ...)	=SUMIFS(J3:J28,I3:I28,"=Full-Time",H3:H28,"=Sales")	$ 499,833
9				
10				
11				
12		**Input**		
13	**Dept =**	Administration	=SUMIF(TblEE[Department],B13,TblEE[Current Salary])	$ 208,000
14	**Status =**	Full-Time	=SUMIFS(TblEE[Current Salary], TblEE[Department],B13,TblEE[Status],B14)	$ 98,000
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				

Last Name	First Name	Department	Status	Current Salary	Date Hired	Year Hired
Allen	Yolanda	Sales	Full-Time	$ 105,321	3/5/2013	2013
Baker	Nancy	Operations	Contract	$ 75,374	4/16/2018	2018
Bunnel	Ken	Marketing	Full-Time	$ 45,427	12/1/2019	2019
Champ	Larry	Administration	Part-Time	$ 18,000	9/16/2014	2014
Cramden	Moe	Administration	Part-Time	$ 18,000	3/12/2016	2016
Davis	Rita	Administration	Full-Time	$ 28,000	4/15/2020	2020
Dunwell	James	Operations	Full-Time	$ 45,639	2/9/2015	2015
Ellis	Pamela	Sales	Full-Time	$ 98,512	3/24/2019	2019
Endow	Ed	Data Processing	Contract	$ 65,321	11/12/2018	2018
Perry	Adam	Sales	Full-Time	$ 95,000	3/5/2013	2013
Hernandez	Albert	Operations	Contract	$ 120,000	4/16/2018	2018
Jackson	Austin	Marketing	Full-Time	$ 75,000	12/1/2019	2019
Gill	Beth	Administration	Part-Time	$ 15,000	9/16/2014	2014
Brooks	Bill	Administration	Part-Time	$ 15,000	3/12/2016	2016
Moreno	Billy	Administration	Full-Time	$ 35,000	3/5/2013	2013
Alonso	Carrie	Operations	Full-Time	$ 58,000	4/16/2018	2018
Gill	Casey	Sales	Full-Time	$ 65,000	12/1/2019	2019
Verlander	Justin	Data Processing	Contract	$ 73,500	9/16/2014	2014
Scherzer	Max	Sales	Full-Time	$ 66,000	3/12/2016	2016
Cabrera	Miguel	Operations	Contract	$ 50,000	4/15/2020	2020
Infante	Omar	Marketing	Full-Time	$ 45,000	2/9/2015	2015
Farbill	Oscar	Administration	Part-Time	$ 22,000	3/24/2019	2019
Fielder	Prince	Administration	Part-Time	$ 22,000	11/12/2018	2018
Sanchez	Raymond	Administration	Full-Time	$ 35,000	3/5/2013	2013
Hunter	Tori	Operations	Full-Time	$ 47,000	4/16/2018	2018
Martinez	Victor	Sales	Full-Time	$ 70,000	12/1/2019	2019

Array Formulas



What is an Array Formula?

Think	You can think of an array as a combination of rows and columns of values
Perform	An array formula can perform multiple calculations on one or more items in an array
Return	Array formulas can return either multiple results, or a single result

Important Note About Array Formulas

- Microsoft 365 Excel versions you can press Enter for array formulas
- ALL other Excel versions require legacy array formulas entry, which requires you to press Ctrl+Shift+Enter
- Due to the difficulty of building training material for ALL versions, I will only be covering Microsoft 365 Excel versions
- If you have other versions, please use the links in the upper right for details on legacy array formulas

Example of a Single-Cell Array Formula

Cust#	Customer Name	Product Name	Qty	Unit Price	Total	
33930	Justin A Robinson	ML Mountain Tire	77	$29.99	$2,309.23	
50470	Tamara Zhu	Patch Kit/8 Patches	238	$2.29	$545.02	
43580	Nicole White	Road Tire Tube	15	$3.99	$59.85	
42860	Nancy L Sanchez	Road-250 Red, 48	5	$2,443.35	$12,216.75	
45800	Reginald Navarro	Sport-100 Helmet, Blue	50	$34.99	$1,749.50	
14170	Autumn Zhu	Touring Tire	150	$28.99	$4,348.50	
43580	Nicole White	LL Road Tire	110	$21.49	$2,363.90	
21840	Denise Mehta	Mountain-200 Black, 42	18	$2,049.09	$36,883.62	
50470	Tamara Zhu	Mountain-200 Silver, 42	13	$2,319.99	$30,159.87	
14170	Autumn Zhu	Touring Tire Tube	23	$4.99	$114.77	
45800	Reginald Navarro	Touring-1000 Blue, 46	12	$2,384.07	$28,608.84	
	Grand Total		**711**		**$119,359.85**	=SUM(F2:F12)
					Non-Array Formula	
				$119,359.85	=SUM(D2:D12*E2:E12)	
				Array Formula		

Non-Array formula, to calculate Grand Total, need to have a calculation for each row that is Qty * Unit Price

An Array formula is a calculation in a single cell that performs Qty * Unit Price row by row without the need for a Total column

Example of a Multi-Cell Array Formula

Cust#	Customer Name	Product Name	Qty	Unit Price	Total		Array Spill	
33930	Justin A Robinson	ML Mountain Tire	77	$29.99	$2,309.23	=D2*E2	$2,309.23	=D2:D12*E2:E12
50470	Tamara Zhu	Patch Kit/8 Patches	238	$2.29	$545.02	=D3*E3	$545.02	
43580	Nicole White	Road Tire Tube	15	$3.99	$59.85	=D4*E4	$59.85	
42860	Nancy L Sanchez	Road-250 Red, 48	5	$2,443.35	$12,216.75	=D5*E5	$12,216.75	
45800	Reginald Navarro	Sport-100 Helmet, Blue	50	$34.99	$1,749.50	=D6*E6	$1,749.50	
14170	Autumn Zhu	Touring Tire	150	$28.99	$4,348.50	=D7*E7	$4,348.50	
43580	Nicole White	LL Road Tire	110	$21.49	$2,363.90	=D8*E8	$2,363.90	
21840	Denise Mehta	Mountain-200 Black, 42	18	$2,049.09	$36,883.62	=D9*E9	$36,883.62	
50470	Tamara Zhu	Mountain-200 Silver, 42	13	$2,319.99	$30,159.87	=D10*E10	$30,159.87	
14170	Autumn Zhu	Touring Tire Tube	23	$4.99	$114.77	=D11*E11	$114.77	
45800	Reginald Navarro	Touring-1000 Blue, 46	12	$2,384.07	$28,608.84	=D12*E12	$28,608.84	
	Grand Total		**711**		**$119,359.85**	=SUM(F2:F12)		
					Non-Array Formula			
				$119,359.85	=SUM(D2:D12*E2:E12)			
				Array Formula				

Enter a formula in a single cell but refer to a Range and it will SPILL to remaining cells

If there is an entry in one of these cells, you will get a #SPILL! error

Using Array Formula SPILL Range

Cust#	Customer Name	Product Name	Qty	Unit Price	Total	Array Spill	Tax		Total	
33930	Justin A Robinson	ML Mountain Tire	77	$29.99	$2,309.23	$2,309.23	$138.55	=H2#*0.06	$2,447.78	=H2#+J2#
50470	Tamara Zhu	Patch Kit/8 Patches	238	$2.29	$545.02	$545.02	$32.70		$577.72	
43580	Nicole White	Road Tire Tube	15	$3.99	$59.85	$59.85	$3.59		$63.44	
42860	Nancy L Sanchez	Road-250 Red, 48	5	$2,443.35	$12,216.75	$12,216.75	$733.01		$12,949.76	
45800	Reginald Navarro	Sport-100 Helmet, Blue	50	$34.99	$1,749.50	$1,749.50	$104.97		$1,854.47	
14170	Autumn Zhu	Touring Tire	150	$28.99	$4,348.50	$4,348.50	$260.91		$4,609.41	
43580	Nicole White	LL Road Tire	110	$21.49	$2,363.90	$2,363.90	$141.83		$2,505.73	
21840	Denise Mehta	Mountain-200 Black, 42	18	$2,049.09	$36,883.62	$36,883.62	$2,213.02		$39,096.64	
50470	Tamara Zhu	Mountain-200 Silver, 42	13	$2,319.99	$30,159.87	$30,159.87	$1,809.59		$31,969.46	
14170	Autumn Zhu	Touring Tire Tube	23	$4.99	$114.77	$114.77	$6.89		$121.66	
45800	Reginald Navarro	Touring-1000 Blue, 46	12	$2,384.07	$28,608.84	$28,608.84	$1,716.53		$30,325.37	
	Grand Total		**711**		**$119,359.85**					
					Non-Array Formula					
				$119,359.85	=SUM(D2:D12*E2:E12)					
				Array Formula						

Use # to refer to the Spill Range in another calculation & that formula will also Spill

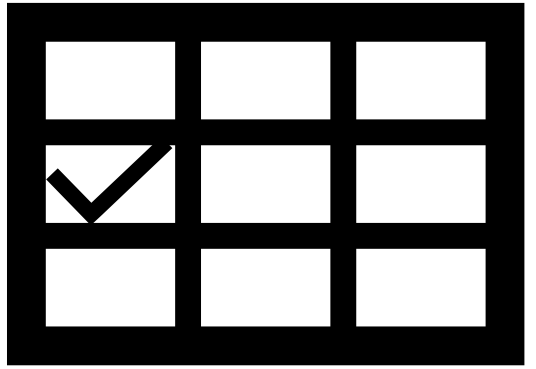
New Dynamic Array Formulas

N2 =SORT(A2:F12,1)

	N	O	P	Q	R	S
1	SORT Function					
2	14170	Autumn Z	Touring Tir	150	28.99	4348.5
3	14170	Autumn Z	Touring Tir	23	4.99	114.77
4	21840	Denise Me	Mountain-	18	2049.09	36883.62
5	33930	Justin A Rc	ML Mount	77	29.99	2309.23
6	42860	Nancy L Sa	Road-250 I	5	2443.35	12216.75
7	43580	Nicole Wh	Road Tire T	15	3.99	59.85
8	43580	Nicole Wh	LL Road Tir	110	21.49	2363.9
9	45800	Reginald N	Sport-100	50	34.99	1749.5
10	45800	Reginald N	Touring-1C	12	2384.07	28608.84
11	50470	Tamara Zł	Patch Kit/8	238	2.29	545.02
12	50470	Tamara Zł	Mountain-	13	2319.99	30159.87

Dynamic Array Formulas automatically SPILL the entire range!!

