

MICROSOFT EXCEL:

# PRO TIPS FOR POWER USERS

75+ EXCEL TIPS TO HELP YOU WORK SMARTER, BOOST PRODUCTIVITY, AND BECOME A CERTIFIED POWER USER

★★★★★ With Best-Selling Excel instructor *Chris Dutton*



# COURSE STRUCTURE & OUTLINE

## PRODUCTIVITY TIPS

- CTRL & ALT Shortcuts
- Data Validation
- Autofill & Flash Fill
- Cell Protection
- Advanced Sorting & Filtering
- Etc.

## FORMATTING TIPS

- Frozen Panes
- Invisible Text
- Custom Number Formats
- Snap to Grid
- Formula Formatting
- Etc.

## FORMULA TIPS

- Formula Auditing Tools
- Calculation Modes
- Fuzzy-Match Lookups
- Uniques & Duplicates
- INDEX & MATCH
- Etc.

## VISUALIZATION TIPS

- Filled Maps
- Sparklines
- Dynamic Ranges
- Form Controls
- Custom Templates
- Etc.

## PIVOT TABLE TIPS

- Date & Value Grouping
- Custom Sort Lists
- Slicers & Timelines
- Cached Source Data
- Conditional Formatting
- Etc.

## ANALYTICS TIPS

- Goal Seek & Solver
- Data Modeling
- CUBE Functions
- Outlier Detection
- Monte Carlo Simulation
- Etc.

# SETTING EXPECTATIONS

## 1 I'm using Microsoft Office 365 ProPlus, for PC

- What you see on your screen **will not always match** what you see on mine, especially if you're using a different operating system or an older version of Excel

## 2 This course is **not designed** to serve as an intro to Excel

- Pro Tips are intended to showcase **specific tools and techniques**; for deeper dives, check out my other Excel & Power BI courses (Formulas, Charts, Pivots, Power Query, etc.)

## 3 This is a **non-linear** course, and can be taken in any order

- Each demo is **self-contained**, so feel free to skip ahead or focus on specific areas

## 4 Questions? Comments? **Let's talk.**

- If you need support along the way, feel free to post a question or reach out directly

# PRODUCTIVITY TIPS

## PRO TIP

# CUSTOMIZE YOUR WORKBOOK FOOTER STATS

- The Excel footer bar typically shows the **Sum**, **Average**, and **Count** of a selected range of values, by default
- Right-click** the footer to customize your options, and display additional stats like **Numerical Count**, **Max**, and **Min**, as well as other notifications (*Flash Fill results*, *Caps Lock*, *Macro status*, etc.)



PRODUCTIVITY



1 STAR (VERY BASIC)

	A	B	C	D
1	Date	Conditions	Temp (F)	Wind Speed (MPH)
2	1/1/2016	Clear	39	32
3	1/2/2016	Clear	35	28
4	1/3/2016	Clear	36	28
5	1/4/2016	Clear	30	28
6	1/5/2016	Clear	16	23
7	1/6/2016	Clear	30	21.9
8	1/7/2016	Clear	33	18.1
9	1/8/2016	Clear	35	23
10	1/9/2016	Rain	40	18.1
11	1/10/2016	Rain	45	38.9
12	1/11/2016	Clear	40	38
13	1/12/2016	Snow	29	23
14	1/13/2016	Clear	29	47
15	1/14/2016	Clear	24	23
16	1/15/2016	Clear	31	17

Customize Status Bar

Cell Mode	Ready
Flash Fill Blank Cells	
Flash Fill Changed Cells	
Signatures	Off
Information Management Policy	Off
Permissions	Off
Caps Lock	Off
Num Lock	Off
Scroll Lock	Off
Fixed Decimal	Off
Overtype Mode	Off
End Mode	Off
Macro Recording	Not Recording
Selection Mode	
Page Number	
Average	33.29411765
Count	17
Numerical Count	17
Minimum	16
Maximum	45
Sum	566

RIGHT-CLICK

Average: 53.14246575 Count: 366 Numerical Count: 365 Min: 0 Max: 86 Sum: 19397

## COMMON USE CASES:

- Quickly generating summary statistics without using formulas
- Adding a status indicator to display while macros are in recording mode

## PRO TIP

# QUICKLY NAVIGATE SHEETS WITH CTRL SHORTCUTS

- **CTRL-ARROW:** Jump to the edge of a contiguous range (*command+arrow* on a Mac)
  - Hold **SHIFT** to select cells at the same time
- **CTRL-HOME & CTRL-END:** Jumps to the top-left or bottom-right cell in a range (*control+fn+arrow* on a Mac)
- **CTRL-PgUp & CTRL-PgDn:** Switches between tabs (*option+arrow* on a Mac)
- **CTRL-G:** Launches the “Go-To” menu, containing any named cell, ranges or tables



PRODUCTIVITY



1 STAR (VERY BASIC)

A	B	C	D	E
1	Title	Release Date	Color/B&W	Genre
2	Over the Hill to the Poorhouse	9/15/1920	Black and White	Crime
3	Metropolis	1/26/1927	Black and White	Drama
4	The Broadway Melody	11/11/1929	Black and White	Musical
5	42nd Street	8/29/1933	Black and White	Comedy
6	Top Hat	4/15/1935	Black and White	Comedy
7	Modern Times	10/7/1936	Black and White	Comedy
8	Snow White and the Seven Dwarfs	2/2/1937	Color	Animation
9	Gone with the Wind	11/12/1939	Color	Drama
10	The Wizard of Oz	4/9/1939	Black and White	Adventure
11	Fantasia	5/18/1940	Color	Animation
12	Pinocchio	10/12/1940	Color	Animation
13				



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12	Pinocchio	10/12/1940	Color	Animation
13				

## COMMON USE CASES:

- Selecting large tables or cell ranges without manually scrolling, or identifying the last active cell in a worksheet

Windows shortcuts: <http://bit.ly/2Cx0gCa>

Mac shortcuts: <http://bit.ly/2QwyqZQ>

## PRO TIP

# ACCESS RIBBON CONTROLS WITH ALT KEY TIPS

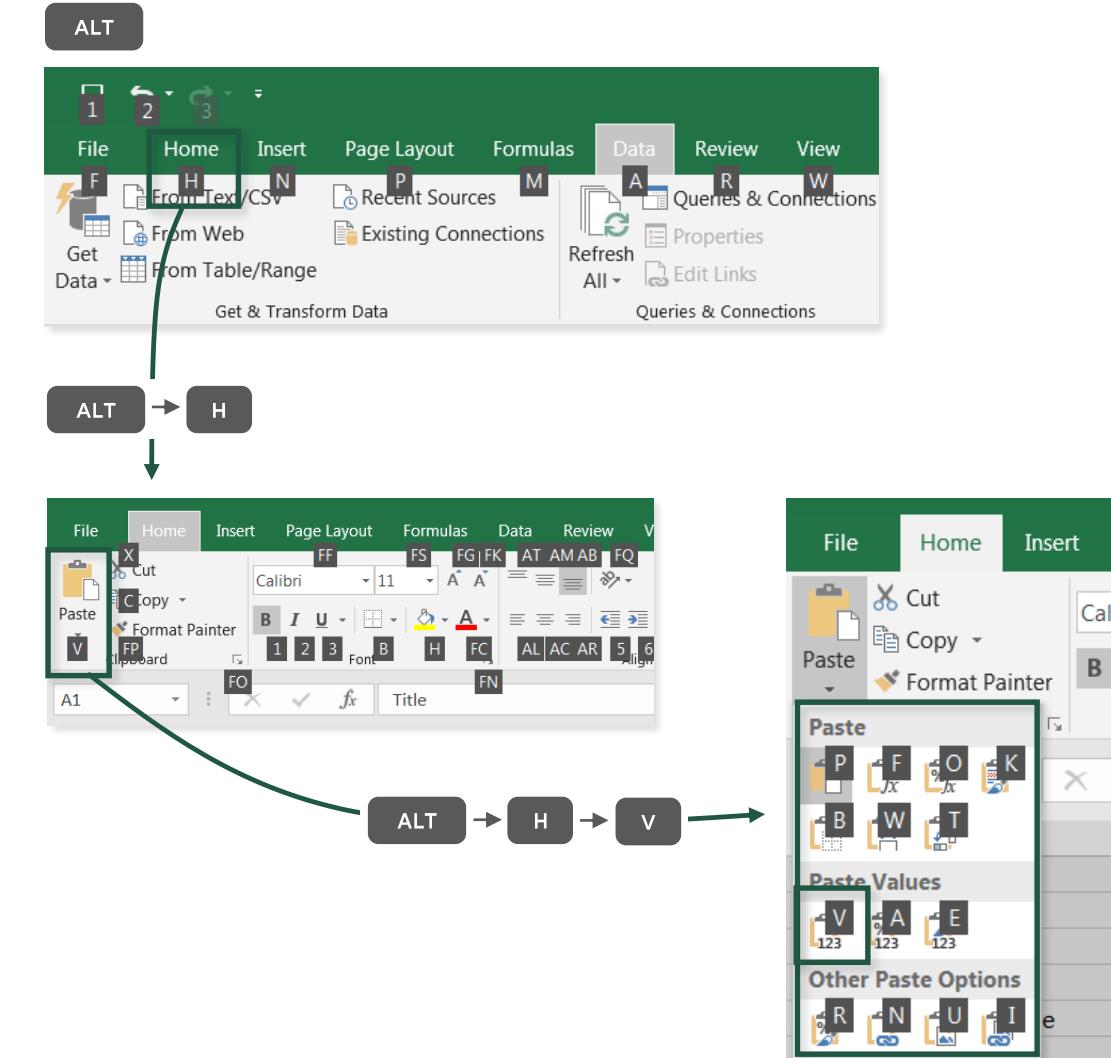
- Press and release the **ALT key** to activate ribbon shortcuts, which allow you to navigate through menu options with simple keystrokes (*no mouse required!*)
  - **ALT → H → V → V:** Paste special as values
  - **ALT → A → T:** Add or remove filters
  - **ALT → H → E → F:** Clear formats
  - **ALT → N → V:** Insert a PivotTable
- **NOTE:** Alt key tips are not available for Mac



PRODUCTIVITY



1 STAR (VERY BASIC)



### COMMON USE CASES:

- Quickly accessing tools or commands that would normally require multiple clicks (i.e. paste special options)

## PRO TIP

# SELECT SPECIAL CELL TYPES WITH "GO TO" OPTIONS

- **CTRL-G:** Launches the default “Go To” options, which allow you to jump to specific tables or named ranges in your workbook
- The **SPECIAL** menu includes additional options to select specific *types* of cells or objects in the sheet (*blanks, formulas, conditional formats, validation cells, etc.*)



PRODUCTIVITY



1 STAR (VERY BASIC)

The screenshot shows the Microsoft Excel interface with two dialog boxes open over a spreadsheet. The top-left dialog is 'Go To' (Ctrl+G), with the 'Special...' button highlighted. The top-right dialog is 'Go To Special'. Both dialogs have arrows pointing to them from the main text area. The 'Go To Special' dialog has several checkboxes under the 'Select' section, with 'Formulas' checked and other options like 'Numbers', 'Text', 'Logicals', and 'Errors' also checked. The bottom part of the image shows a portion of an Excel spreadsheet with a table of product prices. Cell E10 contains the formula =INDEX(C3:G7,MATCH(B10,B3:B7,0),MATCH(C10,C2:G2,0)). Below it, a dropdown menu shows 'T-Shirt' and 'Large' selected, with the result '\$16.50' displayed in a green-bordered box.

	A	B	C	D	E	F	G	H	I	J
1			XSmall	Small	Medium	Large	XLarge			
2			Socks	\$4.00	\$4.25	\$4.50	\$4.75	\$5.00		
3			Shorts	\$12.00	\$12.50	\$13.00	\$13.50	\$14.00		
4			Pants	\$24.00	\$25.00	\$26.00	\$27.00	\$28.00		
5			T-Shirt	\$15.00	\$15.50	\$16.00	\$16.50	\$17.00		
6			Sweater	\$30.00	\$31.00	\$32.00	\$33.00	\$34.00		
7										
8										
9										
10			Product:	Size:			Price			
11			T-Shirt	Large	=		\$16.50			

## COMMON USE CASES:

- Quickly identifying or highlighting all cells containing formulas
- Selecting and deleting all objects in a worksheet with one click
- Identifying cells that have data validation rules applied (i.e. drop-downs)

## PRO TIP

# REMOVE ALL BLANK ROWS IN A WORKSHEET

- **STEP 1:** Use **CTRL-G** to launch the “**Go To**” menu, click **Special**, and select **Blanks** to select all blank rows in the sheet
- **STEP 2:** Delete the selected rows, using any of the following options:
  - **Home > Delete > Delete Sheet Rows**
  - **ALT-H-D-R**
  - **CTRL+- > Shift Cells Up**



PRODUCTIVITY



2 STARS (BASIC)

The screenshot illustrates the steps to remove blank rows in an Excel worksheet. It shows three windows: 1) The 'Go To' dialog box with the 'Special...' button highlighted. 2) The 'Go To Special' dialog box with the 'Blanks' option selected. 3) The 'Delete Cells...' dialog box with the 'Delete Sheet Rows' option selected. The main Excel window shows a data table with columns A, B, and C. The first four rows are highlighted in red, indicating they are selected for deletion.

A	B	C
1 Date	Product ID	Product
2 1/1/1997	869	Nationel Grape Fruit Roll
3 1/1/1997	1472	Fort West Fudge Cookies
4 1/1/1997	76	Red Spade Sliced Chicken
5		Excellent Cranberry Juice
6		
7		
8		
9		
10		
11 1/1/1997	557	
12		
13		
14 1/1/1997	367	Carlson 2% Milk
15 1/1/1997	250	Best Choice Golden Raisins
16 1/1/1997	600	Landslide Decaf Coffee
17 1/1/1997	702	Jumbo Large Eggs
18 1/1/1997	786	Footnote Extra Lean Hamburger
19 1/1/1997	536	Fast Potato Chips
20		
21 1/1/1997	596	Landslide Hot Chocolate
22		
23 1/1/1997	769	Cormorant D-Size Batteries
24		
25 1/1/1997	1135	Tri-State Golden Delcious Apples
26 1/1/1997	1046	PigTail Frozen Peas
27 1/1/1997	170	Robust Monthly Fashion Magazine
28 1/1/1997	885	Monarch Spaghetti
29		
30		
31		
32 1/1/1997	616	Landslide Apple Jam
33 1/1/1997	1432	Hermanos Red Pepper
34 1/1/1997	544	Fast Avocado Dip
35 1/1/1997	320	Excellent Cranberry Juice
36		
37 1/1/1997	952	Special Wheat Puffs
38 1/1/1997	1222	Plato Chunky Peanut Butter
39		
40 1/1/1997	1359	Carrington Frozen Chicken Thighs

## COMMON USE CASES:

- Cleaning up raw data by quickly eliminating extra/blank rows, without having to manually select or use query editing tools

## PRO TIP

# CREATE DROP-DOWN LISTS WITH DATA VALIDATION

- **Data Validation** allows you to limit the values that a particular cell will accept (*whole numbers, ranges, dates, text, etc.*)
- The **List** option allows you to create a drop-down menu containing specific items
  - **Note:** Items can be typed directly or referenced as a cell range (i.e. A1:A10)
- Add **Input Messages** or **Error Alerts** to customize what users see when they select the cell or enter invalid values

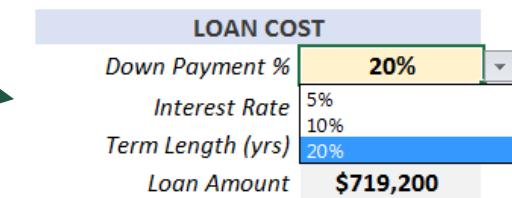
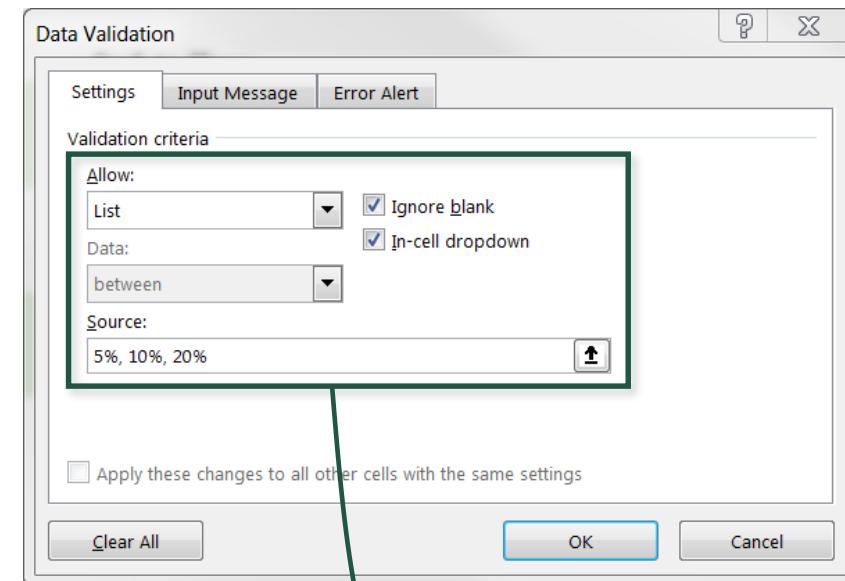
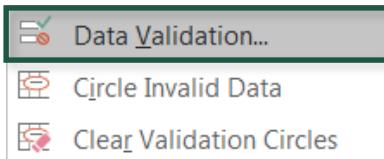


PRODUCTIVITY



2 STARS (BASIC)

(Data > Data Validation)



## COMMON USE CASES:

- Creating formula-based models with variable inputs
- Preventing users from entering invalid values (decimals, negatives, etc.)