Data Validations



Data Validation in Excel

Define restrictions on what data can or should be entered in a cell

Provide messages to define what input you expect

Prevent or warn users of invalid data

Restrict data to:

- Predefined list
- Date/time range,
- Number range
- Text size
- Formula

Data Validation Example

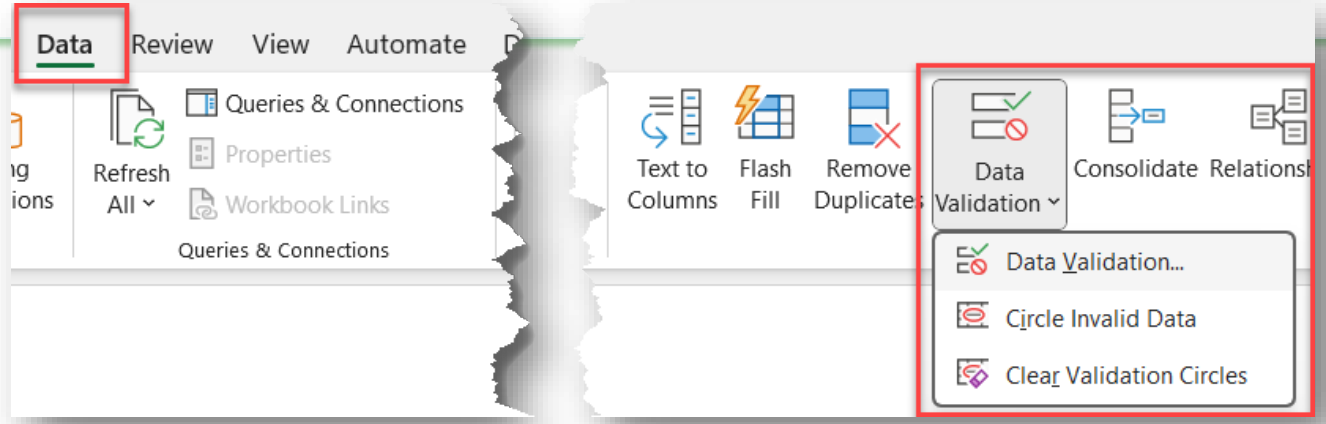
Data Entry Cells

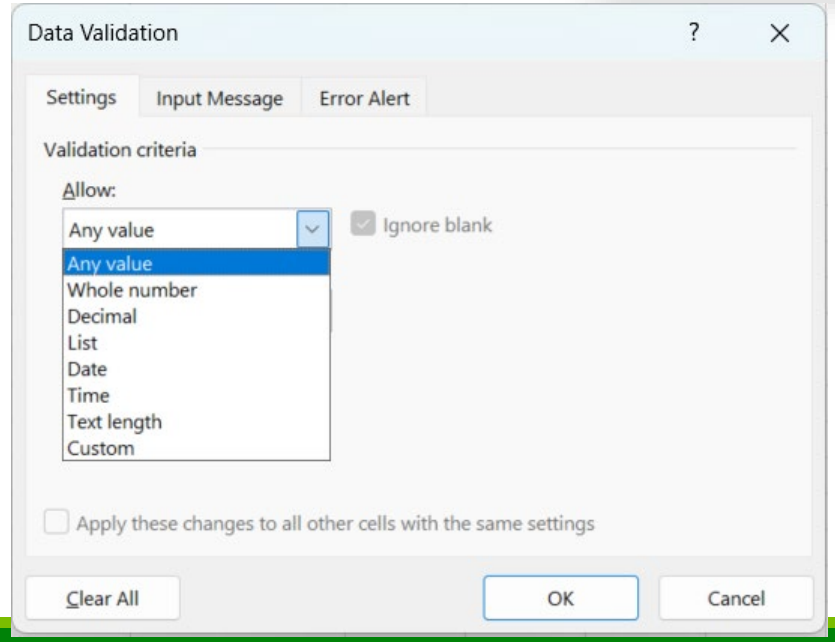
Data Entry Requirements

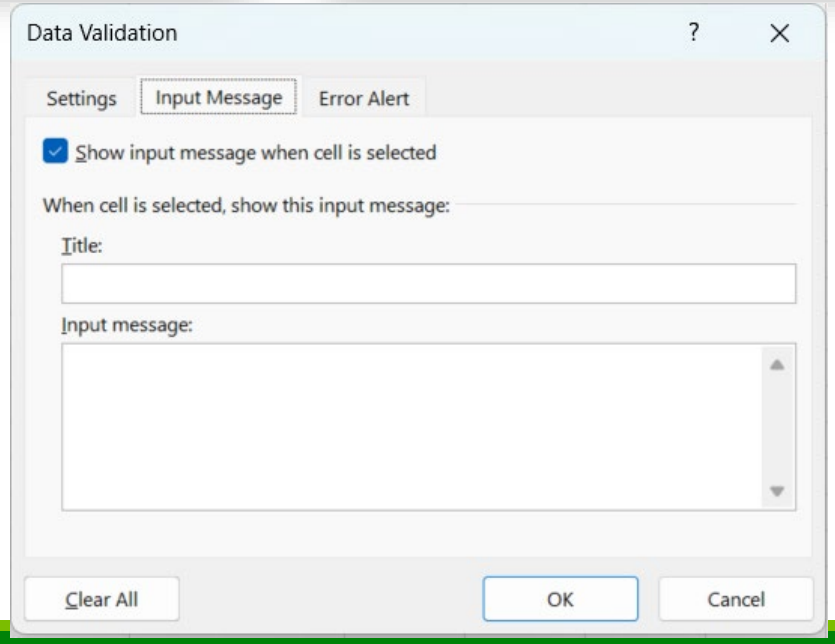
Selection Lists

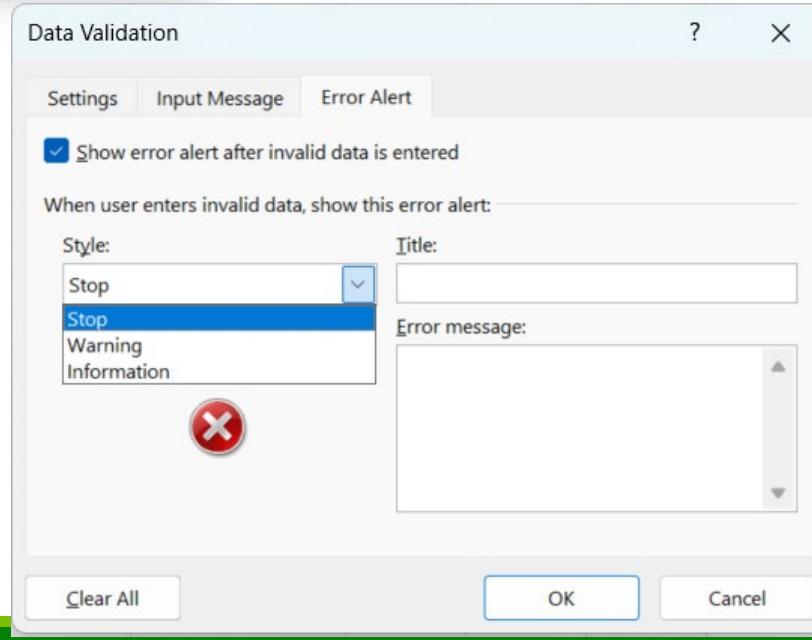
	A	B	C	D	E	F	G	H	I
1								Territories	
2		**Enter Data:**	**Data Validation Requirements:**		**Continent**		**Europe**	**NorthAmerica**	**Pacific**
3	**CustID:**		---> Special format		Europe		France	Canada	Australia
4	**Name:**		---> Limit # of characters		North America		Germany	Central	Japan
5	**Continent:**		---> Drop-Down list of valid entries		Pacific		Italy	Northeast	Philippines
6	**Territory:**		---> Lookup based on Territory				Spain	Northwest	Taiwan
7							United Kingdom	Southeast	
8								Southwest	
9									

Data Validation Dialog Box and Options

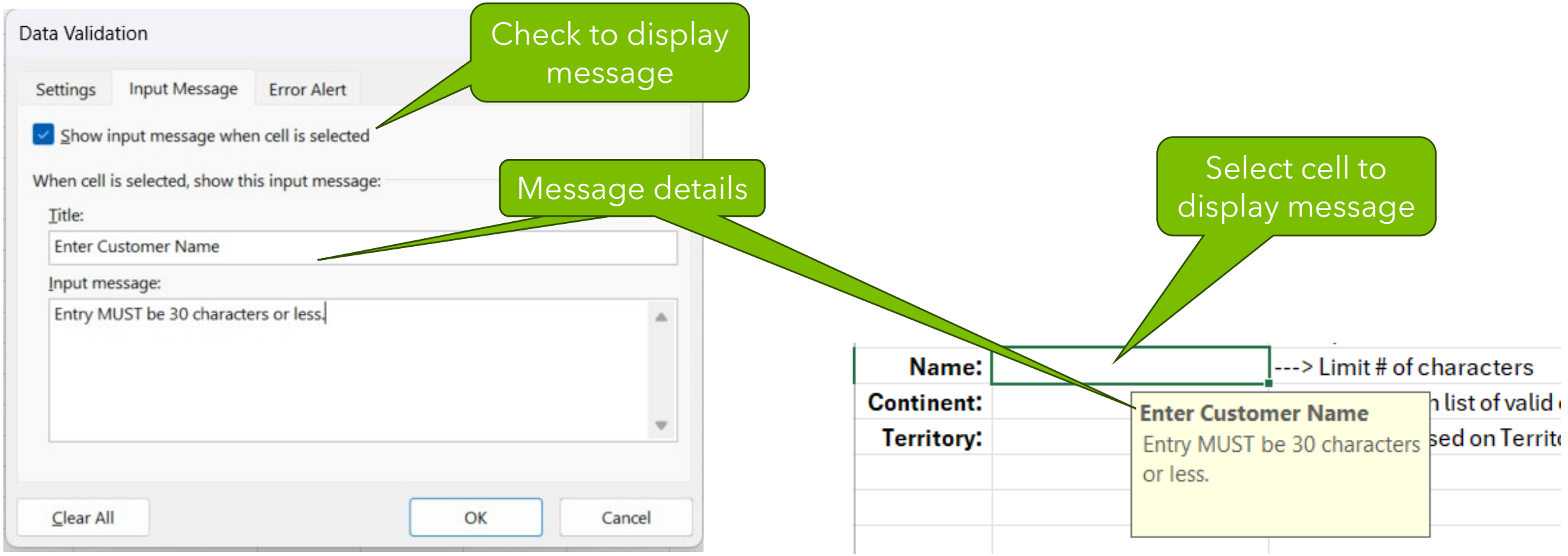




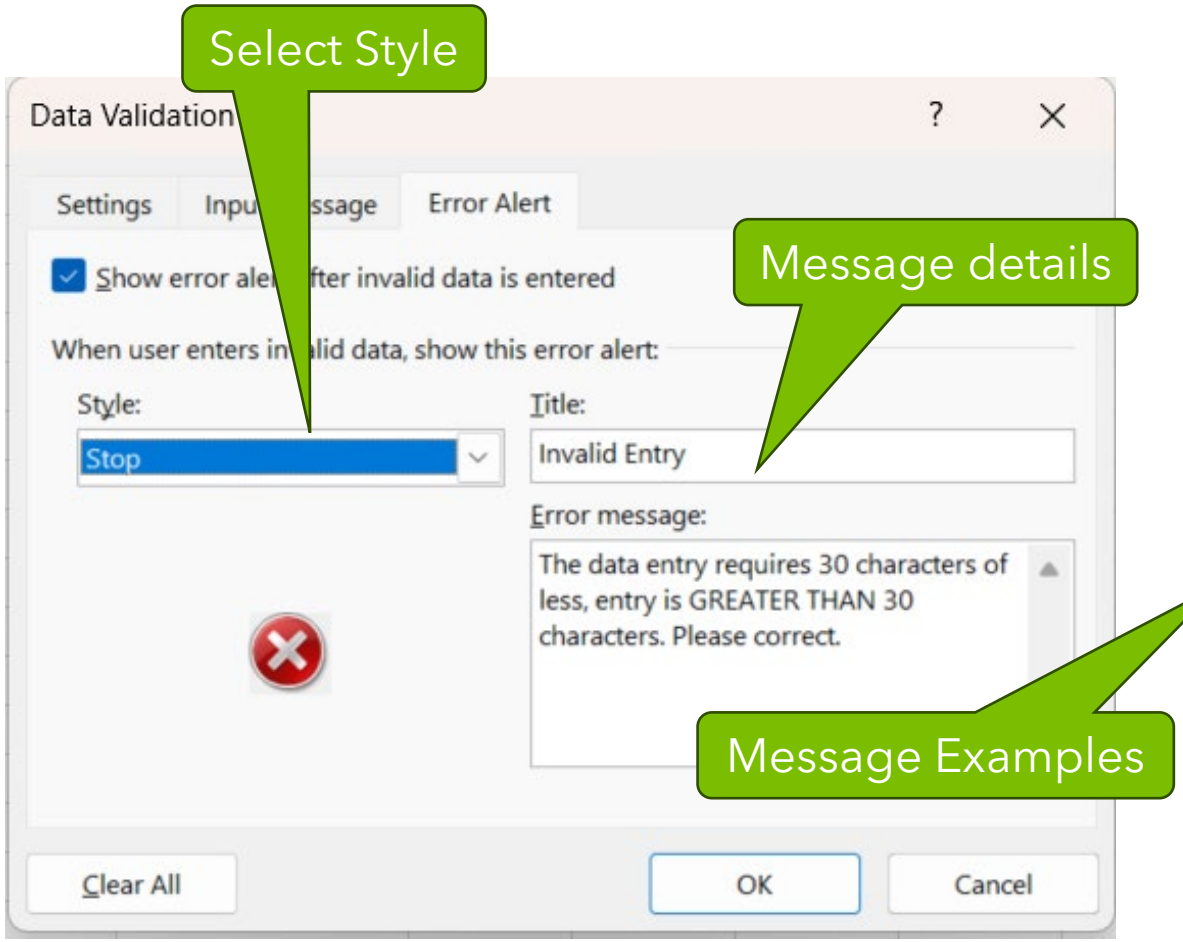




Input Message

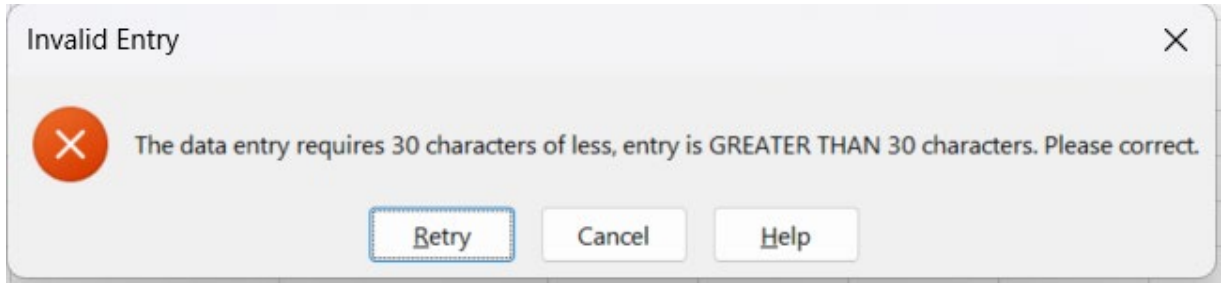


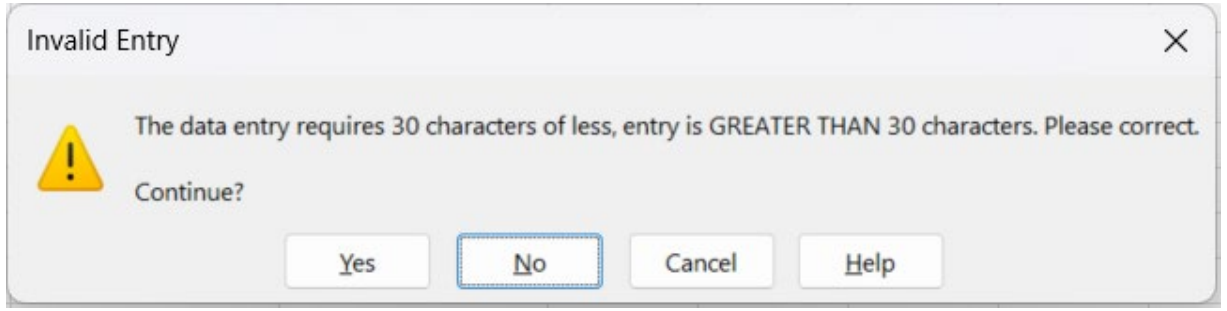
Error Alert

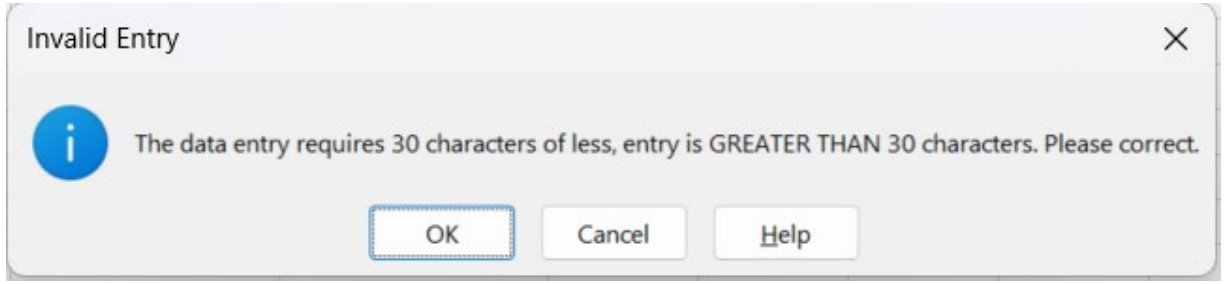


Message details

Message Examples