## PRO TIP

# POPULATE VALUES WITH AUTO FILL & FLASH FILL

- Basic **Auto Fill** options allow you to copy cells, add a sequential series, fill with or without formatting, or apply date intervals
  - Drag or double-click the **lower-right corner** of a cell to access auto fill options and apply values to new rows
- **Flash Fill** identifies patterns based on a sample set of given values, and uses those patterns to populate the whole column



PRODUCTIVITY



2 STARS (BASIC)

The screenshot shows three separate examples of filling data in Excel:

- Example 1 (P Column):** A column of dates from 1/1/2018 to 6/1/2018. A context menu is open over the last cell, showing options: Copy Cells, Fill Series, Fill Formatting Only, Fill Without Formatting, Fill Days, Fill Weekdays, Fill Months (selected), Fill Years, and Flash Fill.
- Example 2 (G Column):** A column of email addresses. A context menu is open over the last cell, showing options: Copy Cells, Fill Series, Fill Formatting Only, Fill Without Formatting, and Flash Fill.
- Example 3 (I Column):** A column of sequential numbers from 1 to 10. A context menu is open over the last cell, showing options: Copy Cells, Fill Series (selected), Fill Formatting Only, Fill Without Formatting, and Flash Fill.

## COMMON USE CASES:

- Applying values to thousands of rows without dragging or copy/pasting
- Filling formulas down to new rows without overwriting existing formats
- Extracting text from strings that would be difficult to isolate using formulas
- Quickly creating sequential index columns or calendar tables

## PRO TIP

# CUSTOMIZE THE RIBBON WITH YOUR OWN TABS

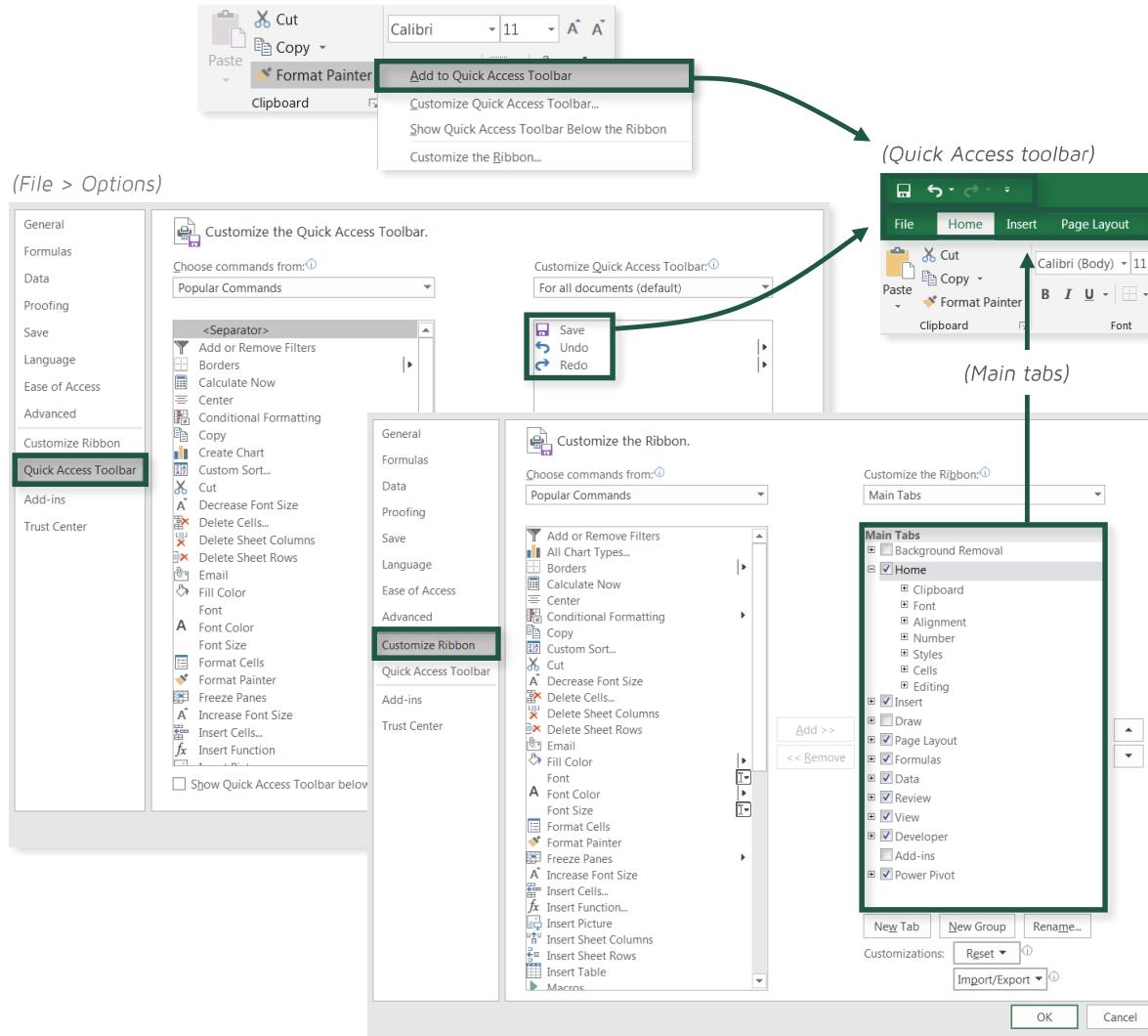
- Excel provides options to add, remove, or rearrange tabs and tools in the workbook ribbon (including the **Quick Access** toolbar)
  - **Quick Access** tools live above the ribbon, and include *Save, Undo & Redo* by default
- Use **File > Options > Customize Ribbon** to show, hide, or rearrange tabs in the ribbon, or to create your own custom tabs



PRODUCTIVITY



2 STARS (BASIC)



### COMMON USE CASES:

- Consolidating commonly used tools into a single, custom tab
- Exposing the **Developer** tab to access form controls or macros

## PRO TIP

# SPLIT TEXT STRINGS USING TEXT TO COLUMNS

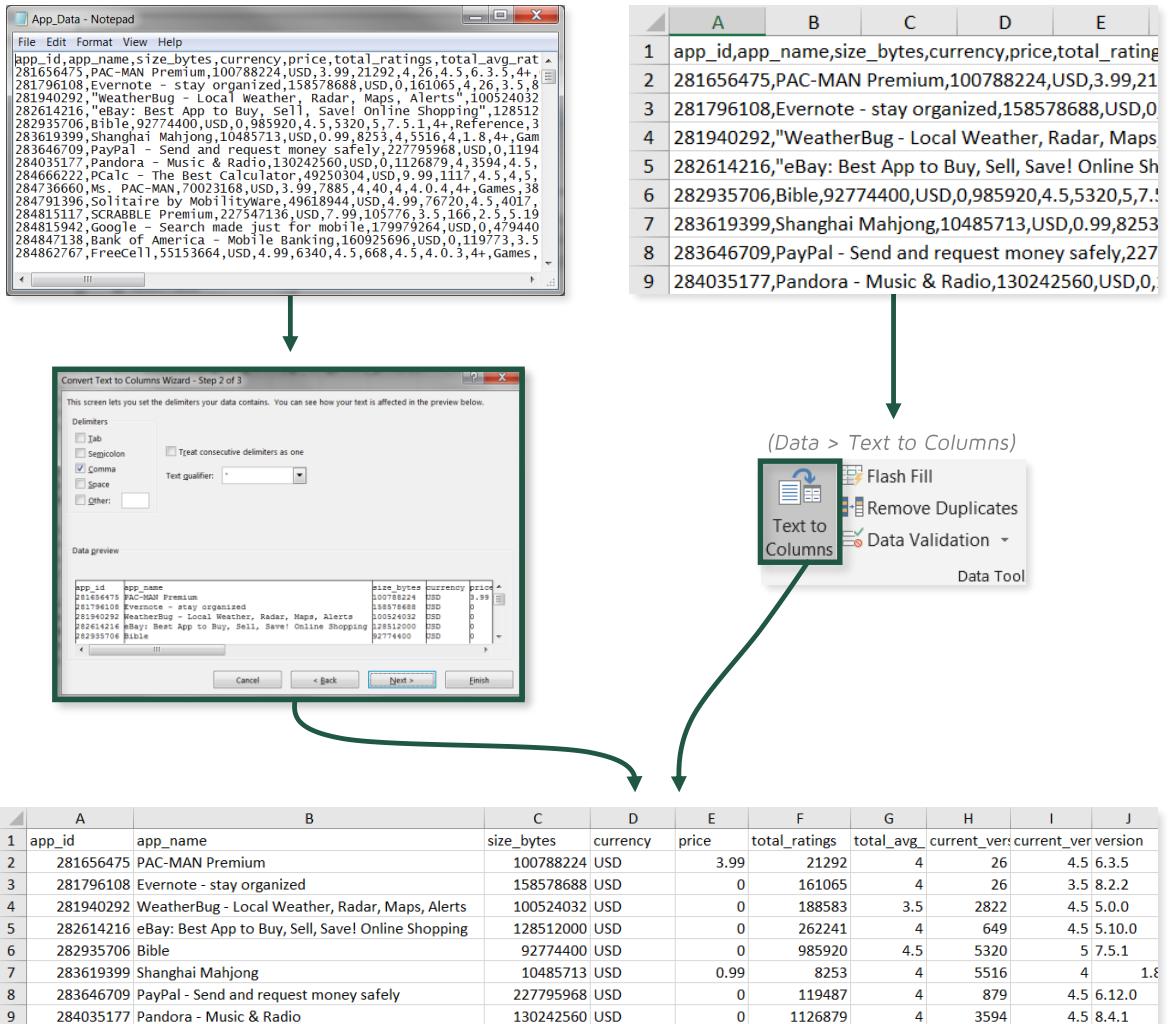
- If your data is stored as text or separated values (i.e. **.txt** or **.csv** files), use **Text to Column** to split values into columns & rows
  - OPTION 1:** Open a txt file from Excel to launch the Text to Column wizard
  - OPTION 2:** Open a csv file or copy data into one column, and use **Data > Text to Column**
- NOTE:** Both methods include options to specify delimiters, define text qualifiers, and format or exclude columns



PRODUCTIVITY



2 STARS (BASIC)



## COMMON USE CASES:

- Transforming text-based data into tabular formats for analysis
- Splitting text strings without using formulas or functions

## PRO TIP

# COMPARE FILES WITH SYNCHRONOUS SCROLLING

- **Synchronous scrolling** allows you to arrange Excel workbooks side-by-side and scroll through them simultaneously
  - **STEP 1:** Open both workbooks that you want to compare
  - **STEP 2:** Click **View > View Side by Side** in order to “stack” your windows
  - **STEP 3:** Activate **View > Synchronous Scrolling** to allow windows to scroll simultaneously



PRODUCTIVITY



2 STARS (BASIC)

The screenshot shows two Excel workbooks side-by-side. The top ribbon has the 'View' tab selected, with arrows pointing to the 'View Side by Side' and 'Synchronous Scrolling' buttons in the 'Window' group. The bottom part shows two identical data tables and charts for 'Temp.Precip.Data' and 'Excel\_Pro.Tips\_v22'. Both tables have the same data:

Week Ending	Mean Temp (F)	Precip (in)
1/1/2016	36.67	0.00
1/10/2016	32.71	1.39
1/17/2016	32.43	1.40
1/24/2016	25.14	0.48
1/31/2016	37.14	0.00
2/7/2016	41.29	1.30
2/14/2016	20.43	0.54
2/21/2016	35.29	0.93
2/28/2016	39.29	1.40
3/6/2016	36.14	0.38
3/13/2016	49.14	0.49
3/20/2016	42.00	1.50
3/27/2016	39.71	0.38
4/3/2016	48.29	1.27
4/10/2016	38.00	1.44
4/17/2016	47.00	0.23
4/24/2016	53.57	0.11
5/1/2016	47.29	0.37
5/8/2016	47.43	1.23
5/15/2016	59.86	0.11
5/22/2016	57.14	0.00
5/29/2016	64.86	0.26
6/5/2016	64.29	2.04
6/12/2016	66.43	0.17
6/19/2016	67.71	0.12
6/26/2016	69.71	0.02
7/3/2016	73.71	0.31
7/10/2016	68.86	0.45
7/17/2016	76.43	0.00
7/24/2016	79.00	0.01

Below the tables are tabs for 'Tables vs. Ranges', 'Synchronous Scrolling', and 'Extracting Unique Values'. The 'Synchronous Scrolling' tab is selected.

## COMMON USE CASES:

- Spot-checking workbooks for version control issues
- Making quick visual comparisons between similar files

## PRO TIP

# EXTRACT UNIQUE VALUES WITH ADVANCED FILTERS

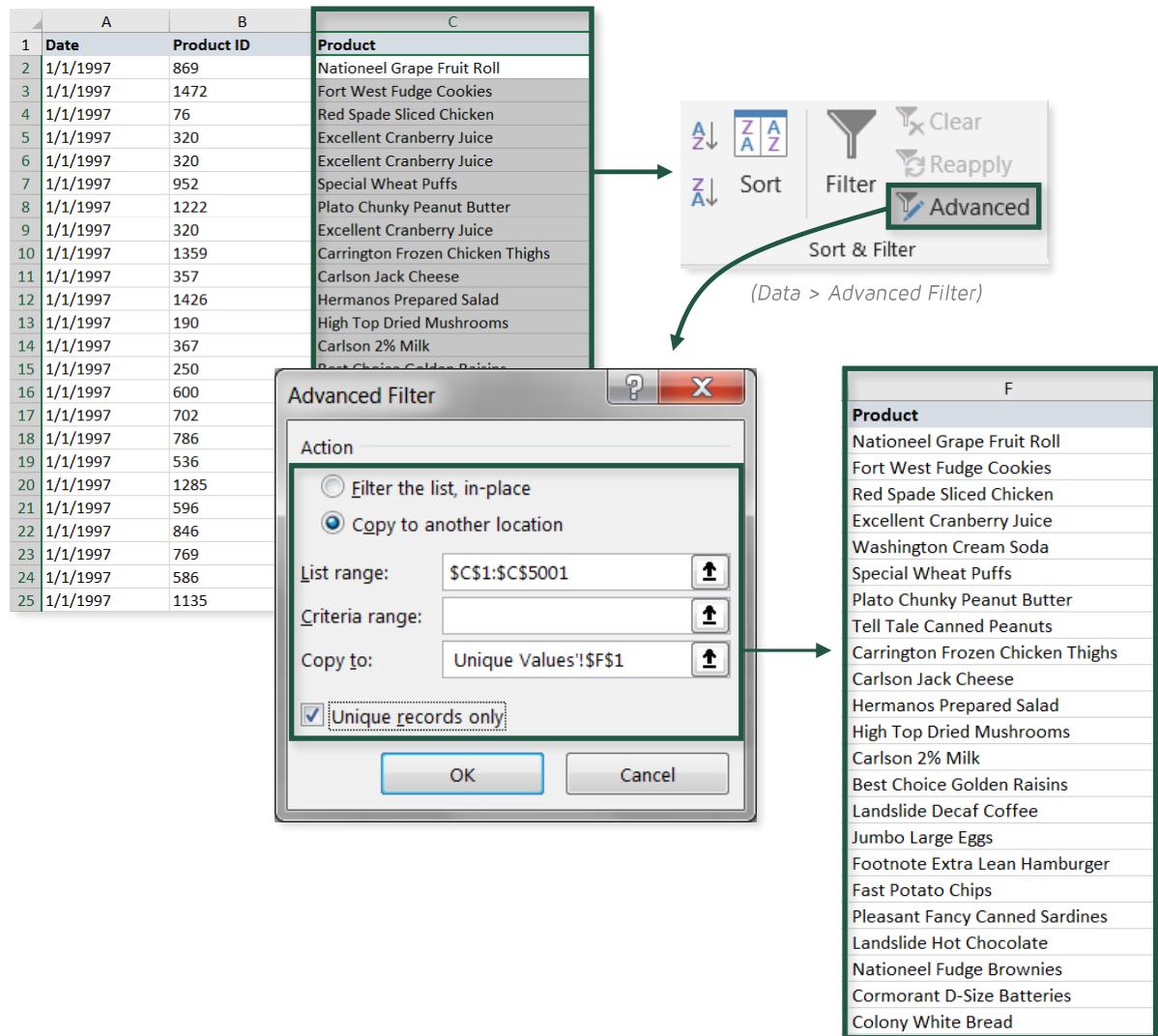
- There are several ways to remove duplicate values from a list in Excel, including the **Remove Duplicates** tool, **Advanced Filters**, **PivotTables** and **Power Query**
- The **Advanced Filter** is the most flexible option, allowing you to either filter in place or copy unique values to a new location
  - **NOTE:** To extract uniques into a new list, select “*Copy to another location*” and “*Unique records only*”