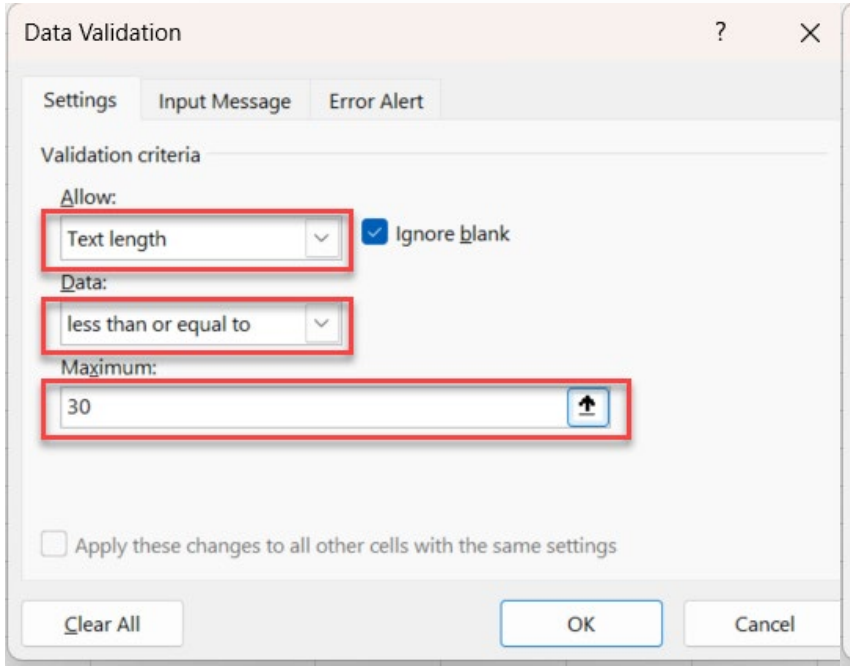


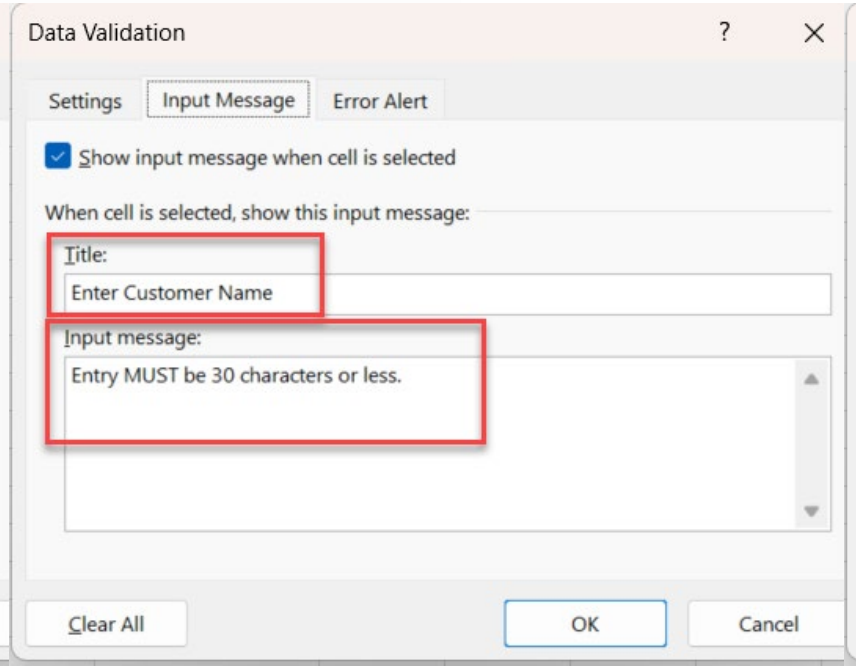


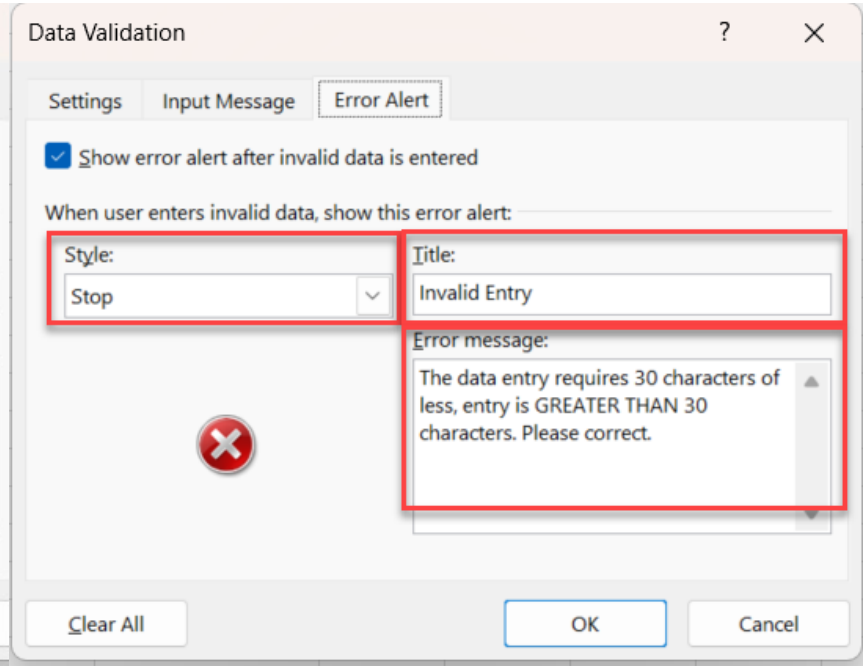
Name Field Example – Limit # of Characters to 30

	Enter Data:	Data Validation Requirements:
CustID:		---> Special format
Name:		---> Limit # of characters
Continent:		---> Drop-Down list of valid entries

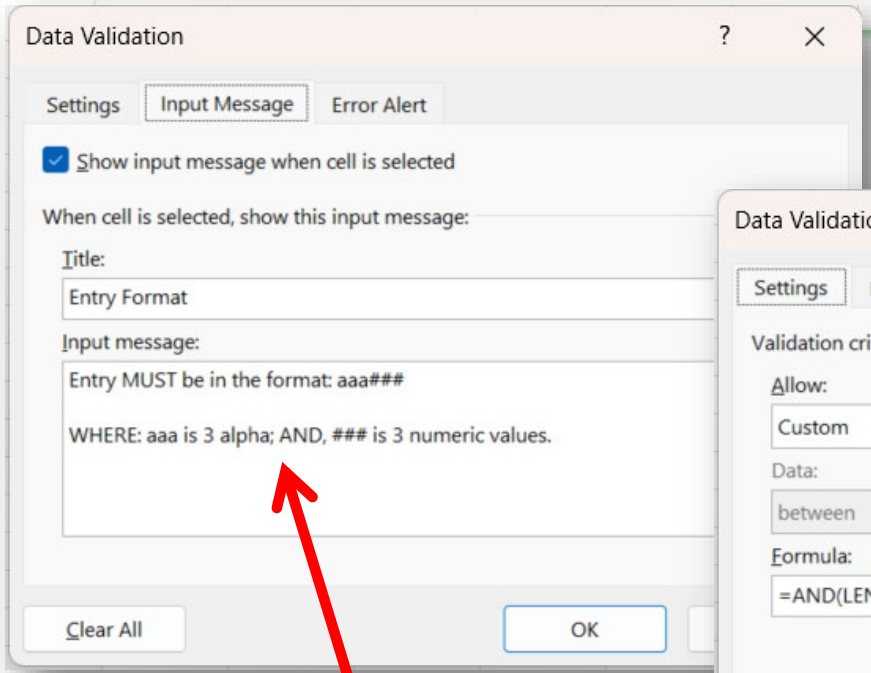
Select Cell > Data > Data Validation

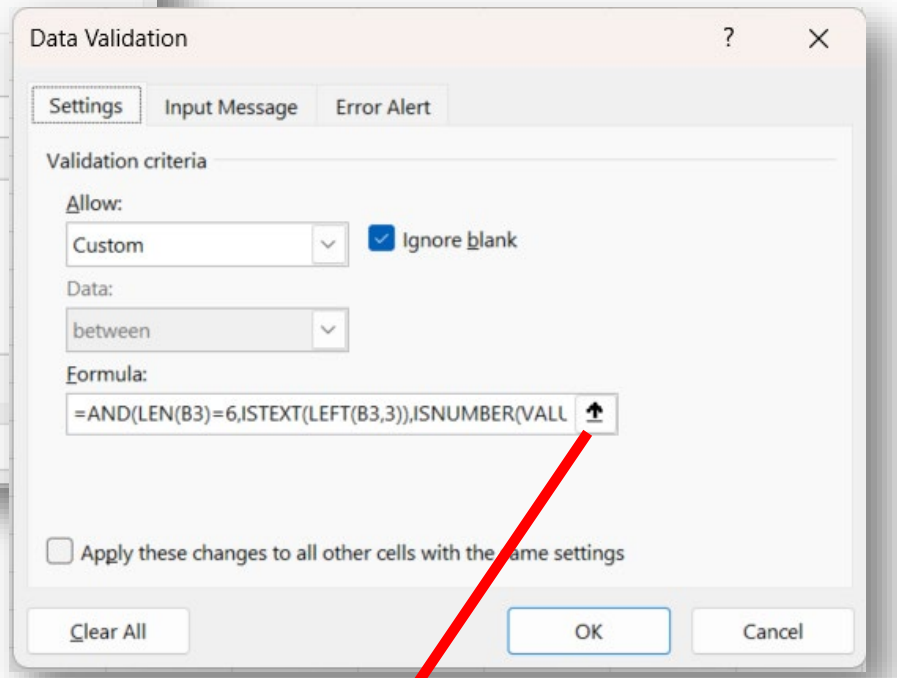


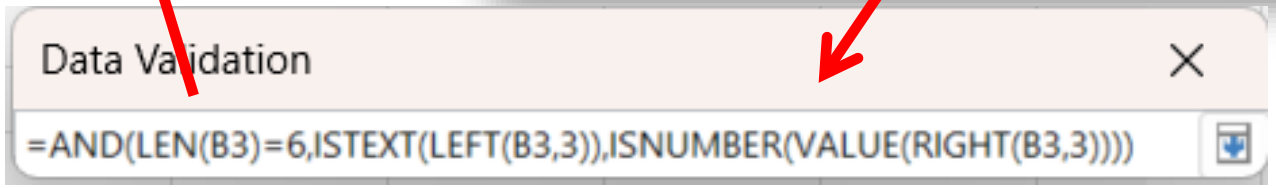


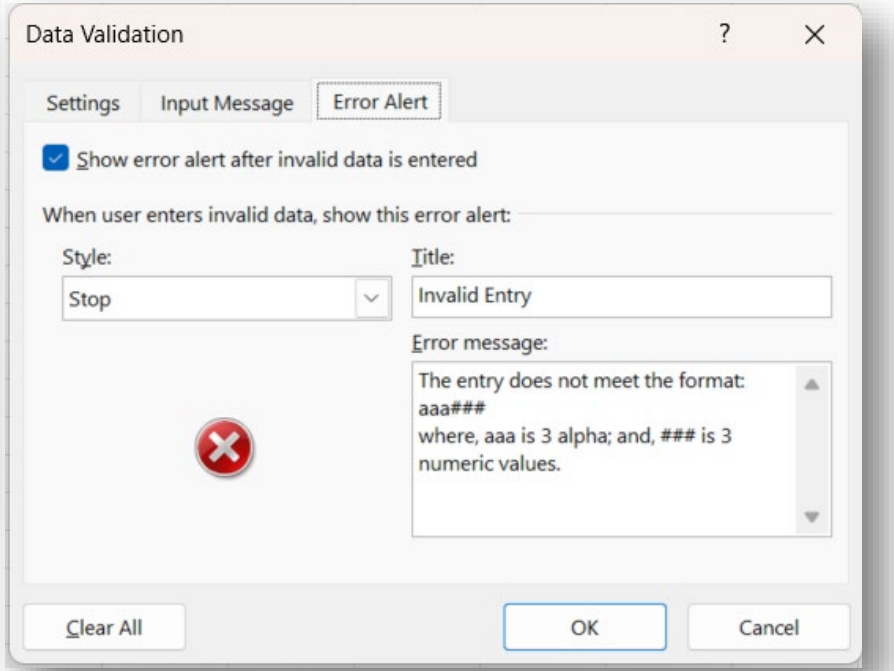


Customer ID Example – Formula for Special Format





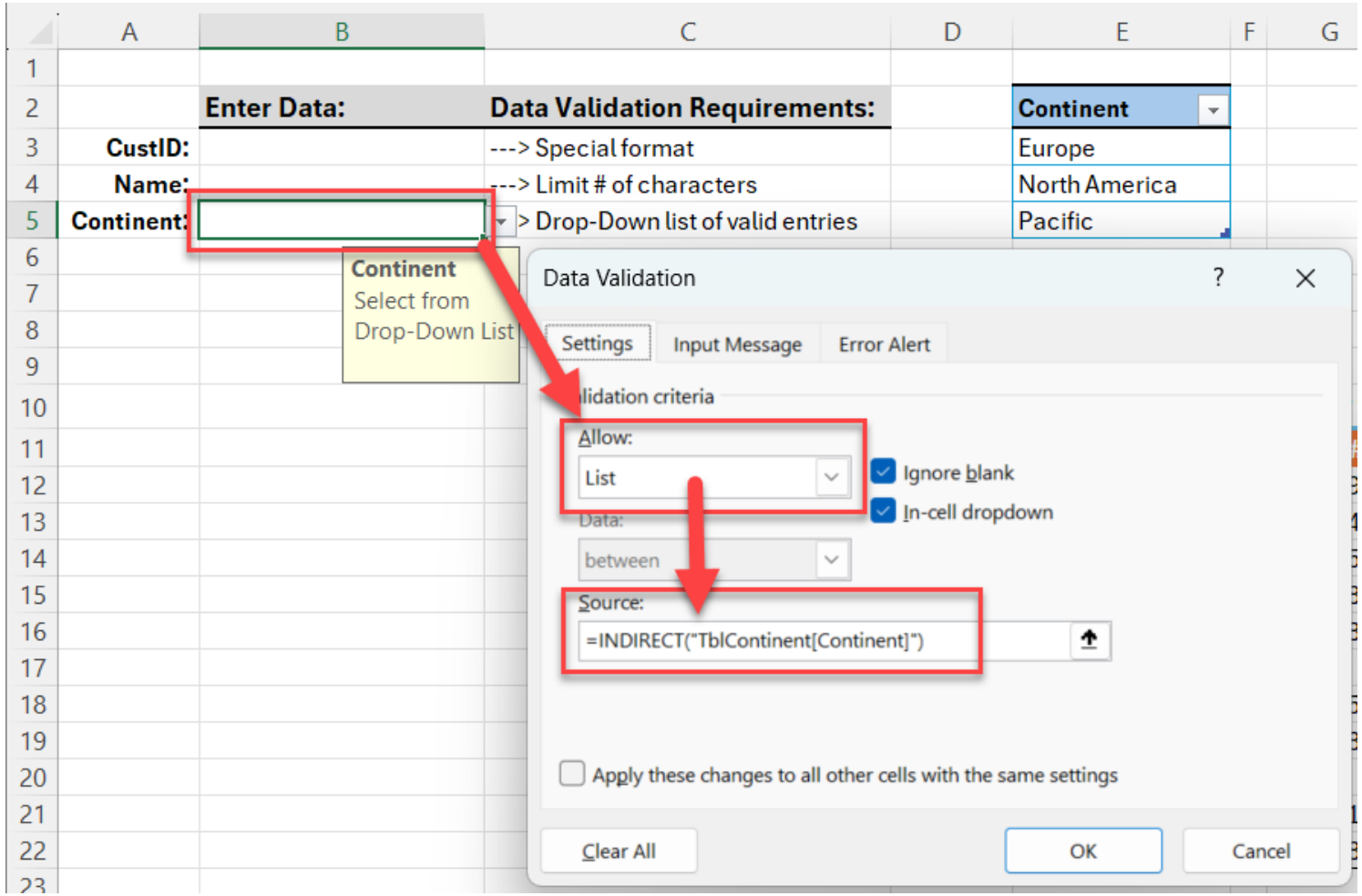




Continent Example – Select from a Drop-down List

Best Practice		
	Create List	
	Make list an Excel Table	Allows list to auto-expands
	Create Data Validation where source uses INDIRECT	Data Validation source doesn't allow table names
	=INDIRECT("Table[Column]")	Here =INDIRECT("TblContinent[Continent]")

Data Validation – List



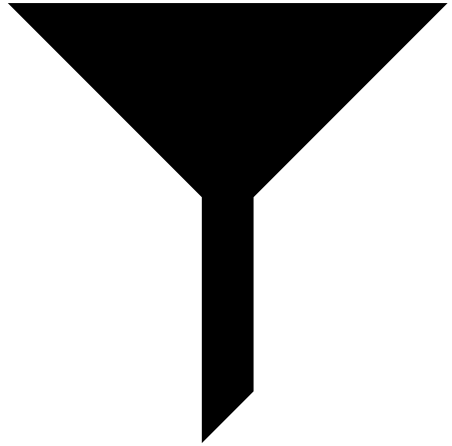
Data Validation Note

Input messages and error alerts appear only when data is typed directly into the cells

- They do not appear under the following conditions:
  - Pasting values into cell or using the fill command
  - A formula in the cell calculates a result that is not valid
  - A macro enters invalid data in the cell

If you apply Data Validation to cells that already have data, does not notify you of invalid data (use Circle Invalid Data)

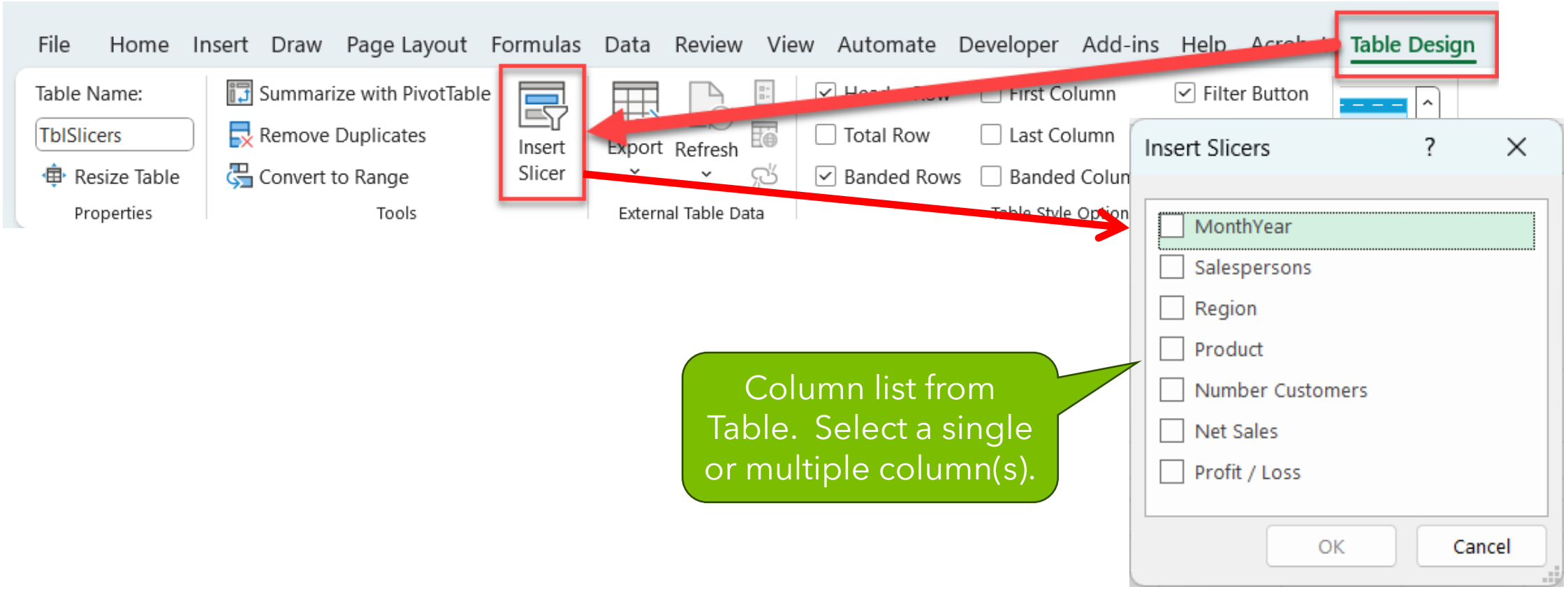
Slicers



What Are Slicers?