PRODUCTIVITY



2 STARS (BASIC)



### COMMON USE CASES:

- Identifying unique values while preserving the original list
- Creating a new lookup or dimension table containing unique primary keys

## PRO TIP

# SIMPLIFY FORMULAS WITH NAMED RANGES & TABLES

- Use **Named Ranges** or **Tables** (vs. raw cell ranges) to simplify formula references
- Compared to Named Ranges, formatting as a **Table** (**CTRL-T**) allows you to:
  1. Automatically ingest new rows of data
  2. Access quick formatting & filtering options (*fixed headers, banded rows, etc.*)
  3. Write efficient calculated columns vs. traditional (A1-style) cell formulas



PRODUCTIVITY



3 STARS (MODERATE)

A	B	C	D	E	F
Date	Transactions	Holiday		Date	Holiday
1/1/2014	788	New Year's Day		1/1/2014	New Year's Day
1/2/2014	878	None		1/20/2014	Martin Luther King Jr. Day
1/3/2014	847	None		2/12/2014	Lincoln's Birthday
1/4/2014	369	None		2/17/2014	Presidents' Day
1/5/2014	939	None		5/26/2014	Memorial Day
1/6/2014	588	None		7/4/2014	Independence Day
1/7/2014	660	None		10/13/2014	Columbus Day
1/8/2014	980	None		11/4/2014	Election Day
1/9/2014	738	None		11/11/2014	Veterans Day
1/10/2014	322	None		11/27/2014	Thanksgiving Day
1/11/2014	756	None		11/28/2014	Lincoln's Birthday/Lincoln's Day
1/12/2014	859	None		12/24/2014	Christmas Eve
1/13/2014	149	None		12/25/2014	Christmas Day
1/14/2014	138	None		12/26/2014	Day After Christmas Day
1/15/2014	258	None		12/31/2014	New Year's Eve
1/16/2014	852	None			

Table Name:

Holidays

Resize Table

Properties

(Table Tools)

A	B	C	D
Date	Transactions	Holiday	
1/1/2014	788	New Year's Day	
1/2/2014	878	None	
1/3/2014	847	None	

## COMMON USE CASES:

- Replacing cell references with tables to make formulas easier to interpret
- Converting chart source data to enable automatic updates
- Preparing data for analysis with Excel BI tools (data model, Power Pivot)

## PRO TIP

# ADD CUSTOM WORKBOOK PROTECTION SETTINGS

- The **Protection** tab in the **Format Cells** dialog box allows you to specify how cells behave once the worksheet is protected:
  - Locked** means that users can view the cell contents but not edit (*default*)
  - Hidden** means that users cannot see any underlying formulas or references
- NOTE:** All cells are **locked** by default; you must actively *unprotect* the specific cells that you want to remain editable



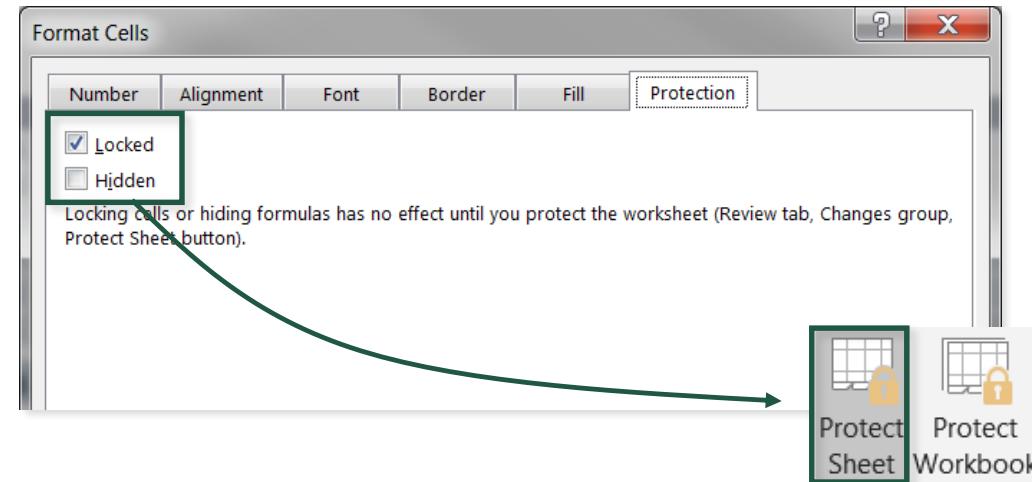
PRODUCTIVITY



3 STARS (MODERATE)

A	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	
1																	
2					Albert Pujols												
3																	
4																	
5					AB	H	Avg	R	2B	3B	HR	RBI	SB	CS	SB%	BB	
6					587	183	0.312	115	39	1	42	118	14	4	78%	103	
7					579	173	0.299	105	29	0	37	99	9	1	90%	61	
8					607	173	0.285	85	50	0	30	105	8	1	89%	52	
9					391	101	0.258	49	19	0	17	64	1	1	50%	40	
10					633	172	0.272	89	37	1	28	105	5	1	83%	48	
11					602	147	0.244	85	22	0	40	95	5	3	63%	50	
12					Total:	3,399	949	0.279	528	196	2	194	586	42	11	79%	354
13																	

CTRL 1



(Review > Protect Sheet)

## COMMON USE CASES:

- Preventing users from accidentally modifying sensitive content
- Obscuring underlying formulas or cell references from view
- Limiting user interaction to a specific set of inputs or cells

## PRO TIP

# APPLY MULTI-LEVEL ROW & COLUMN SORTING

- Instead of using column header options, use the **Sort** tool to apply **multi-level sorting**
  - **Example:** Sort a table alphabetically by *Country*, then *Province*, and finally by *Price*
- Select entire columns and use the **Options** menu to sort **Left to Right**, which allows you to **sort columns** instead of rows
  - **NOTE:** In addition to values, you can sort based on **cell color**, **font color**, or **icon**



PRODUCTIVITY



3 STARS (MODERATE)

The screenshot shows the 'Sort & Filter' ribbon tab selected. The 'Sort' icon is highlighted. A green arrow points from the 'Sort' icon to the 'Sort Options' dialog box. The 'Sort Options' dialog box is open, showing the 'Orientation' section with the 'Sort top to bottom' radio button selected.

**Sort & Filter**

(Data > Sort)

Sort

Clear

Reapply

Advanced

Add Level Delete Level Copy Level Options... My data has headers

Column Sort On Order

Sort by Country Cell Values A to Z

Then by Province Cell Values A to Z

Then by Points Cell Values Largest to Smallest

OK Cancel

Sort Options

Case sensitive

Orientation

Sort top to bottom

Sort left to right

OK Cancel

The screenshot shows the 'Sort & Filter' ribbon tab selected. The 'Sort Options' dialog box is open, showing the 'Orientation' section with the 'Sort left to right' radio button selected.

Add Level Delete Level Copy Level Options... My data has headers

Row Sort On Order

Sort by Row 1 Cell Color On Right

OK Cancel

Sort Options

Case sensitive

Orientation

Sort top to bottom

Sort left to right

OK Cancel

## COMMON USE CASES:

- Applying complex or custom sorting rules to a table or range
- Rearranging columns (alphabetically or by color) to organize a large table

## PRO TIP

# EXPLORE TABLES WITH ADVANCED FILTERING

- **Advanced Filters** allow you to define a custom **criteria range**, which can contain complex combinations of filtering rules
  - Use advanced filtering to define rules that would be impossible with standard filters or PivotTables (*i.e. filtering on Action films rated 8.5+ plus Biography films rated 8+*)
- **NOTE:** Advanced filters iterate through all rows of the table, and can be *very slow* for large tables or very broad criteria

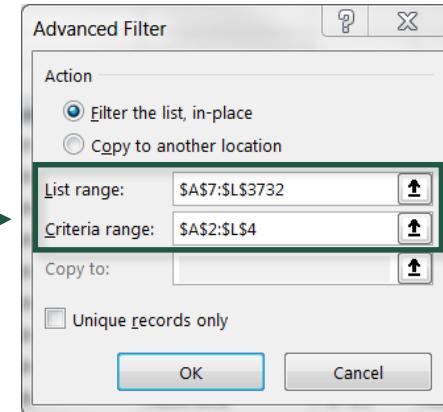
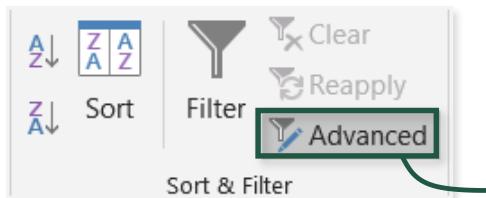


PRODUCTIVITY



5 STARS (EXPERT)

(Data > Advanced Filter)



	A	B	C	D	E	F	G	H	I
1	Filter Criteria:								
2	Title	Release Year	Color/B&W	Genre	Language	Country	Rating	Lead Actor	IMDb Score
3	The*			Biography					>8
4				Action					>8.5
5									
6									
7	Title	Release Year	Color/B&W	Genre	Language	Country	Rating	Lead Actor	IMDb Score
118	Seven Samurai	1954	B&W	Action	Japanese	Japan	Unrated	Takashi Shimura	8.7
119	The Lord of the Rings: The Fellowship of the Ring	2001	Color	Action	English	New Zealand	PG-13	Christopher Lee	8.8
209	The Dark Knight	2008	Color	Action	English	USA	PG-13	Christian Bale	9
211	Star Wars: Episode IV - A New Hope	1977	Color	Action	English	USA	PG	Harrison Ford	8.7
219	The Lord of the Rings: The Return of the King	2003	Color	Action	English	USA	PG-13	Orlando Bloom	8.9
224	The Lord of the Rings: The Two Towers	2002	Color	Action	English	USA	PG-13	Christopher Lee	8.7
237	Inception	2010	Color	Action	English	USA	PG-13	Leonardo DiCaprio	8.8
239	Star Wars: Episode V - The Empire Strikes Back	1980	Color	Action	English	USA	PG	Harrison Ford	8.8
260	Saving Private Ryan	1998	Color	Action	English	USA	R	Tom Hanks	8.6
310	The Matrix	1999	Color	Action	English	USA	R	Keanu Reeves	8.7
1323	The Pianist	2002	B&W	Biography	English	France	R	Emilia Fox	8.5
1339	The Sea Inside	2004	Color	Biography	Spanish	Spain	PG-13	Belén Rueda	8.1
1342	The Imitation Game	2014	Color	Biography	English	UK	PG-13	Benedict Cumberbatch	8.1
1379	The Act of Killing	2012	Color	Biography	Indonesian	UK	Not Rated	Anwar Congo	8.2
1395	The Wolf of Wall Street	2013	Color	Biography	English	USA	R	Leonardo DiCaprio	8.2

## COMMON USE CASES:

- Applying custom or complex filtering rules that cannot be replicated with standard filter tools or PivotTables
- Adding a user-facing criteria range to provide transparency into the filter settings that have been applied to a table

# FORMATTING TIPS

## PRO TIP

# USE CTRL TO APPLY FORMATTING SHORTCUTS

- Access common number formats using **CTRL shortcuts**:
  - CTRL-SHIFT-1 (CTRL-!)**: Number
  - CTRL-SHIFT-2 (CTRL-@)**: Time
  - CTRL-SHIFT-3 (CTRL-#)**: Date
  - CTRL-SHIFT-4 (CTRL-\$)**: Currency
  - CTRL-SHIFT-5 (CTRL-%)**: Percentage
  - CTRL-SHIFT-6 (CTRL-^)**: Scientific
- CTRL-SHIFT-~ (tilde)** reverts to General



FORMATTING



1 STAR (VERY BASIC)

	A	B	C	D
1	Release Date	FB Likes	Gross Revenue	ROI %
2	7564	0	3000000	30
3	9888	12000	26435	0.004405833
4	10908	167	2808000	7.408970976
5	12295	439	2300000	5.239179954
6	12889	1000	3000000	4.926108374
7	13430	0	163245	0.10883
8	13548	0	184925485	92.4627425
9	14561	16000	198655278	49.95103797
10	14344	14000	22202612	7.929504286

	A	B	C	D
1	Release Date	FB Likes	Gross Revenue	ROI %
2	15-Sep-20	0.00	\$3,000,000.00	3000%
3	26-Jan-27	12,000.00	\$26,435.00	0%
4	11-Nov-29	167.00	\$2,808,000.00	741%
5	29-Aug-33	439.00	\$2,300,000.00	524%
6	15-Apr-35	1,000.00	\$3,000,000.00	493%
7	7-Oct-36	0.00	\$163,245.00	11%
8	2-Feb-37	0.00	\$184,925,485.00	9246%
9	12-Nov-39	16,000.00	\$198,655,278.00	4995%
10	9-Apr-39	14,000.00	\$22,202,612.00	793%

## COMMON USE CASES:

- Quickly applying common number formats without using the mouse or accessing the **Format Cells** dialog box

## PRO TIP

# ALIGN WORKBOOK OBJECTS USING SNAP TO GRID

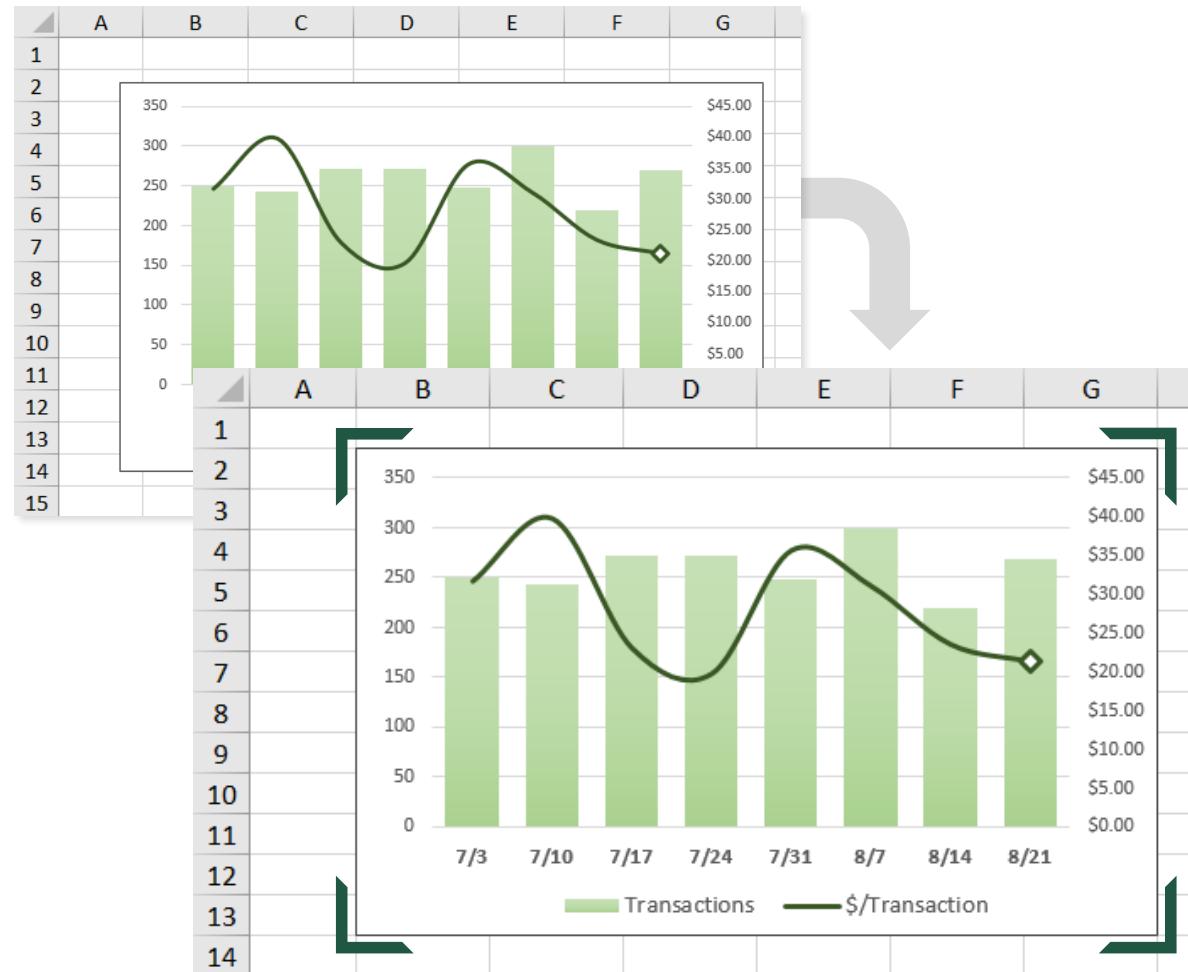
- Hold the **ALT key** as you drag or resize objects to “snap” them to cell borders
- **BONUS TIPS:**
  - Hold **CTRL** as you drag to create a copy of the object at the same time
  - Hold **SHIFT** as you drag to limit movement to the horizontal or vertical plane



FORMATTING



1 STAR (VERY BASIC)



## COMMON USE CASES:

- Ensuring that all worksheet objects are aligned to a common grid
- Designing clean and polished user-facing tools or dashboards

## PRO TIP

# HIDE WORKBOOK ELEMENTS TO REDUCE CLUTTER

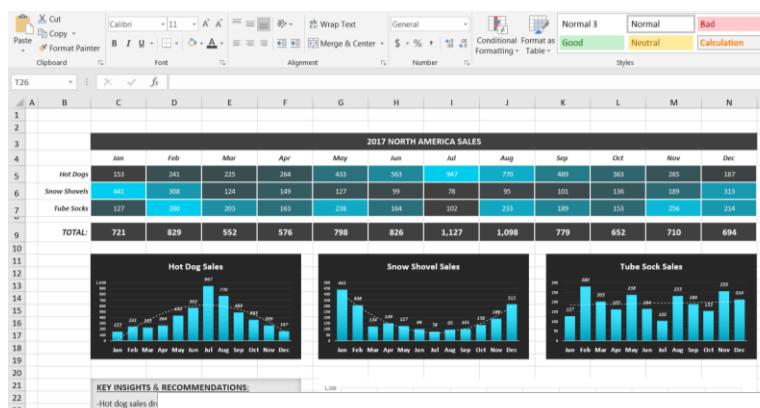
- Use the **View > Show** checkboxes to hide workbook elements from view, including **Gridlines**, **Headings**, or the **Formula Bar**
- To collapse the ribbon from view, click the **caret icon (^)** in the lower right corner
  - To anchor the ribbon, select a tab and click the “pin” icon (where the caret used to be)
- **NOTE:** Gridlines and headings are specific to individual sheets, but formula bar and ribbon settings impact the entire workbook



FORMATTING

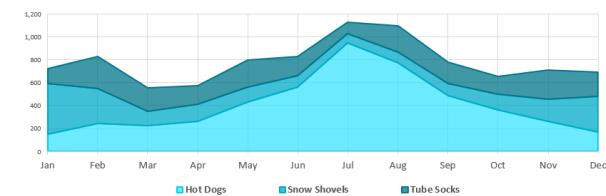


1 STAR (VERY BASIC)



**KEY INSIGHTS & RECOMMENDATIONS:**

- Hot dog sales drove ~75% of summer revenue, peaking in July to an all-time high of 947; however, sales dipped 19% in August as bun supply fell short of demand
- Snow shovel sales missed forecasts due to a drier than expected winter; recommend offering pre-season discounts to drive Oct/Nov sales
- Tube sock sales fluctuated between 20-50%, but saw strong performance during February “Buy 1 Sock Get the Other Free” promotions



(View Tab)

Ruler    Formula Bar  
 Gridlines    Headings  
Show

EXCEL  
MAVEN

## COMMON USE CASES:

- Creating clean and polished “dashboard-style” views
- Preventing users from modifying rows, columns, or formulas

## PRO TIP

# REPLICATE FORMATS WITH THE FORMAT PAINTER

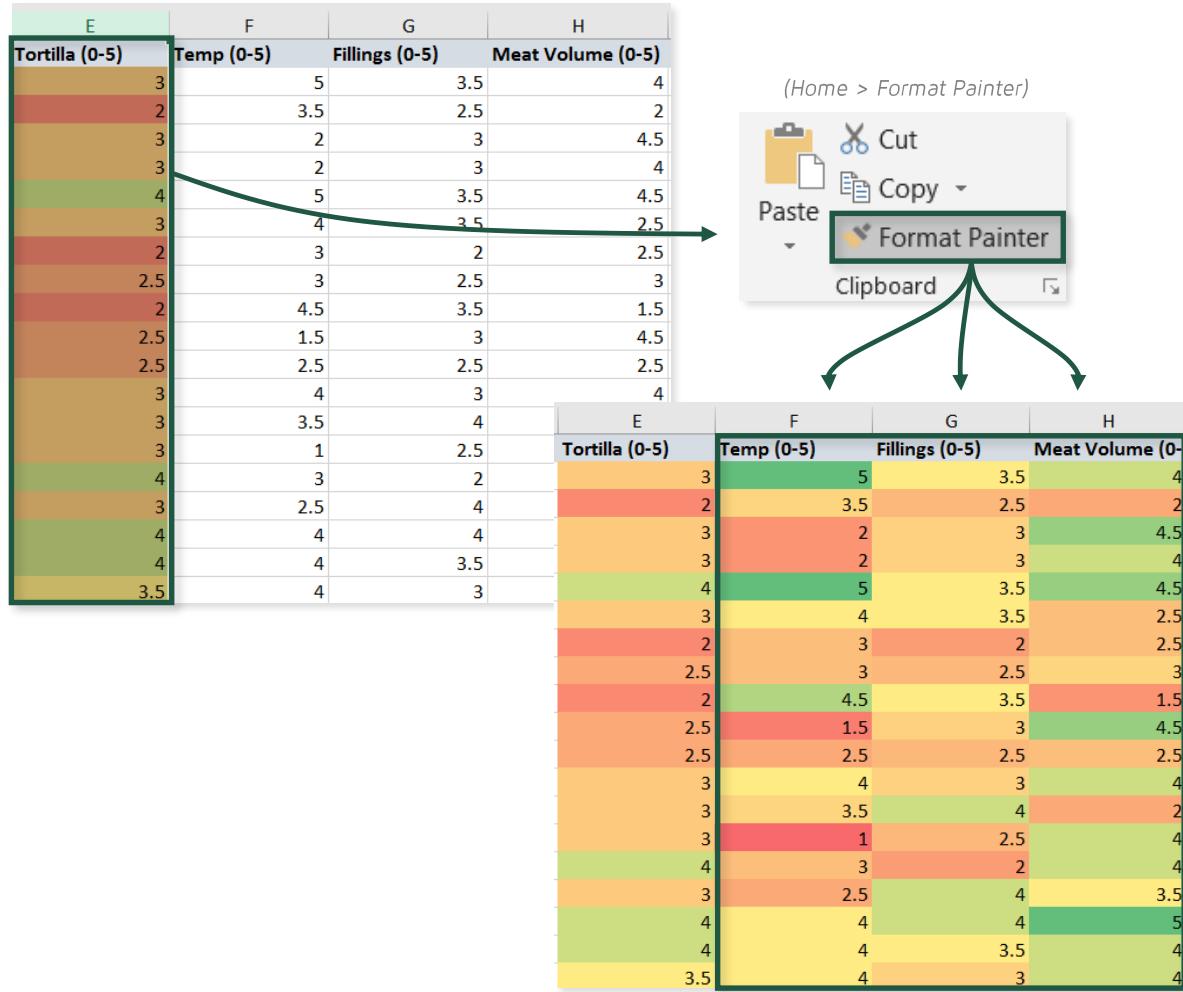
- Use the **Format Painter** to copy all formatting settings (*fill, number format, borders, font styles, alignment, etc.*) from one cell or range of cells to another
- Click the format painter once to copy formats one time; **double click** if you want to copy formats multiple times (*until you click the format painter again to deactivate*)



FORMATTING



1 STAR (VERY BASIC)



## COMMON USE CASES:

- Quickly applying formats across multiple columns without having to manually replicate each setting
- Ensuring that cell formats are exactly the same (borders, fill, number format, etc.)

## PRO TIP

# USE COLOR & BORDERS TO CREATE POLISHED REPORTS

- **Fill colors** and **borders** aren't just stylistic tools; they can be used strategically to improve readability, create spacing, and draw attention to key metrics or trends
- Hide worksheet gridlines and add **white borders** to create a clean and polished look
  - Under the border options in the *Home* tab, use **Line Color** to set the border color and **Line Style** to determine the thickness



FORMATTING



1 STAR (VERY BASIC)

The screenshot illustrates the use of borders and colors in Excel. The first part shows a polished report with light borders. The second part shows the 'Font' ribbon tab with styling options. The third part shows the 'Draw Borders' context menu.

Week Start	TRAFFIC						LEADS					
	Spend	Impressions	Clicks	\$/Click	Click %	Lead A	Lead B	Lead C	Lead D	Total Leads	\$/Lead	Lead %
6/30/18	\$7,761	29,005	2,986	\$2.60	10.3%	319	194	336	267	1,116	\$6.95	37.4%
7/7/18	\$9,748	25,647	1,307	\$7.46	5.1%	177	210	177	287	851	\$11.45	65.1%
7/14/18	\$6,482	22,026	2,548	\$2.54	11.6%	292	314	219	155	980	\$6.61	38.5%
7/21/18	\$5,463	28,726	2,227	\$2.45	7.8%	244	243	306	259	1,052	\$5.19	47.2%
7/28/18	\$9,907	24,595	2,952	\$3.36	12.0%	288	270	298	237	1,093	\$9.06	37.0%
8/4/18	\$5,504	28,700	1,343	\$4.10	4.7%	314	155	216	310	995	\$5.53	74.1%
8/11/18	\$5,632	27,690	1,327	\$4.24	4.8%	220	236	306	229	991	\$5.68	74.7%
8/18/18	\$9,201	22,969	1,567	\$5.87	6.8%	256	283	202	155	896	\$10.27	57.2%
8/25/18	\$5,567	23,096	1,033	\$5.39	4.5%	251	340	306	264	1,161	\$4.80	112.4%
9/1/18	\$6,399	25,640	2,141	\$2.99	8.4%	272	196	342	159	969	\$6.60	45.3%
9/8/18	\$9,730	15,279	2,879	\$3.38	18.8%	231	315	275	256	1,077	\$9.03	37.4%
9/15/18	\$5,301	29,993	1,255	\$4.22	4.2%	168	350	309	333	1,160	\$4.57	92.4%
9/22/18	\$9,778	19,627	2,218	\$4.41	11.3%	301	183	325	325	1,134	\$8.62	51.1%

## COMMON USE CASES:

- Designing tools or dashboards that don't have a "spreadsheet" feel
- Creating separation between values without adding extra rows or columns

## PRO TIP

# FREEZE PANES TO KEEP ROWS & COLUMNS IN VIEW

- **Freeze Panes** is commonly used to “freeze” or fix the first row or column in place while allowing the rest of the sheet to scroll:
  - **Freeze Top Row**: Freezes the first row in place (*usually the header row*)
  - **Freeze First Column**: Freezes the first column in place
  - **Freeze Panes**: Freezes all cells *above and to the left of* the selected cell
- **NOTE:** Use the **Freeze Panes** option when you want to fix both rows and columns



FORMATTING



2 STARS (BASIC)

A	B	C	D	
1	Title	Release Date	Release Year	Release Month
2	Over the Hill to the Poorhouse	9/15/1920	1920	9
3	Metropolis	1/26/1927	1927	1
4	The Broadway Melody	11/11/1929	1929	11
5	42nd Street	8/29/1933	1933	8
6	Top Hat	4/15/1935	1935	4
7	Modern Times	10/7/1936	1936	10
8	Snow White and the Seven Dwarfs	2/2/1937	1937	2
9	Gone with the Wind	11/12/1939	1939	11
10	The Wizard of Oz	4/9/1939	1939	4
11	Fantasia	5/18/1940	1940	5
12	Pinocchio	10/12/1940	1940	10
13	Duel in the Sun	6/7/1946	1946	6

(View > Freeze Panes)

### Freeze Panes

Keep rows and columns visible while the rest of the worksheet scrolls (based on current selection).

### Freeze Top Row

Keep the top row visible while scrolling through the rest of the worksheet.

### Freeze First Column

Keep the first column visible while scrolling through the rest of the worksheet.

A	P	Q	R	S	
1	Title	Lead Actor FB Likes	Cast FB Likes	Director FB Likes	Movie FB Likes
32	A Fistful of Dollars	16000	16534	0	0
33	A Hard Day's Night	785	2538	44	0
34	Goldfinger	387	1198	82	0
35	Mary Poppins	382	2045	55	0
36	My Fair Lady	453	1164	165	0
37	Nothing But a Man	581	835	0	363
38	Doctor Zhivago	597	1966	767	7000
39	Major Dundee	773	2888	541	251
40	The Greatest Story Ever Told	940	1934	126	1000
41	The Sound of Music	354	1495	338	15000
42	Thunderball	244	1164	92	0
43	The Good, the Bad and the Ugly	16000	16089	0	20000
44	You Only Live Twice	742	2127	43	0
45	2001: A Space Odyssey	273	727	0	24000
46	Oliver!	695	1593	82	0
47	Butch Cassidy and the Sundance Kid	640	2169	131	0
48	Mississippi Mermaid	963	1694	0	278

## COMMON USE CASES:

- Keeping the header row visible as you scroll through rows (**Note:** this happens by default if you format your range as a **table**)
- Freezing “key” columns when tables contain a large number of fields

## PRO TIP

# CENTER TEXT ACROSS A SELECTION OF CELLS

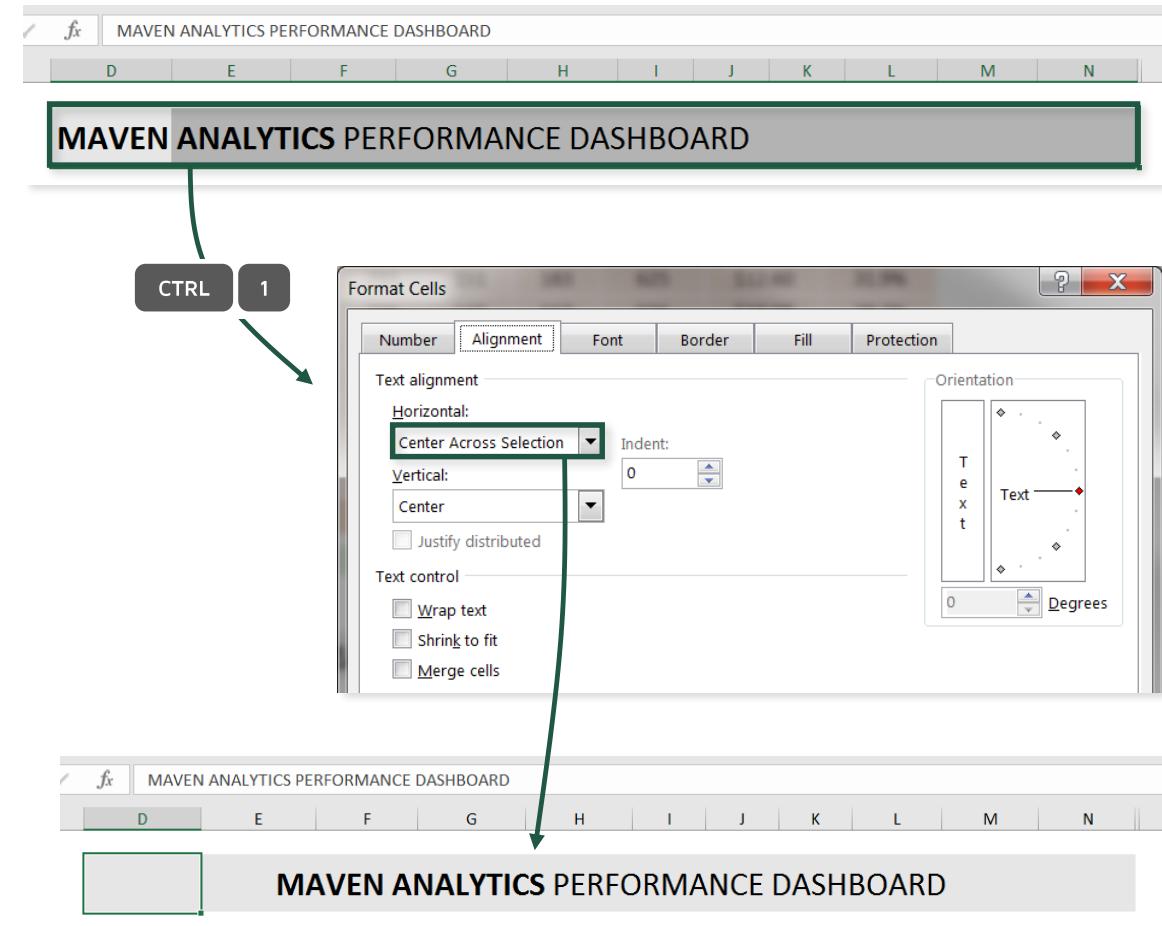
- Most users center text across cells by **merging** and then **aligning to center**; however, merged cells can cause issues if you need to modify other cells in the sheet
- Instead of merging, select a cell range, launch the **Format Cells** dialog box (**CTRL-1**), and choose **Center Across Selection** in the Alignment tab (*Horizontal options*)



FORMATTING



2 STARS (BASIC)



## COMMON USE CASES:

- *Formatting text headers within reports or dashboards*
- *Customizing alignment in cases where merged cells cannot be used*