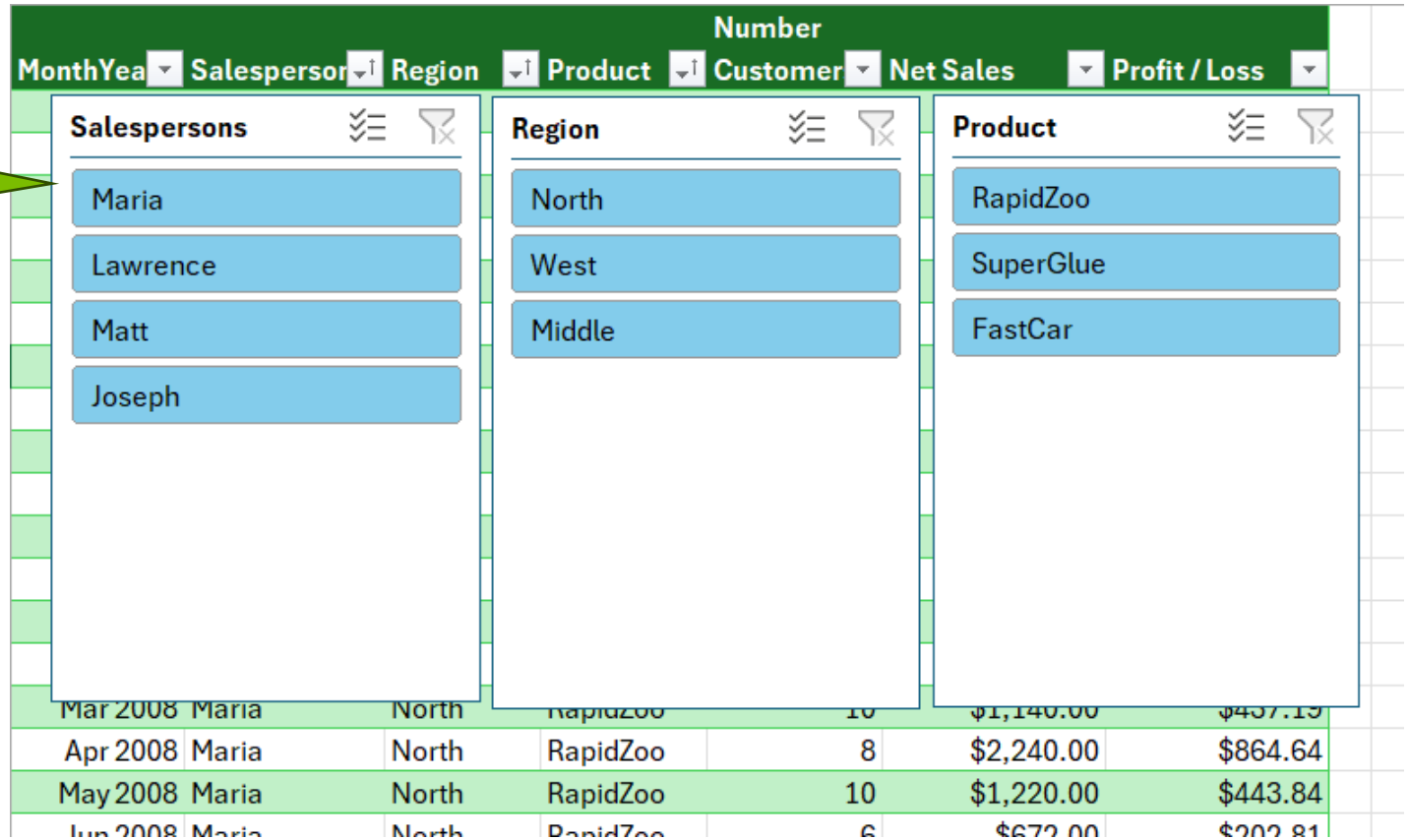
- A filtering tool in Excel
- Easily filter data in Tables, PivotTables and PivotCharts
- User-friendly interface, don't have to use the drop-down button on columns
- "Button-like" interface that indicate current filtering state
- "Buttons" are automatically created and updated base on data
- Options to change the look of individual slicers

Insert Slicer(s)

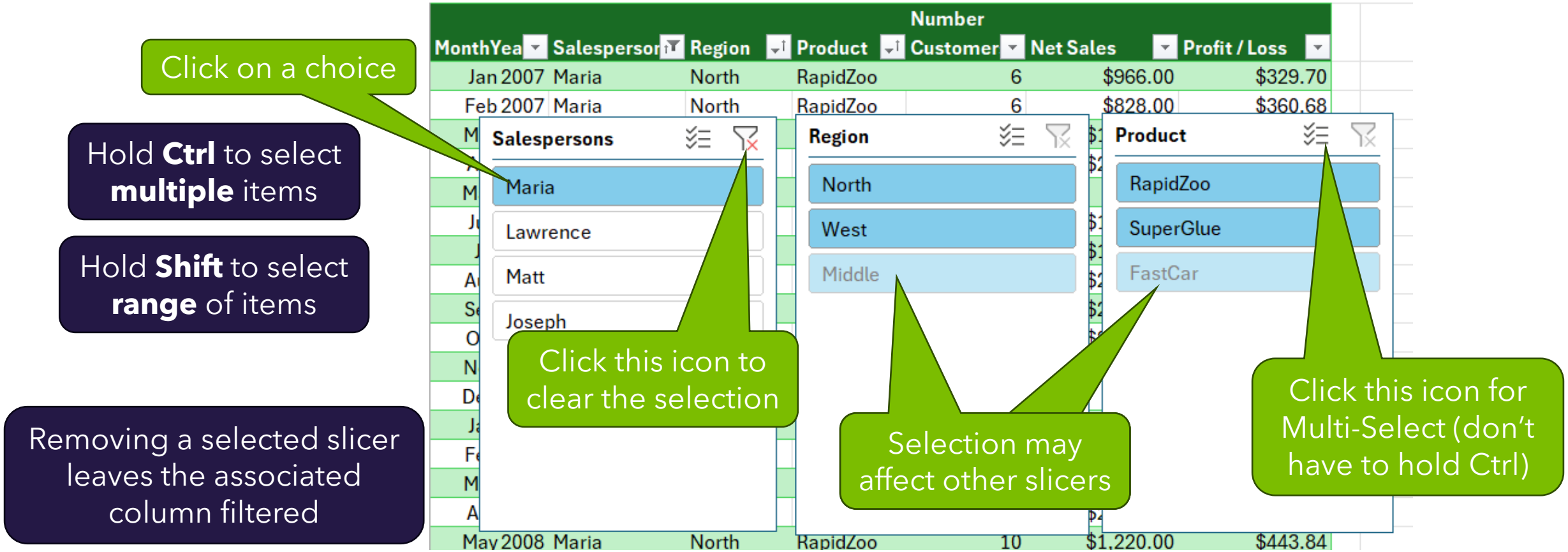


Inserted Slicers

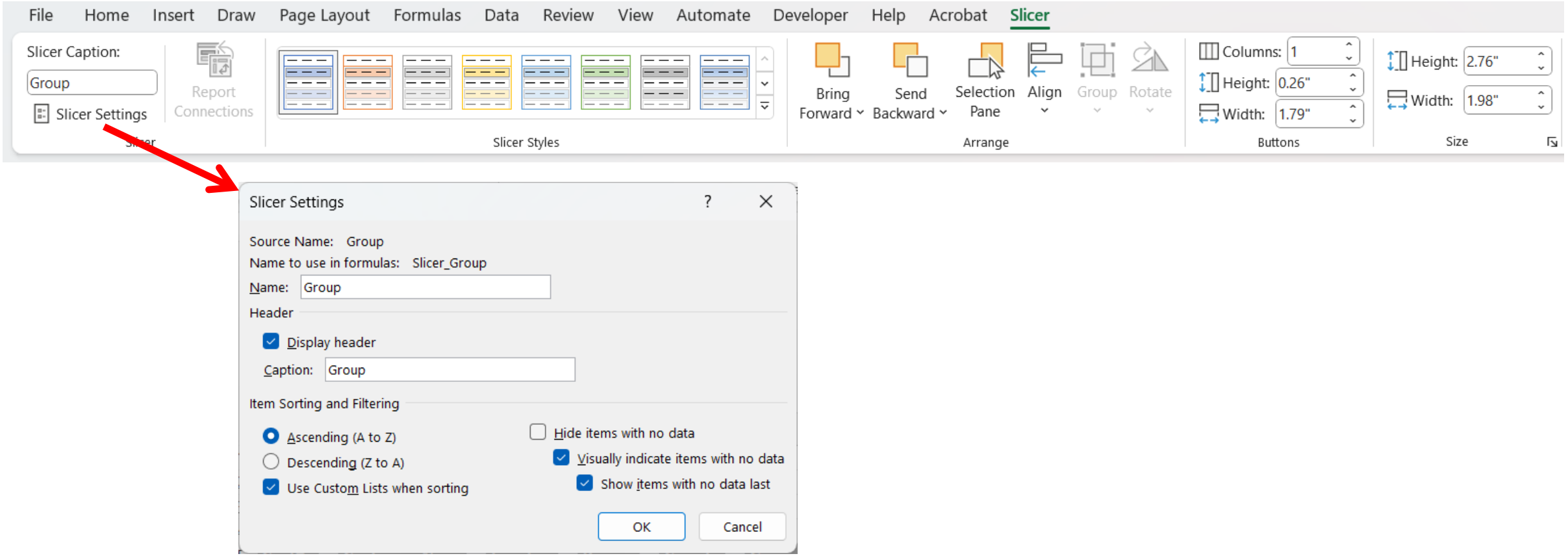
Slicers can be moved, resized and "float" anywhere on the sheet