## PRO TIP

# USE CUSTOM FORMATTING TO MAKE TEXT INVISIBLE

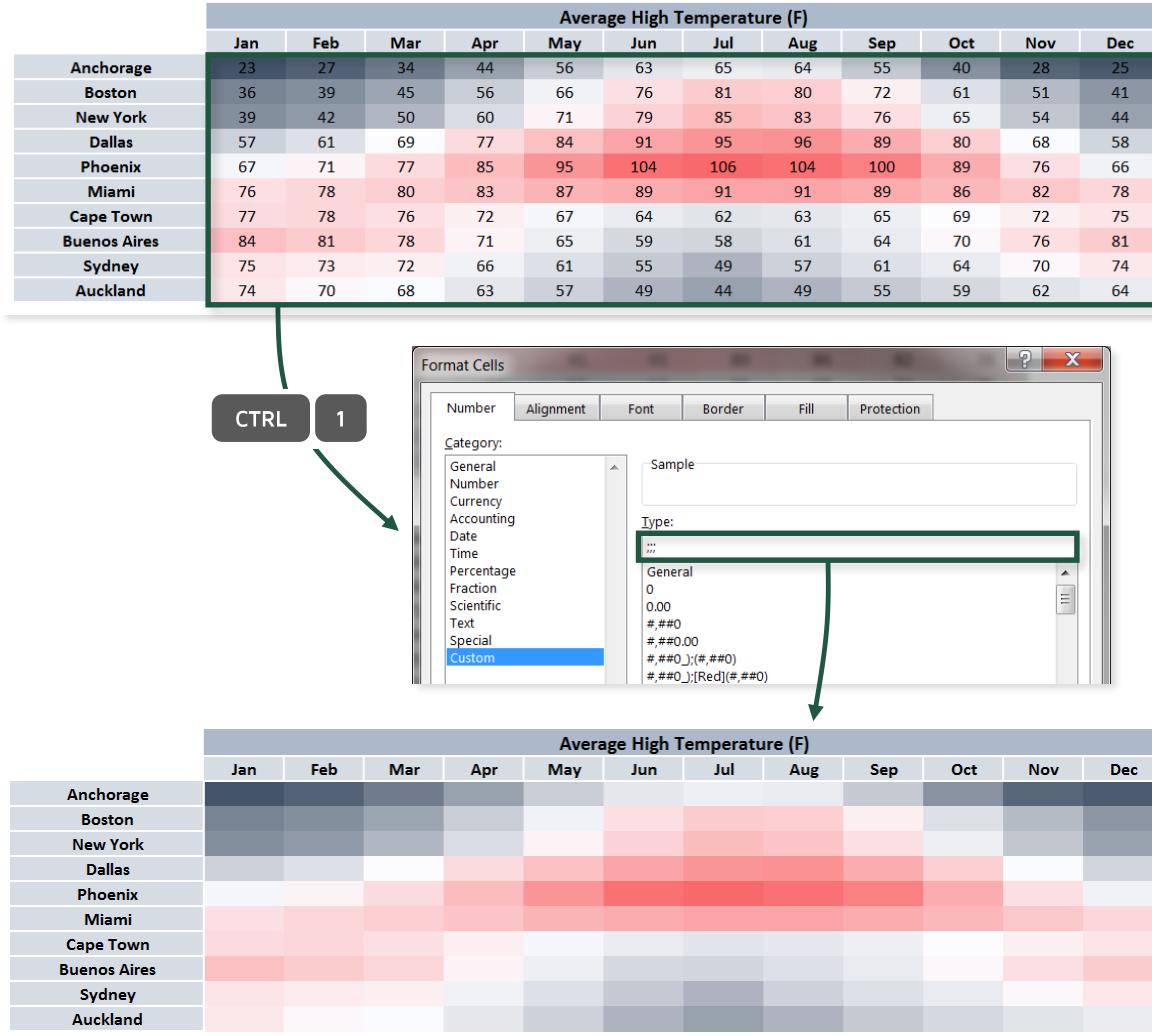
- Use a **custom number format** with type “;;;” (three consecutive semi-colons) to make text invisible
- **NOTE:** This does *not* delete the underlying values, it simply prevents them from displaying within cells



FORMATTING



2 STARS (BASIC)



## COMMON USE CASES:

- Creating heatmaps to visualize data while obscuring underlying values
- Transforming a column of values into **data bars** or **icon sets** to visualize high-level patterns or trends

## PRO TIP

# PROPERLY FORMAT ZIP CODES & PHONE NUMBERS

- Zip codes and phone numbers can be difficult to work with, since Excel often converts them to numerical fields by default
- Most versions of Excel include a **Special** formatting category for dealing with these specific types of values (as well as SS#)
  - **NOTE:** You can also use text functions like **TEXT(A1,"0#####")** to format zip codes or **LEFT/MID/RIGHT** to format phone numbers



FORMATTING



2 STARS (BASIC)

The screenshot shows two adjacent Excel tables. The left table (D) has columns for 'Zip Code' and 'Telephone'. The right table (E) also has columns for 'Zip Code' and 'Telephone'. A 'Format Cells' dialog box is open over the tables. In the 'Category' list, 'Text' is selected. In the 'Type' list, 'Zip Code' is highlighted. The 'Sample' box shows '62031' and '(618) 376-3064' respectively. Arrows point from the 'CTRL' key and the number '1' to the 'Text' category and the 'Zip Code' type selection in the dialog box.

D	E
Zip Code	Telephone
62031	6183763064
95936	5302893807
7040	9082641670
22448	5406447658
70815	2252744802
97205	5034022075
78749	5126337667
36083	3347257343
11101	3476260700
12207	5184317602
77803	9798141664
75247	2544883212
2905	4012
8232	6094
54620	6082
48607	9896

D	E
Zip Code	Telephone
62031	(618) 376-3064
95936	(530) 289-3807
07040	(908) 264-1670
22448	(540) 644-7658
70815	(225) 274-4802
97205	(503) 402-2075
78749	(512) 633-7667
36083	(334) 725-7343
11101	(347) 626-0700
12207	(518) 431-7602
77803	(979) 814-1664
75247	(254) 488-3212
	(401) 222-2097
	(609) 412-4268
	(608) 272-8021
	(989) 669-4705

## COMMON USE CASES:

- Reformatting zip codes or phone numbers that have automatically been converted into numerical values (you'll never add two zip codes!)
- Adding leading zeros to force zip codes into a consistent 5-digit format

## PRO TIP

# GROUP COLUMNS OR ROWS TO SIMPLIFY REPORTS

- Use the **Group** option (*Data > Group*) to hide selected rows or columns from view
- Excel automatically generates toggles (+/-) to show or hide individual groups, as well as buttons to show or hide *all* rows or columns with one click (labeled "1" and "2")



FORMATTING



2 STARS (BASIC)

The screenshot shows a complex Excel dashboard titled 'MAVEN ANALYTICS PERFORMANCE DASHBOARD'. It contains several data tables and charts. A green arrow points from the 'Data > Group' menu in the top ribbon to the 'Group' button in the ribbon, which is highlighted. The 'Group' button is part of a group of buttons including 'Ungroup' and 'Subtotal'.

**MAVEN ANALYTICS PERFORMANCE DASHBOARD**

TOPLINE SUMMARY		TRAFFIC						LEADS						TRANSACTIONS					
Week	Start Date	Spend	Impressions	Clicks	CPC	CTR	Total Leads	\$/Lead	Lead %	Total Transactions	S/Transaction	Transaction %							
9/1/18	9/1/18	\$8,831	16,398	1,789	\$4.94	10.9%	935	\$9.44	52.3%	248	\$35.61	13.9%							
9/8/18	9/8/18	\$9,264	29,366	1,604	\$5.78	5.5%	964	\$9.61	60.1%	299	\$30.98	18.6%							
9/15/18	9/15/18	\$5,152	20,077	2,206	\$2.34	11.0%	894	\$5.76	40.5%	220	\$23.42	10.0%							
9/22/18	9/22/18	\$5,706	29,892	1,500	\$3.80	5.0%	1,012	\$5.64	67.5%	269	\$21.21	17.9%							

**SEGMENT BREAKDOWN**

Segment	Week	Spend	Impressions	Clicks	CPC	CTR	Total Leads	\$/Lead	Lead %	Total Transactions	S/Transaction	Transaction %
SEGMENT A	9/1/18	\$2,295	4,081	431	\$5.41	10.3%	50	\$51.80	98.0%	123	\$33.62	37.7%
SEGMENT A	9/8/18	\$2,580	7,320	2,293	\$2.32	32.2%	206	\$12.63	50.0%	243	\$30.92	18.2%
SEGMENT B	9/1/18	\$1,789	3,486	389	\$4.94	11.0%	133	\$11.74	52.3%	104	\$29.53	19.8%
SEGMENT B	9/8/18	\$1,564	29,366	1,604	\$5.78	5.5%	964	\$9.61	60.1%	299	\$30.98	18.6%
SEGMENT C	9/1/18	\$1,162	20,077	2,206	\$2.34	11.0%	894	\$5.76	40.5%	220	\$23.42	10.0%
SEGMENT C	9/8/18	\$1,077	1,030	389	\$3.80	3.5%	218	\$15.38	50.0%	133	\$27.40	17.9%

**CHANNEL BREAKDOWN**

Channel	Week	Spend	Impressions	Clicks	CPC	CTR	Total Leads	\$/Lead	Lead %	Total Transactions	S/Transaction	Transaction %
CHANNEL A	9/1/18	\$1,107	17,462	769	\$1.14	4.4%	79	\$14.17	90.1%	123	\$34.64	37.7%
CHANNEL A	9/8/18	\$2,203	14,932	703	\$3.11	4.8%	47	\$7.60	81.6%	243	\$30.92	18.2%
CHANNEL B	9/1/18	\$1,175	9,311	644	\$1.39	7.2%	91	\$7.73	95.6%	104	\$29.53	19.8%
CHANNEL B	9/8/18	\$2,546	13,435	521	\$4.52	6.7%	62	\$7.93	97.0%	133	\$27.40	17.9%
CHANNEL C	9/1/18	\$1,147	10,052	771	\$1.60	4.0%	77	\$14.58	96.0%	74	\$34.64	37.7%
CHANNEL C	9/8/18	\$2,532	14,932	806	\$2.46	5.7%	96	\$12.31	99.1%	133	\$27.40	17.9%

## COMMON USE CASES:

- Designing reports that contain a large amount of data, but only display the most important information by default
- Enabling users to quickly toggle views without manually unhiding rows and columns

## PRO TIP

# REFORMAT ERRORS WITH IFERROR FUNCTIONS

- Wrap formulas with an **IFERROR** statement to customize how errors will be displayed (*i.e.* “-” instead of **#DIV/0!**)
- NOTE:** Use this tip carefully, and only when you understand the source of the error; **IFERROR** should be used for cosmetics, not to “fix” broken formulas or mislead users



FORMATTING



3 STARS (MODERATE)

Select Player: Victor Martinez

	AB	H	Avg	R	HR	RBI	SB	CS	SB%	K/BB
2010	493	149	0.302	64	20	79	1	0	100%	1.3
2011	540	178	0.330	76	12	103	1	0	100%	1.1
2012	0	0	#DIV/0!	0	0	0	0	0	#DIV/0!	#DIV/0!
2013	605	182	0.301	68	14	83	0	2	0%	1.1
2014	561	188	0.335	87	32	103	3	2	60%	0.6
2015	440	108	0.245	39	11	64	0	0	#DIV/0!	1.7
Total:	2,639	805	0.305	334	89	432	5	4	56%	1.1

X ✓ fx =IFERROR(AB5/(AB5+AC5),"-")

Select Player: Victor Martinez

	AB	H	Avg	R	HR	RBI	SB	CS	SB%	K/BB
2010	493	149	0.302	64	20	79	1	0	100%	1.3
2011	540	178	0.330	76	12	103	1	0	100%	1.1
2012	0	0	-	0	0	0	0	0	-	-
2013	605	182	0.301	68	14	83	0	2	0%	1.1
2014	561	188	0.335	87	32	103	3	2	60%	0.6
2015	440	108	0.245	39	11	64	0	0	-	1.7
Total:	2,639	805	0.305	334	89	432	5	4	56%	1.1

## COMMON USE CASES:

- Cleaning up a user-facing report or dashboard where occasional errors are expected (*i.e.* dividing by zero)
- Writing formulas that produce different outputs based on whether or not a conditional test yields an error

## PRO TIP

# CONVERT TEXT STRINGS INTO DATE VALUES

- **Dates** are one of the most challenging data types to work with, as formats tend to vary considerably (i.e. **MM/DD/YYYY** vs. **DD/MM/YYYY** vs. **MMDDYYYY**)
  - Excel understands a wide range of date formats specific to your regional settings; however, unusual or non-local formats may be recognized as **text**, not dates
- Use text functions (**LEFT/MID/RIGHT/&**) to rearrange date components from a string, and **DATEVALUE** to convert the result



FORMATTING



4 STARS (ADVANCED)

	A	B	C
1	Date	Type	Country
2	19000128	Unprovoked	Australia
3	19000701	Provoked	USA
4	19000714	Invalid	USA
5	19000731	Unprovoked	Croatia
6	19000821	Unprovoked	USA
7	19000905	Unprovoked	USA
8	19000913	Unprovoked	USA

=DATEVALUE(MID(A2,5,2)"/"&RIGHT(A2,2)"/"&LEFT(A2,4))

	A	B	C	D
1	Date	New Date	Type	Country
2	19000128	1/28/1900	Unprovoked	Australia
3	19000701	7/1/1900	Provoked	USA
4	19000714	7/14/1900	Invalid	USA
5	19000731	7/31/1900	Unprovoked	Croatia
6	19000821	8/21/1900	Unprovoked	USA
7	19000905	9/5/1900	Unprovoked	USA
8	19000913	9/13/1900	Unprovoked	USA

## COMMON USE CASES:

- Reformattting fields that Excel doesn't recognize as common date types
- Converting dates from text to date values, in order to use them for date/time or time-series analysis

## PRO TIP

# DEFINE YOUR OWN FORMULA-DRIVEN FORMATS

- Use **formula rules** to format cells using custom or complex logic that standard conditional formatting tools can't handle
  - *For example:* formatting an entire row in a table or range based on the values in one column, or applying formats to cells that meet multiple, formula-based criteria
- **NOTE:** Intellisense is not available within the conditional formatting dialog box, so make sure you know your formula syntax!



FORMATTING



5 STARS (EXPERT)

The screenshot shows a Microsoft Excel spreadsheet titled "TO-DO LIST". The table has columns: A (TASK), B (CATEGORY), C (PRIORITY (1-3)), D (DUE DATE), and E (STATUS (0/1)). Rows 3 through 24 list various tasks. Row 2 is a header row with dropdown arrows. The "Status" column contains green checkmarks in most rows, except for row 11 which has a red question mark.

A green arrow points from the bottom-left of the table to the "Conditional Formatting" button in the top ribbon. Another green arrow points from the "New Rule..." option in the "Highlight Cells Rules" submenu to the "Format values where this formula is true:" input field in the "Format Rule" dialog box. The formula entered is `=AND($D3<TODAY(),$E3=0)`. A preview window shows a row with a due date before today and a status of 0 (red) highlighted in pink.

The "Format Rule" dialog box also includes fields for "Format..." (button), "OK" (button), and "Cancel" (button). The "Edit the Rule Description:" section contains the formula `=AND($D3<TODAY(),$E3=0)`.

## COMMON USE CASES:

- Applying custom or complex formats beyond the standard options
- Highlighting cells which meet a specific set of criteria (i.e. rows where **Due Date** has passed, **Category** = "Work" and **Priority** = 1)

## PRO TIP

# APPLY ADVANCED CUSTOM NUMBER FORMATS

- Use **Custom** formatting options to select more complex formats, or define your own using Excel's custom formatting syntax
- Custom formats contain up to 4 conditions, separated by semicolons (**A;B;C;D**)
  - **A:** Format for **positive** numbers
  - **B:** Format for **negative** numbers
  - **C:** Format for **zeros**
  - **D:** Format for **text**
- **LEARN MORE:** <http://bit.ly/2A1JFUD>



FORMATTING



5 STARS (EXPERT)

The screenshot illustrates the process of applying custom number formats in Excel. It shows a table with three columns: Gross Revenue, Budget, and Profit. The Profit column contains both positive and negative values. A green arrow points from the Profit column to the 'Custom' category in the 'NumberFormat' dropdown menu. Another green arrow points from the 'Custom' category to the 'Type' dropdown menu, which displays the custom format code: '\$#,##0\_.);[Red](#,##0)'. This code defines four conditions: positive numbers (e.g., \$3.00 M), zero (e.g., \$0.16 M), negative numbers (e.g., \$(5,973,565)), and text (e.g., \$#,##0\_.);(\$#,##0)). The final result is shown in the bottom right, where the Profit column values are formatted according to these rules.