Using Slicers

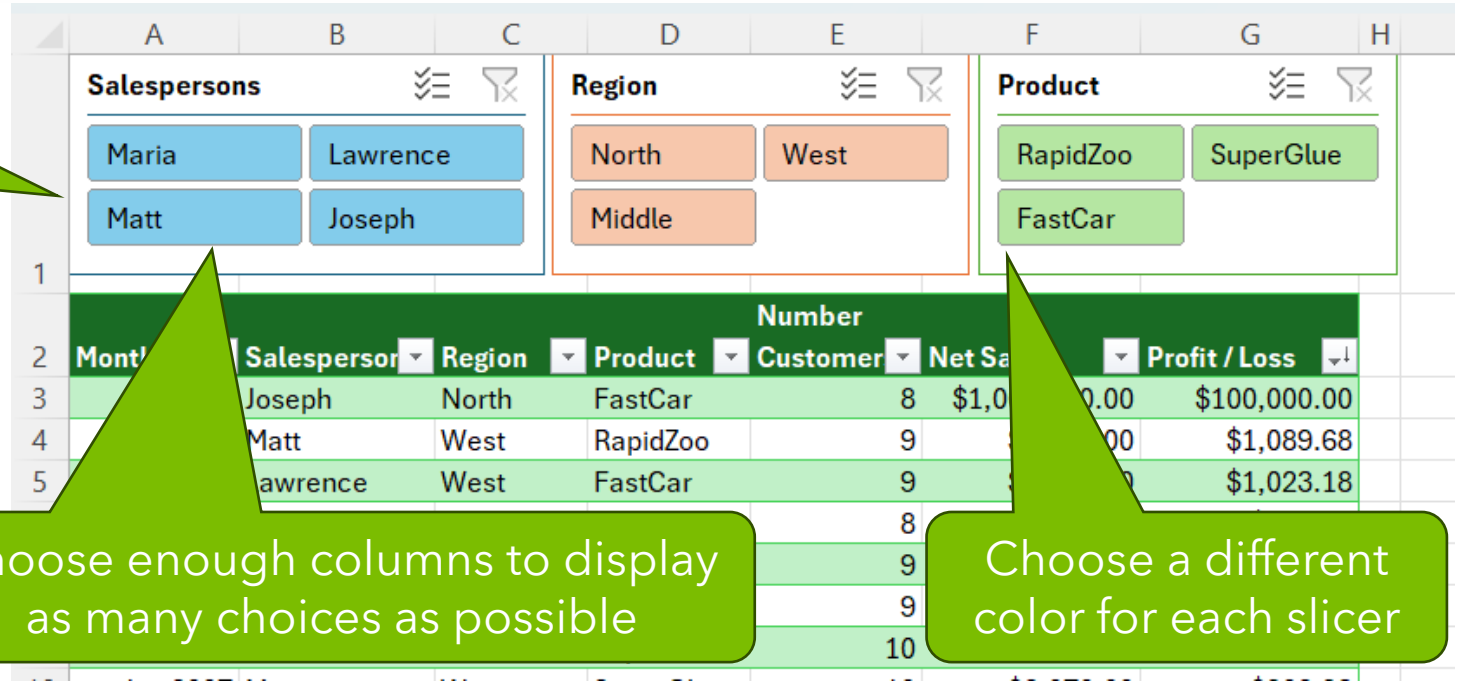


Customizing Slicers



Best Practice for Slicers

Add above data & make row size to fit sliders



Choose enough columns to display as many choices as possible

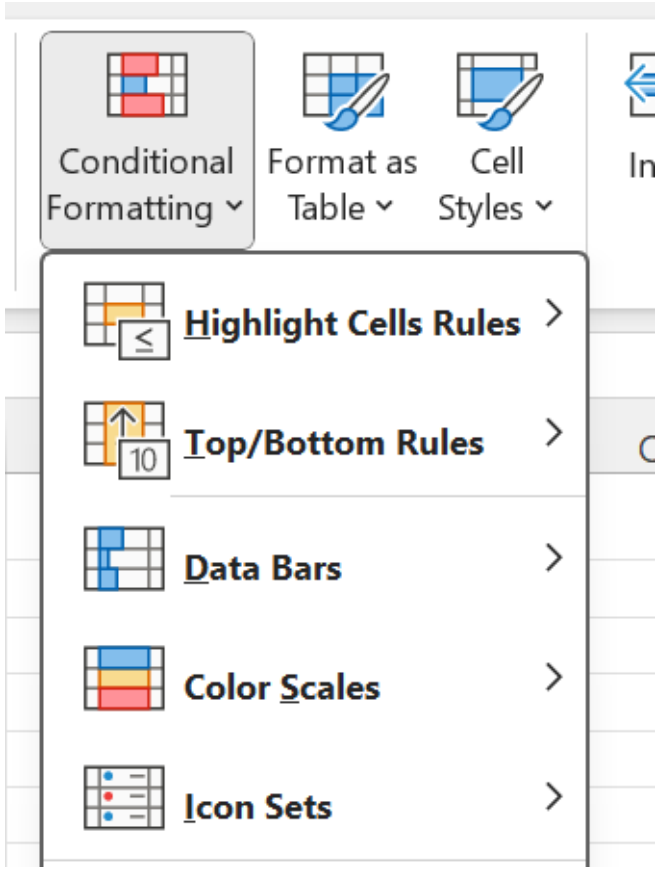
Choose a different color for each slicer

When slicers span several columns, their width will be affected when adding / removing / moving / changing column width

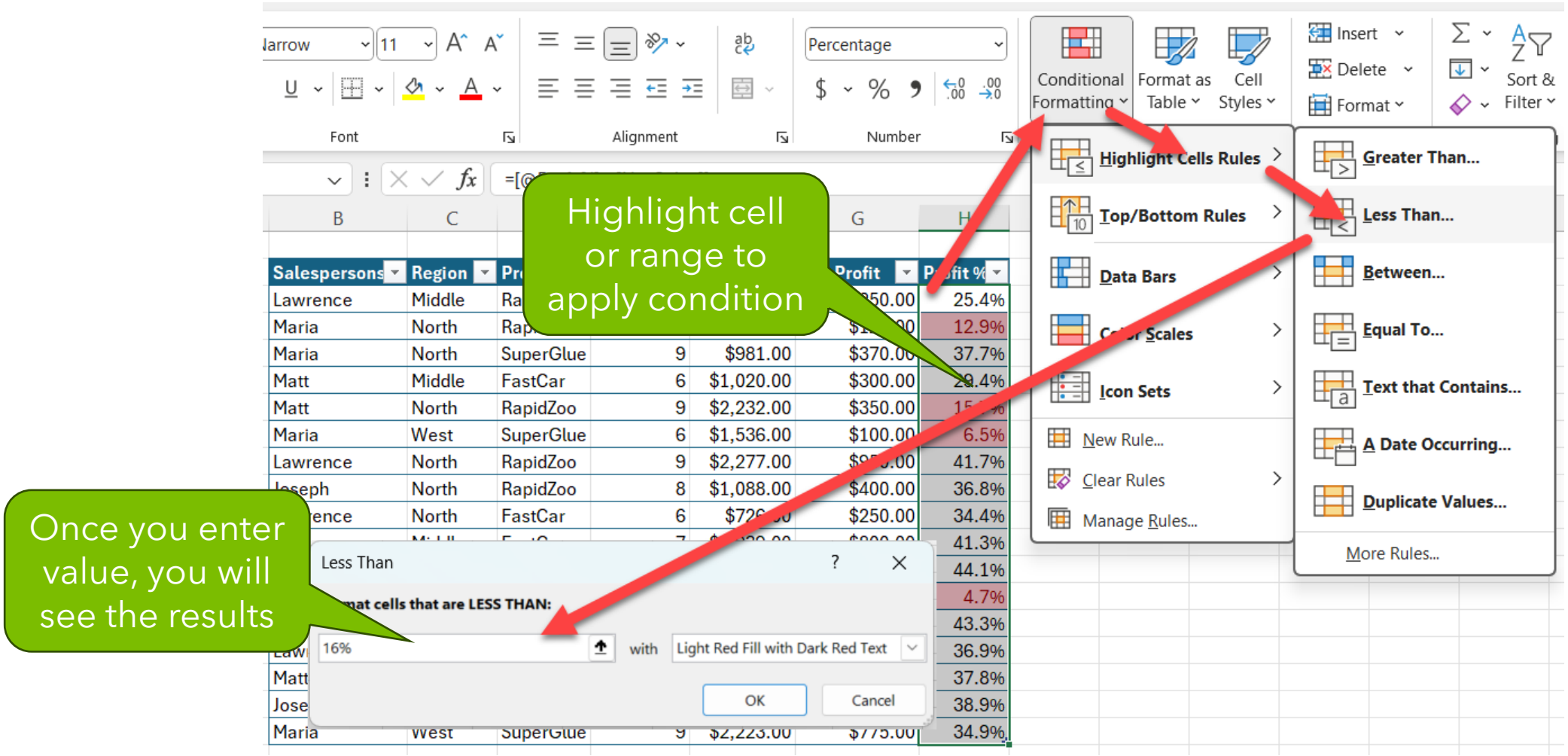
Conditional Formatting

Conditional Formatting

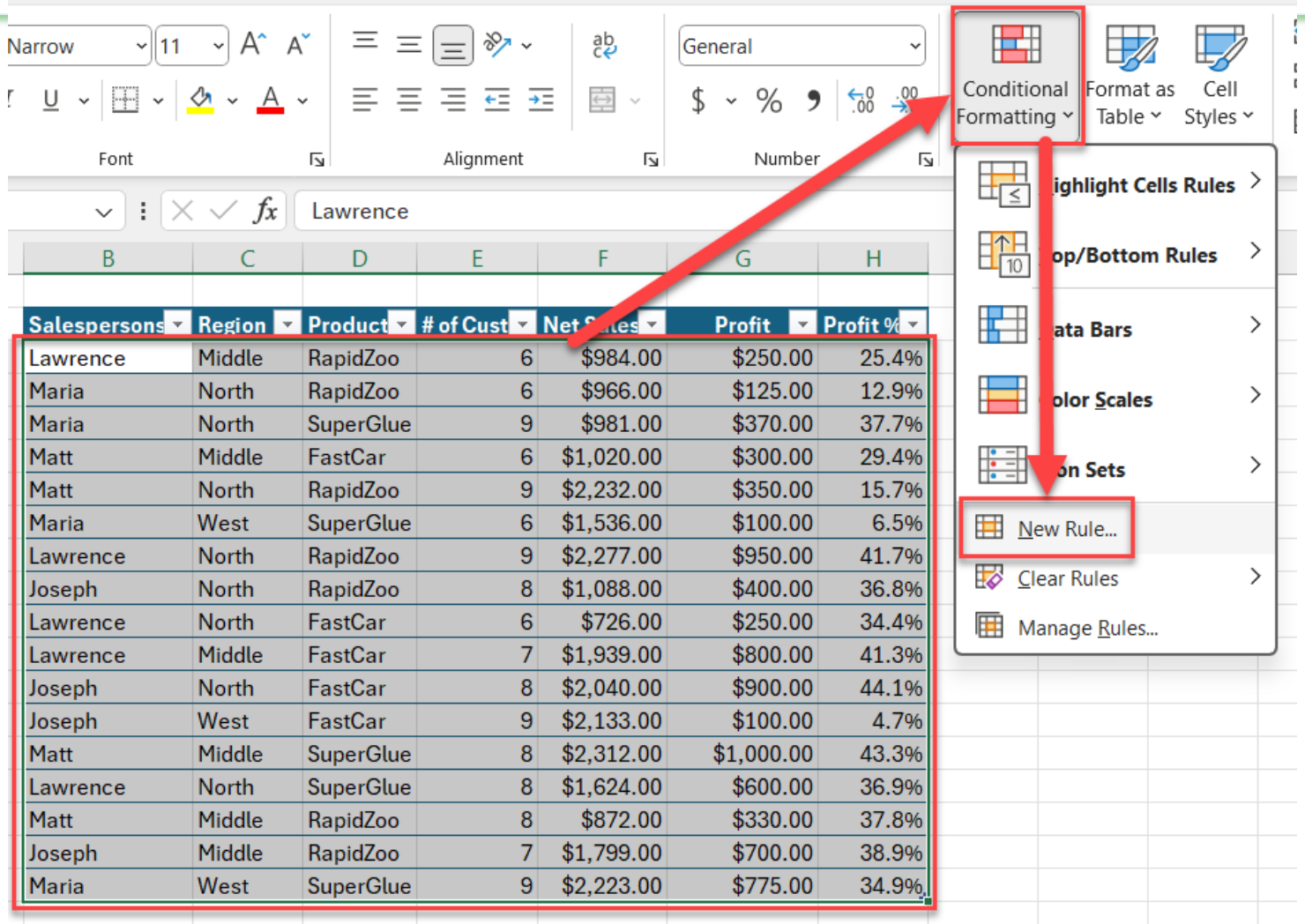
- Rules to automatically format cells/range based upon a condition
- Excel has many built-in conditions
- Formula option allows you to build complex conditions



Conditional Formatting – Highlight Cells Rules

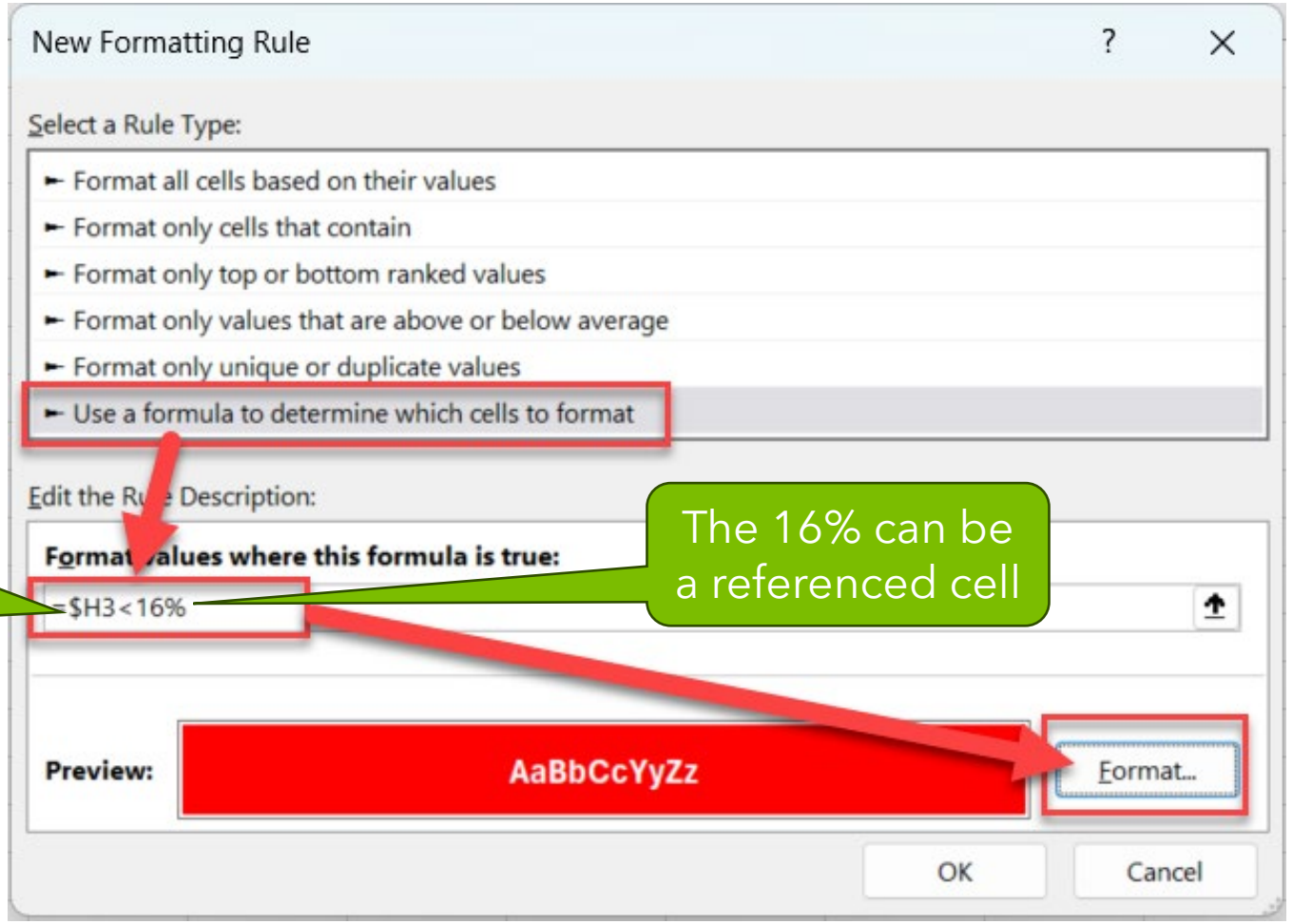


Conditional Formatting – Formula Highlight a Row based on Condition



Salespersons	Region	Product	# of Cust	Net Sales	Profit	Profit %
Lawrence	Middle	RapidZoo	6	$984.00	$250.00	25.4%
Maria	North	RapidZoo	6	$966.00	$125.00	12.9%
Maria	North	SuperGlue	9	$981.00	$370.00	37.7%
Matt	Middle	FastCar	6	$1,020.00	$300.00	29.4%
Matt	North	RapidZoo	9	$2,232.00	$350.00	15.7%
Maria	West	SuperGlue	6	$1,536.00	$100.00	6.5%
Lawrence	North	RapidZoo	9	$2,277.00	$950.00	41.7%
Joseph	North	RapidZoo	8	$1,088.00	$400.00	36.8%
Lawrence	North	FastCar	6	$726.00	$250.00	34.4%
Lawrence	Middle	FastCar	7	$1,939.00	$800.00	41.3%
Joseph	North	FastCar	8	$2,040.00	$900.00	44.1%
Joseph	West	FastCar	9	$2,133.00	$100.00	4.7%
Matt	Middle	SuperGlue	8	$2,312.00	$1,000.00	43.3%
Lawrence	North	SuperGlue	8	$1,624.00	$600.00	36.9%
Matt	Middle	RapidZoo	8	$872.00	$330.00	37.8%
Joseph	Middle	RapidZoo	7	$1,799.00	$700.00	38.9%
Maria	West	SuperGlue	9	$2,223.00	$775.00	34.9%

New Formatting Rule – Formula



Enter a formula, here we anchor the COLUMN so the entire row is highlighted

The 16% can be a referenced cell

Wrap-Up

Presentation Wrap-Up

- Excel Tables
- Custom Sorting
- XLOOKUP
- SUBTOTAL
- SUMIF(S)
- Array Formulas
- Data Validations
- Slicers
- Conditional Formatting

Questions?

Thank You!!

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ONE FINAL NOTE