Gross Revenue	Budget	Profit
3000000	100000	2900000
26435	6000000	-5973565
2808000	379000	2429000
2300000	439000	1861000
3000000	609000	2391000
163245	1500000	-1336755
184925485	2000000	182925485
198655278	3977000	194678278
22202612	2800000	19402612

Gross Revenue	Budget	Profit
\$3.00 M	\$0.10 M	\$2,900,000
\$0.03 M	\$6.00 M	(\$(5,973,565))
\$2.81 M	\$0.38 M	\$2,429,000
\$2.30 M	\$0.44 M	\$1,861,000
\$3.00 M	\$0.61 M	\$2,391,000
\$0.16 M	\$1.50 M	(\$(1,336,755))
\$184.93 M	\$2.00 M	\$182,925,485
\$198.66 M	\$3.98 M	\$194,678,278
\$22.20 M	\$2.80 M	\$19,402,612

## COMMON USE CASES:

- Applying *custom formats* to *positive vs. negative values* to draw attention to important patterns or trends
- Abbreviating large values with "**K**" or "**M**" labels (no formulas required)

# FORMULA TIPS

## PRO TIP

# CHANGE FORMULA CALCULATION MODES

- Excel has two primary **calculation modes**: **Automatic** (default) and **Manual**
  - Automatic** allows formulas to calculate automatically with any workbook change
  - Manual** freezes all formula calculations until the **Calculate Now (F9)** option is selected
- NOTE:** If you see a worksheet formula producing duplicate values, check that you are not in **Manual** calculation mode

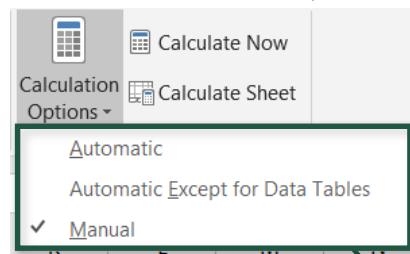


FORMULAS

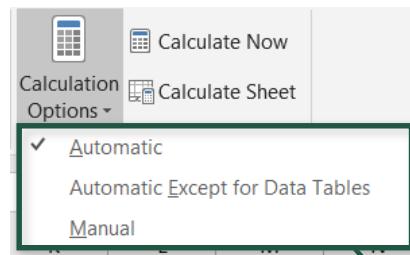


1 STAR (VERY BASIC)

(Formulas > Calculation Options)



B	C	D	E
Quantity	Retail Price	Unit Cost	Sales Profit
53,847	\$0.32	\$0.10	\$12,058.25
47,363	\$2.47	\$0.74	\$12,058.25
36,381	\$1.72	\$0.86	\$12,058.25
36,334	\$1.01	\$0.10	\$12,058.25
36,039	\$0.76	\$0.38	\$12,058.25
35,317	\$3.20	\$0.32	\$12,058.25
30,680	\$2.38	\$0.95	\$12,058.25
26,437	\$0.78	\$0.31	\$12,058.25
26,315	\$0.45	\$0.09	\$12,058.25
24,753	\$0.74	\$0.22	\$12,058.25
23,854	\$1.65	\$0.66	\$12,058.25



B	C	D	E
Quantity	Retail Price	Unit Cost	Sales Profit
53,847	\$0.32	\$0.10	\$12,058.25
47,363	\$2.47	\$0.74	\$81,899.38
36,381	\$1.72	\$0.86	\$31,324.62
36,334	\$1.01	\$0.10	\$33,059.74
36,039	\$0.76	\$0.38	\$13,622.48
35,317	\$3.20	\$0.32	\$101,848.07
30,680	\$2.38	\$0.95	\$43,726.09
26,437	\$0.78	\$0.31	\$12,397.33
26,315	\$0.45	\$0.09	\$9,390.94
24,753	\$0.74	\$0.22	\$12,843.13
23,854	\$1.65	\$0.66	\$23,634.29

## COMMON USE CASES:

- Switching large, formula-heavy files to manual mode while editing to prevent automatic recalculation
- Allowing formulas to calculate automatically with the exception of data tables, which typically iterate a large number of times

## PRO TIP

# USE FORMULA LINE BREAKS TO IMPROVE READABILITY

- While typing or editing in the formula bar, press **ALT-ENTER** to create a line break
- **Line breaks** are a great way to improve readability and provide transparency into formula logic, particularly for complex nested or conditional (IF) functions



FORMULAS



1 STAR (VERY BASIC)

B	C	D	E	F	G	H
ion_id	store_type	store_city	store_state	store_country	total_sqft	store_size
28	Supermarket	Acapulco	Guerrero	Mexico	23,593	Small
78	Small Grocery	Bellingham	WA	USA	28,206	Medium
76	Supermarket	Bremerton	WA	USA	39,696	Very Large

ALT      ENTER

B	C	D	E	F	G	H
ion_id	store_type	store_city	store_state	store_country	total_sqft	store_size
28	Supermarket	Acapulco	Guerrero	Mexico	23,593	"Other"))))
78	Small Grocery	Bellingham	WA	USA	28,206	Medium
76	Supermarket	Bremerton	WA	USA	39,696	Very Large

## COMMON USE CASES:

- Breaking conditional functions into multiple lines to isolate each criteria
- Making complex nested formulas easier to interpret by introducing each component function on a new line

## PRO TIP

# CHANGE MEASUREMENT UNITS WITH CONVERT

- Use the **CONVERT** function to change values from one unit of measurement to another (*lbs to kg, celcius to fahrenheit, minutes to seconds, etc.*)
- **NOTE:** Some unit types may not be listed in the formula dialog box, but can be accessed by typing them directly (i.e. “cm” for centimeters or “kg” for kilograms)



FORMULAS



1 STAR (VERY BASIC)

B	C	D	E
Average Monthly Temperature			
Month	Temp_f	Temp_c	
1/1/2010	41.7	=CONVERT(C3,"F","	
2/1/2010	43.1	CONVERT(number,from unit,to unit)	
3/1/2010	47.6		
4/1/2010	56.3		
5/1/2010	59.8		
6/1/2010	69.4		
7/1/2010	80.7		



B	C	D
Average Monthly Temperature		
Month	Temp_f	Temp_c
1/1/2010	41.7	5.3870968
2/1/2010	43.1	6.1428571
3/1/2010	47.6	8.6774194
4/1/2010	56.3	13.5
5/1/2010	59.8	15.419355
6/1/2010	69.4	20.8
7/1/2010	80.7	27.032258

## COMMON USE CASES:

- Quickly converting measurements without needing conversion rates or calculators
- Converting date or time values without the use of formula constants

## PRO TIP

# ADD REAL-TIME FORMULAS WITH TODAY & NOW

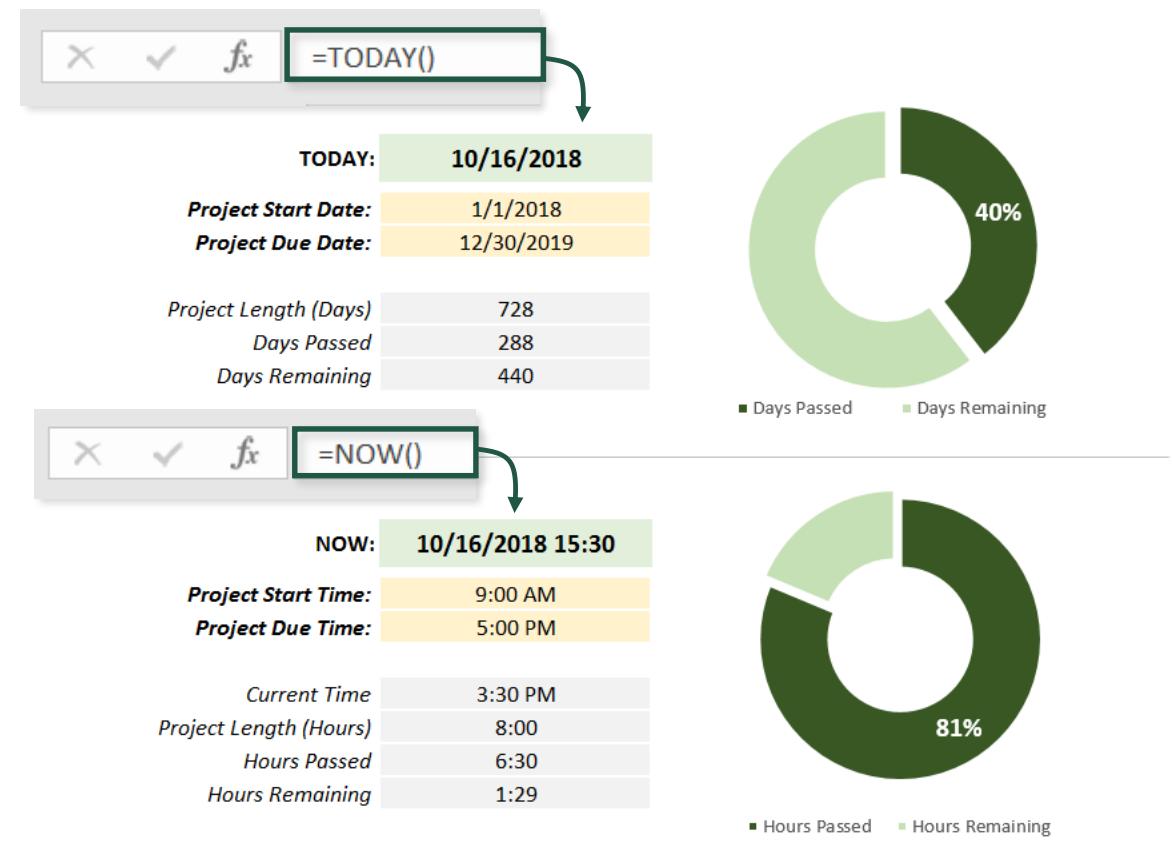
- Use **TODAY()** and **NOW()** functions to return the current date or time
- **NOTE:** These are **volatile** functions, meaning that they automatically recalculate with *any* workbook change
  - Use the **CTRL-;** shortcut to return the current day as a hard-coded value, or **CTRL-SHIFT-;** to return the current time



FORMULAS



2 STARS (BASIC)



## COMMON USE CASES:

- Displaying the current date or time in a worksheet cell
- Creating scheduling or timeline tools that update with any workbook change

## PRO TIP

# FIND & FIX ERRORS USING FORMULA AUDITING TOOLS

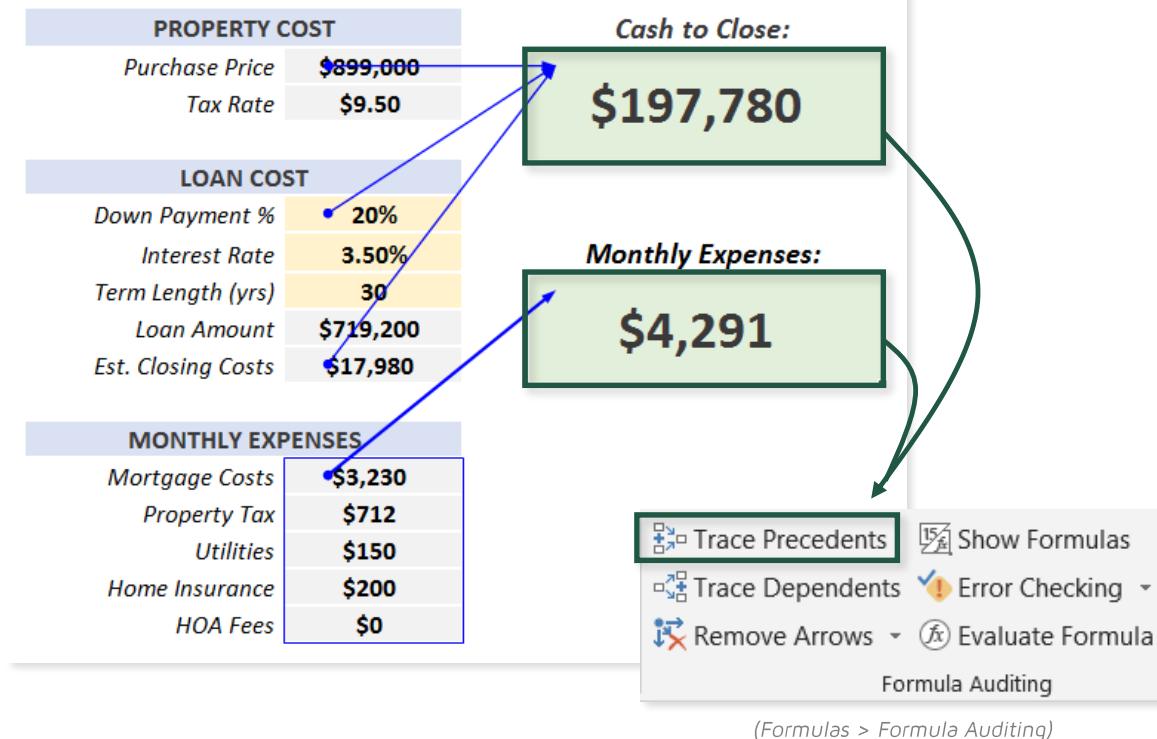
- Use **Formula Auditing** to trace references, evaluate calculations, and diagnose errors:
  - **Trace Precedents:** Draws arrows to any cells that *impact* the selected value
  - **Trace Dependents:** Draws arrows to any cells *impacted by* the selected value
  - **Show Formulas:** Temporarily displays all formulas within the worksheet
  - **Error Checking:** Scans the sheet for errors and traces the source to precedent cells
  - **Evaluate Formula:** Evaluates each component of a formula step-by-step



FORMULAS



3 STARS (MODERATE)



## COMMON USE CASES:

- Understanding how complex formulas and functions operate
- Visualizing which cells factor into a certain formula output
- Tracing and diagnosing the source of an error

## PRO TIP

# USE STATS FUNCTIONS FOR PIVOT-STYLE REPORTS

- **Conditional stats functions (SUMIFS, COUNTIFS, AVERAGEIFS)** can be used to generate filtered values just like PivotTables
- While pivots are ideal for unstructured analysis, **stats functions** are a great tool for building custom reports and dashboards



FORMULAS



3 STARS (MODERATE)

The diagram illustrates the mapping of three Excel functions (COUNTIFS, SUMIFS, and AVERAGEIFS) to a PivotTable structure. The main table shows raw data with columns: Title, Genre, Country, IMDb Score, Revenue, and Action. A PivotTable is shown below, grouped by Country, with rows for USA, UK, France, Germany, and Australia. The PivotTable includes three summary rows: Count of Title, Sum of Revenue, and Average IMDb Score.

**PivotTable Structure:**

Country	Title Count	Revenue	Avg. IMDb Score
USA	702	\$59,778,470,770	6.23
UK	69	\$3,099,974,501	6.56
France	27	\$1,076,178,688	6.53
Germany	24	\$649,089,608	5.87
Australia	14	\$843,261,855	6.48

**Function Mappings:**

- COUNTIFS:** Corresponds to the "Count of Title" row in the PivotTable.
- SUMIFS:** Corresponds to the "Revenue" row in the PivotTable.
- AVERAGEIFS:** Corresponds to the "Avg. IMDb Score" row in the PivotTable.

## COMMON USE CASES:

- Designing custom-formatted, dynamic reports without using PivotTables
- Filtering or segmenting raw data based on a given set of criteria

## PRO TIP

# COUNT WORDS IN A CELL USING TEXT FORMULAS

- **LEN** and **SUBSTITUTE** can be used to count the number of spaces (and therefore determine the number of words) in a string
  - *In this example, we're counting spaces by replacing them with blanks, and comparing the original string length to the new one*
- **NOTE:** Add a **TRIM** function to avoid counting extra (leading or trailing) spaces



FORMULAS



3 STARS (MODERATE)

F	Description	G	Word Count
Berry and cherry aromas are surprisingly sturdy and clean. Freshness is maintained on the palate, which is honest enough to offer modest tannic bite. Lightly spiced plum and raspberry flavors change little on an easy finish.			36
Fruity, soft and rather sweet, this wine smells and tastes like apple and pear juice. It has low acidity, medium body and a sugary finish.			25
Crimson in color but also translucent, with a candied, slightly green nose. Overall this is a simple quaffer with no excess weight and reasonably good flavors of berry and plum. Bland on the finish, but for \$4 who's caring about finish?			41
Sweet and fruity, this canned wine feels soft and syrupy, with sugary pear as the primary flavor on the palate. It's a basic white wine in a convenient package.			29
This opens with standard cherry and berry aromas before transitioning to a juicy palate with red berry, plum, herb and grass notes. It finishes a little hot and aggressive, but for \$4 who's complaining?			34
Nice on the nose, this has a leafy note and a mellow red-berry aroma. Bouncy and rubbery feeling, it has easygoing flavors of raspberry and plum. It's candied and rubbery tasting on the finish, but good overall.			37

=LEN(TRIM(F2))-LEN(TRIM(SUBSTITUTE(F2, " ", "")))+1

## COMMON USE CASES:

- Adding counters in cases where word counts are important
- Analyzing text fields (Tweets, Blogs, Ad Copy, etc.) based on length

## PRO TIP

# CREATE DEPENDENT DROP-DOWNS WITH INDIRECT

- Use **INDIRECT** and **Data Validation** to create drop-down lists that update based on user selections:
  - **STEP 1:** Create individual lists containing all sets of possible selections
  - **STEP 2:** Turn each list into a named range using the Name Manager or Name Box (be *consistent with your names!*)
  - **STEP 3:** Create a second drop-down, and configure the list source to reference the first drop-down cell, wrapped in **INDIRECT**



FORMULAS



4 STARS (ADVANCED)

(Summer Named Range)

Summer		
L	M	N
1	Season	Summer Sports
2	Summer	Archery
3	Winter	Athletics
4		Badminton
5		Baseball
6		Basketball
7		Beach Volleyball
8		Boxing
9		Canoeing
10		Cycling
11		Diving
12		Equestrianism
		Winter Sports
		Alpine Skiing
		Biathlon
		Bobsleigh
		Cross Country Skiing
		Curling
		Figure Skating
		Freestyle Skiing
		Ice Hockey
		Luge
		Nordic Combined
		Short Track Speed Skating

(Winter Named Range)

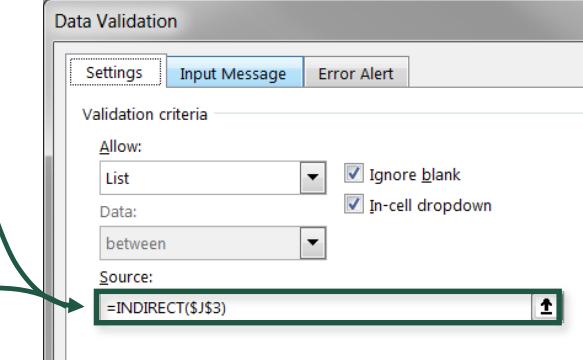
Winter		
L	M	N
1	Season	Summer Sports
2	Summer	Archery
3	Winter	Athletics
4		Badminton
5		Baseball
6		Basketball
7		Beach Volleyball
8		Boxing
9		Canoeing
10		Cycling
11		Diving
12		Equestrianism
		Winter Sports
		Alpine Skiing
		Biathlon
		Bobsleigh
		Cross Country Skiing
		Curling
		Figure Skating
		Freestyle Skiing
		Ice Hockey
		Luge
		Nordic Combined
		Short Track Speed Skating

Select Season: Summer

Select Sport: Archery

Select Season: Winter

Select Sport: Alpine Skiing



(Data > Data Validation)

## COMMON USE CASES:

- Creating dynamic reports with multiple user inputs
- Configuring drop-down lists to prevent users from selecting invalid combinations of options

## PRO TIP

# CREATE DYNAMIC LINKS USING HYPERLINK

- Use **HYPERNLINK** to connect users straight to specific workbook locations
- Syntax is *extremely* specific; for example, the following would link to Sheet1, cell A1:  
`=HYPERLINK("#'Sheet1'!A1","LinkName")`
- **NOTE:** You can replace a hard-coded sheet name with a cell reference, but you need to concatenate it with the hash, exclamation point, and quotation marks as shown



FORMULAS



4 STARS (ADVANCED)

The screenshot shows a Microsoft Excel interface with two main sections: "PRODUCTIVITY TIPS" and "FORMATTING TIPS". Both sections have columns for Topic, Level of Difficulty (using a star rating system), and Link. In the "PRODUCTIVITY TIPS" section, the "Link" column for row 4 ("Navigation Shortcuts") contains the formula `=HYPERLINK("#'"&B5&"'!A1","Link")`. A green arrow points from this formula down to a smaller screenshot below, which shows a product price table. In this smaller screenshot, the "Price" cell for a "T-Shirt" in "Large" size is highlighted in yellow, with the formula `=HYPERLINK("#'"&B5&"'!A1","Link")` displayed above it. The Excel ribbon at the bottom includes tabs for TABLE OF CONTENTS, Navigation Shortcuts, and "Go To" Options.

## COMMON USE CASES:

- Adding tools to help users navigate large or complex workbooks
- Creating reports with links to additional details or data sources

## PRO TIP

# FIND VALUE RANGES USING “FUZZY MATCH” VLOOKUPS

- **Approximate** (aka “Fuzzy”) **Match** can be used to determine where a specific lookup value falls within a given set of ranges
  - Instead of finding an *exact* match, this finds the closest match that is **equal to or less than** the lookup value
  - In the *[range\_lookup]* argument of a VLOOKUP, use **TRUE** (or 1) for fuzzy match
- **NOTE:** Groups must be defined by the **minimum value**, and in **ascending order**



FORMULAS



4 STARS (ADVANCED)

Product	Quantity	Retail Price	Discount
WORLD WAR 2 GLIDERS ASSTD DESIGNS	5	\$0.32	0%
JUMBO BAG RED RETROSPOT	25	\$2.47	15%
ASSORTED COLOUR BIRD ORNAMENT	75	\$1.72	20%
POPCORN HOLDER	6	\$1.01	5%
PACK OF 72 RETROSPOT CAKE CASES	10	\$0.76	5%
WHITE HANGING HEART T-LIGHT HOLDER	5	\$3.20	0%
RABBIT NIGHT LIGHT	100	\$2.38	20%
MINI PAINT SET VINTAGE	15	\$0.78	10%

=VLOOKUP(C2,\$H\$2:\$I\$6,2,TRUE)

- TRUE - Approximate match
- FALSE - Exact match

G	H	I
Order Volume	Order Minimum	Discount
0 - 5	0	0%
6 - 10	6	5%
11 - 20	11	10%
21 - 50	21	15%
51+	51	20%

## COMMON USE CASES:

- Defining variable commission rates based on agent sales volume
- Calculating tiered discounts based on purchase quantity

## PRO TIP

# RANDOMIZE ITEMS WITH OFFSET & RANDBETWEEN

- Combine **OFFSET** with **RANDBETWEEN** to jump to random rows within a cell range
  - Since **RANDBETWEEN** is a **volatile** function, the result will automatically recalculate with *any* workbook change
- TIP:** Rather than hard-coding the max random value, use a **COUNTA** function to automatically count the length of the list



FORMULAS



4 STARS (ADVANCED)

	A	B
1	<b>LIST A</b>	<b>LIST B</b>
2	AQUATIC	AARDVAARKS
3	BALD	AIRBAGS
4	BELLIGERENT	ANGELS
5	CHUBBY	BANANAS
6	CLEAN	BEASTS
7	DAZZLING	BUBBLES
8	ELASTIC	CRICKETS
9	ELECTRIC	CROWS
10	ELEGANT	DAUGHTERS
11	FANCY	FISH
12	FLABBY	GHOSTS
13	FRIGID	GOGGLES
14	GLAMOROUS	KITTENS
15	GLISTENING	KNIVES
16	HANDSOME	MILKMEN
17	MAGNIFICENT	MONKEYS
18	MUSCULAR	MUSHROOMS
19	MYSTERIOUS	NECKTIES
20	PLUMP	PENGUINS
21	SALTY	
22	SCREECHING	
23	SCRUFFY	
24	SHAPELY	
25	SHORT	
26	SKINNY	
27	SLIPPERY	
28	UGLY	
29	UNDERCOVER	TODDLERS
30	WHIMSICLE	WEASELS
31	WHITE HOT	WHIPS



=OFFSET(A\$1,RANDBETWEEN(1,30),0)

=OFFSET(B\$1,RANDBETWEEN(1,30),0)

## COMMON USE CASES:

- Creating models or scenarios with randomized inputs
- Building your own hilarious band name generator (because why not!)

## PRO TIP

# COMBINE INDEX & MATCH FOR A FLEXIBLE LOOKUP

- **INDEX & MATCH** offer several benefits over traditional VLOOKUP functions:
  - No hard-coded column index; MATCH can identify headers and automatically pull values from the correct columns
  - Lookup values **don't need to live in the first column** of the table array
  - **More flexibility** for custom or complex cases (like finding the 2<sup>nd</sup> or 3<sup>rd</sup> matches)



FORMULAS



4 STARS (ADVANCED)

	A	B	C	D	E	F
1	Year	Store ID	Revenue	City	State	Country
2	2016	1	\$631,303	Acapulco	Guerrero	Mexico
3	2016	2	\$542,738	Bellingham	WA	USA
4	2016	3	\$653,469	Bremerton	WA	USA
5	2016	4	\$178,607	Camacho	Zacatecas	Mexico
6	2016	5	\$463,379	Spokane	WA	USA
7	2016	6	\$717,386	Beverly Hills	CA	USA
8	2016	7	\$517,508	Los Angeles	CA	USA
9	2016	8	\$122,819	Merida	Yucatan	Mexico
10	2016	9	\$379,994	Mexico City	DF	Mexico
11	2016	10	\$714,400	Orizaba	Veracruz	Mexico

H	I	J	K	L	M
Store Label	Store ID	Address	City	State	Country
Store 1	1	2853 Bailey Rd	Acapulco	Guerrero	Mexico
Store 2	2	5203 Catanzaro Way	Bellingham	WA	USA
Store 3	3	1501 Ramsey Circle	Bremerton	WA	USA
Store 4	4	433 St George Dr	Camacho	Zacatecas	Mexico
Store 5	5	5922 La Salle Ct	Spokane	WA	USA
Store 6	6	5495 Mitchell Canyon Road	Beverly Hills	CA	USA
Store 7	7	1077 Wharf Drive	Los Angeles	CA	USA
Store 8	8	3173 Buena Vista Ave	Merida	Yucatan	Mexico
Store 9	9	1872 El Pintado Road	Mexico City	DF	Mexico
Store 10	10	7894 Rotherham Dr	Orizaba	Veracruz	Mexico

## COMMON USE CASES:

- Populating many lookup columns without having to manually update formulas
- Working with more complex scenarios (like lookups with multiple matches)

## PRO TIP

# COUNT MATCHING ITEMS BETWEEN TWO LISTS

- Combine **SUMPRODUCT** with **COUNTIF** to return the number of matching values across multiple lists
- SUMPRODUCT** acts like an array formula, iterating through each row of one list to search for matches in the other
  - COUNTIF** assigns each row as a **1** (if a match exists) or a **0**, and **SUMPRODUCT** sums the resulting array of values
- NOTE:** Either list can be used as the basis



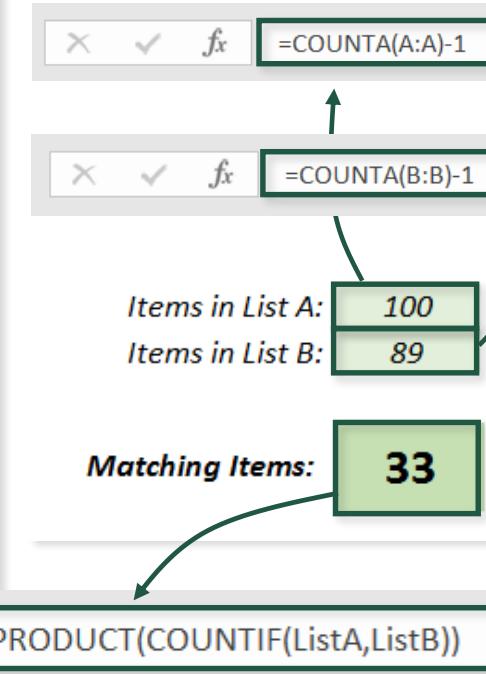
FORMULAS



5 STARS (EXPERT)

	A	B
1	Product List A	Product List B
2	Racing Socks, L	Touring-1000 Blue, 50
3	HL Touring Frame - Blue, 46	Mountain-100 Black, 48
4	Taillights - Battery-Powered	Touring Tire Tube
5	Mountain-100 Black, 48	ML Road Pedal
6	Rear Derailleur	Mountain-500 Silver, 42
7	Touring-1000 Blue, 46	HL Mountain Frame - Silver, 48
8	HL Fork	ML Road Frame-W - Yellow, 48
9	Long-Sleeve Logo Jersey, L	HL Touring Frame - Yellow, 46
10	Road-550-W Yellow, 42	Road-650 Red, 60
11	Road-550-W Yellow, 44	Mountain-200 Silver, 46
12	Sport-100 Helmet, Red	Short-Sleeve Classic Jersey, S
13	HL Road Tire	LL Road Frame - Red, 62
14	Road-250 Black, 48	Mountain-500 Black, 40
15	Touring-1000 Blue, 50	Road-250 Black, 58
16	Mountain-100 Silver, 42	Road-750 Black, 58
17	Touring-2000 Blue, 50	Road-450 Red, 44
18	LL Road Frame - Red, 44	Mountain-500 Silver, 40
19	LL Touring Frame - Yellow, 50	Mountain-500 Black, 44
20	HL Touring Frame - Blue, 50	Mountain Tire Tube
21	LL Mountain Seat/Saddle	ML Mountain Frame-W - Silver, 42
22	ML Road Frame-W - Yellow, 48	Road-650 Black, 44
23	HL Road Frame - Red, 48	Mountain-500 Silver, 44
24	Touring-2000 Blue, 54	ML Mountain Tire
25	Road-250 Black, 44	MI Mountain Rear Wheel
26	Road-650 Black, .	
27	ML Road Frame - Re	
28	Men's Bib-Shorts,	
29	HL Road Frame - Red, 52	Road-550-W Yellow, 40
30	Headlights - Dual-Beam	ML Touring Seat/Saddle
31	Road-250 Red, 44	Road-650 Red, 48

(ListA = A2:A101, ListB = B2:B90)



## COMMON USE CASES:

- Calculating the overlap between two lists
- Confirming that lists are unique to avoid double-counting errors

## PRO TIP

# COUNT DUPLICATE OR UNIQUE ROWS IN A LIST

- Counting duplicates and uniques with cell formulas alone can be deceptively tricky
  - **NOTE:** Tools like Pivots or Power Query (which *includes* a “Count Distinct” option) often offer simpler alternatives
- One option is to use **SUMPRODUCT** and **COUNTIF** to count *unique* values, and then subtract from the total count to identify the number of *duplicate* values



FORMULAS



5 STARS (EXPERT)

A	B	C	D	E
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				

**Grocery List**

Green Ribbon Canned Peaches  
Washington Cranberry Juice  
Jeffers Oatmeal  
Blue Label Canned Tuna in Water  
Queen City Map  
Washington Orange Juice  
Washington Mango Drink  
Blue Label Canned Yams  
Blue Label Fancy Canned Anchovies  
Blue Label Large Canned Shrimp  
Blue Label Noodle Soup  
Washington Mango Drink  
Blue Label Chicken Soup  
Club Sour Cream  
Washington Cola  
Green Ribbon Canned Mixed Fruit  
Blue Label Beef Soup

Total Items: 49

Unique Items: 47

Duplicates: 2

=COUNTA(Groceries)

=E3-E5

=SUMPRODUCT(1/COUNTIF(Groceries,Groceries))

(Groceries = B4:B52)

## COMMON USE CASES:

- Calculating the number of unique or distinct products ordered
- Error-checking to avoid inflation caused by duplicate records

## PRO TIP

# USE COUNTIF TO HANDLE MANY-TO-MANY LOOKUPS

- Excel lookup formulas are designed to work with **1-to-1** or **1-to-Many** relationships (*only one instance of each primary key*)
- If you have a **Many-to-Many relationship** (multiple matches), you can use **COUNTIF**, **INDEX** and **MATCH** formulas to return values from subsequent matches
- NOTE:** Make sure to understand why there are multiple instances of your key, and confirm that they are valid records



FORMULAS



5 STARS (EXPERT)

fx =COUNTIF(\$G\$2:\$G\$13,B4)

A	B	C	D	E	
1	OrderID	Store ID	# Instances	Revenue	Address
2	87696	2	1	\$631,303	5203 Catanzaro Way
3	69581	6	1	\$542,738	5495 Mitchell Canyon Road
4	66216	8	2	\$653,469	6764 Glen Road
5	70863	1	1	\$178,607	2853 Bailey Rd
6	22797	5	2	\$463,379	490 Risdon Road
7	49585	5	2	\$717,386	490 Risdon Road
8	23289	10	1	\$517,508	7894 Rotherham Dr

=MATCH(B6,\$G\$2:\$G\$13,0)+1

+1

G	H
Store ID	Address
1	2853 Bailey Rd
2	5203 Catanzaro Way
3	1501 Ramsey Circle
4	433 St George Dr
5	5922 La Salle Ct
5	490 Risdon Road
6	5495 Mitchell Canyon Road
7	1077 Wharf Drive
8	3173 Buena Vista Ave
8	6764 Glen Road
9	1872 El Pintado Road
10	7894 Rotherham Dr

(Stores = G2:I13)

## COMMON USE CASES:

- Tracking historical changes within an existing lookup table (i.e. product prices or store addresses that may have changed at one point in time)

# VISUALIZATION TIPS

## PRO TIP

# PREVENT CHARTS FROM MOVING OR SIZING

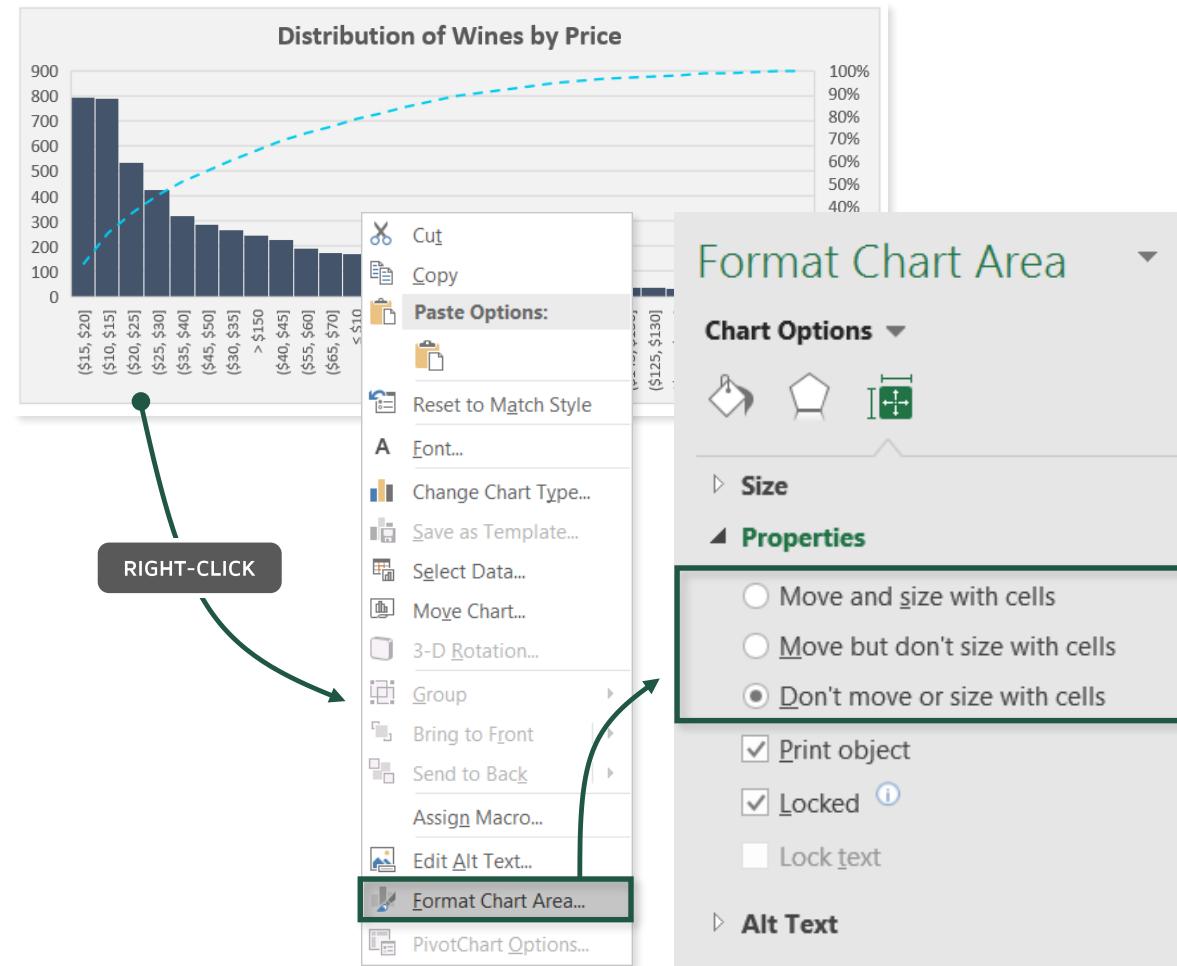
- By default, charts **move** and **size** with cells, stretching and shifting as underlying rows or columns are resized
- Change chart behavior using the **Format Chart Area** options, under **Properties**:
  - **Move and Size**: Allows charts to move and stretch with columns or rows
  - **Move but don't Size**: Allows charts to move but not stretch or distort
  - **Don't move or Size**: Fixes chart position in place, regardless of how cells change



DATA VIZ



1 STAR (VERY BASIC)



## COMMON USE CASES:

- Locking in chart positions within reports or dashboards to prevent them from distorting if underlying rows or columns are modified
- Allowing charts to move (but not stretch) if rows are filtered or sorted

## PRO TIP

# ALLOW CHARTS TO REFERENCE HIDDEN DATA

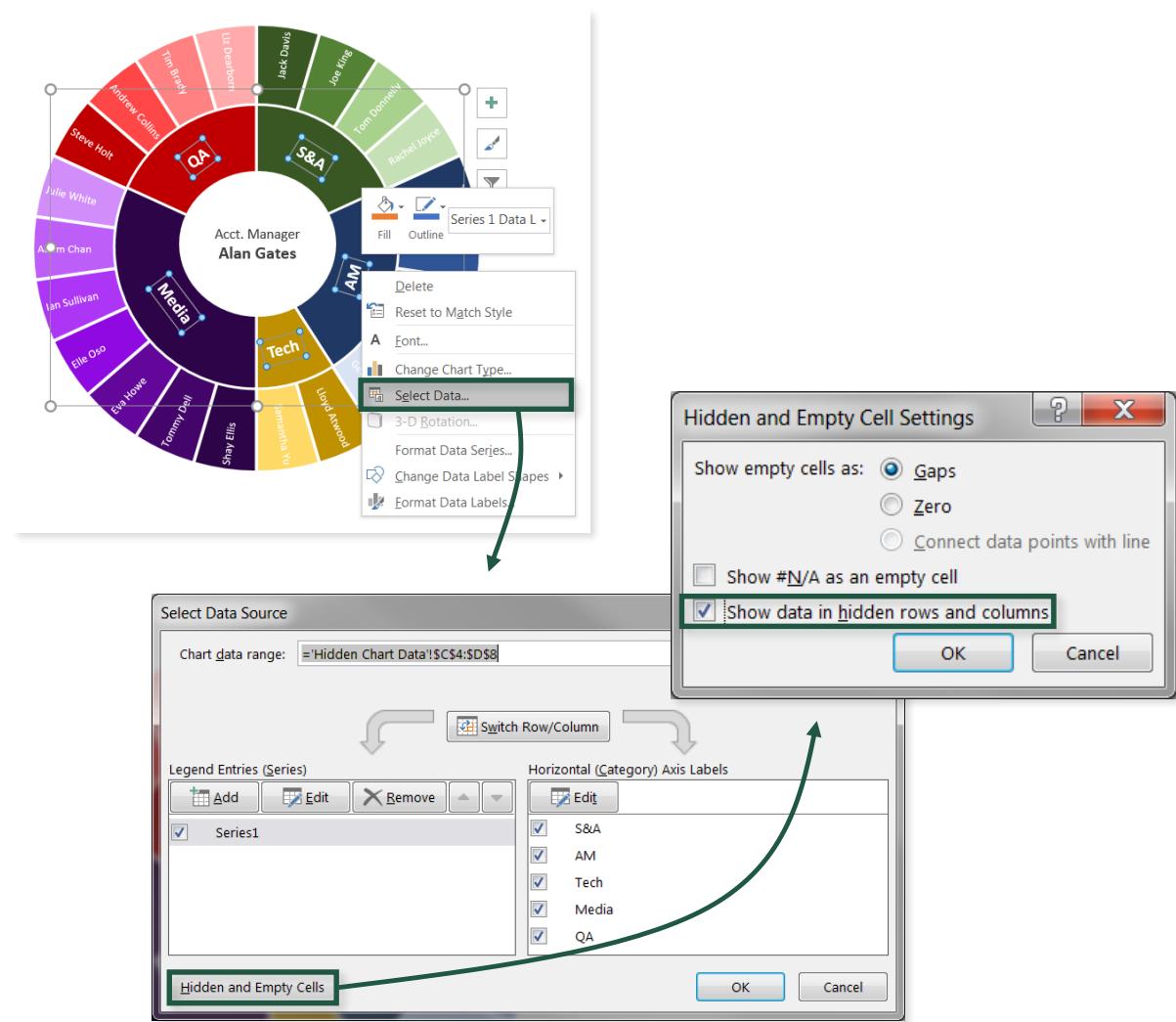
- By default, Excel charts will not display source data in **hidden rows or columns**
- To allow charts to display hidden data, right-click, **Select Data**, click **Hidden and Empty Cells**, and activate the “*Show data in hidden rows and columns*” checkbox



DATA VIZ



1 STAR (VERY BASIC)



## COMMON USE CASES:

- Designing reports with the source data and visuals on the same tab
- Preventing users from accessing or modifying a chart's raw source data

## PRO TIP

# USE FILLED MAPS FOR GEOSPATIAL ANALYSIS

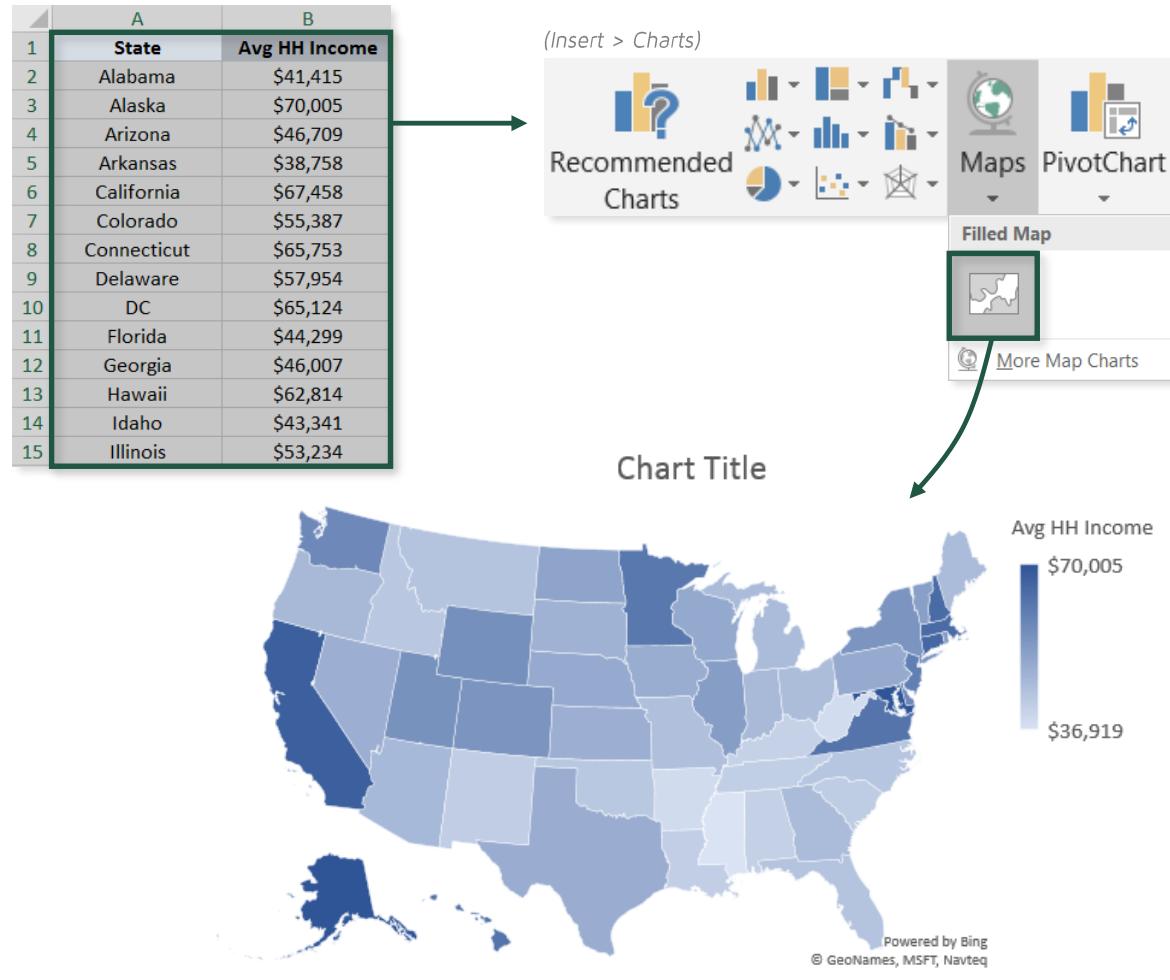
- Recent versions of Excel (2016/365) include a **Filled Map** visual to plot geospatial data
  - Like dates, Excel automatically recognizes many types of geospatial information (*states, countries, zip codes, lat/long, etc.*)
  - If some values aren't recognized, you may see a warning icon with a statement like "*We plotted 80% of the locations from your data with high confidence*"
- NOTE:** Filled maps are currently unavailable in older versions of Excel (pre-2016)



DATA VIZ



1 STAR (VERY BASIC)



## COMMON USE CASES:

- Quickly visualizing regional patterns or trends
- Comparing census information like population, GDP, household income, or birth rates across countries

## PRO TIP

# CUSTOMIZE YOUR CHARTS TO TELL A STORY

- Don't settle for boring, default formats; use **chart titles** and **formatting tools** to add insight and bring your data to life
  - **Tell a story** in the chart title or subtitle rather than making the user interpret it
  - Add **individual labels or markers** to draw attention to key points
  - **Use colors** consistently and deliberately
- **TIP:** Add text or shapes while the chart is selected to automatically group the objects



DATA VIZ

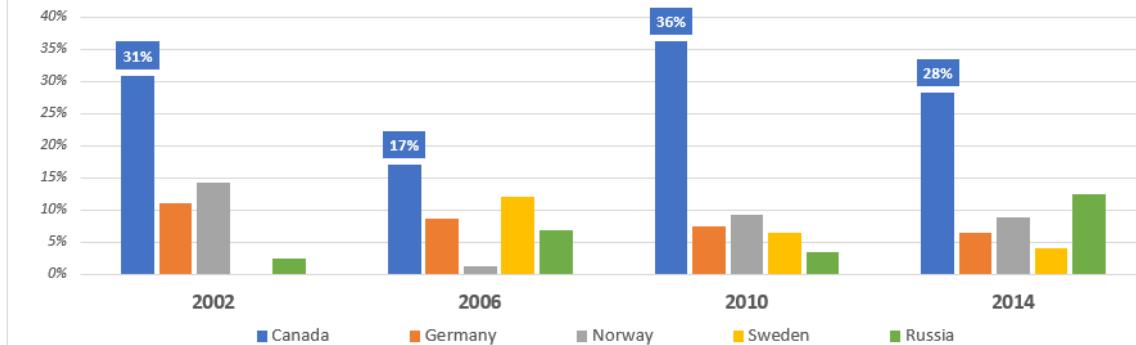


2 STARS (BASIC)

	% of Winter Olympic Gold Medals (Top 5 Countries)			
	2002	2006	2010	2014
<b>Canada</b>	31%	17%	36%	28%
<b>Germany</b>	11%	9%	7%	6%
<b>Norway</b>	14%	1%	9%	9%
<b>Sweden</b>	0%	12%	6%	4%
<b>Russia</b>	2%	7%	3%	12%

Share of Winter Olympic Gold Medals (Top 5 Countries)

Canada dominated the Winter Games from 2002-2014, capturing an unprecedented 36% of all gold medals in 2010



## COMMON USE CASES:

- Preparing visuals for use in presentations, where comprehension is key
- Reducing the chance of users misinterpreting the story that a chart or graph is designed to communicate

## PRO TIP

# QUICKLY VISUALIZE TRENDS WITH SPARKLINES

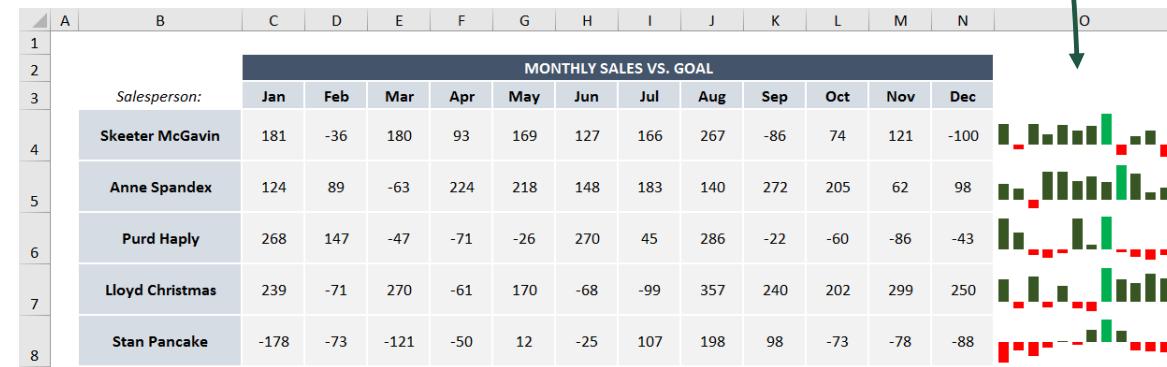
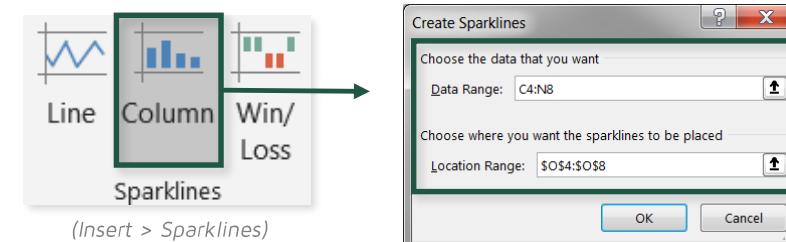
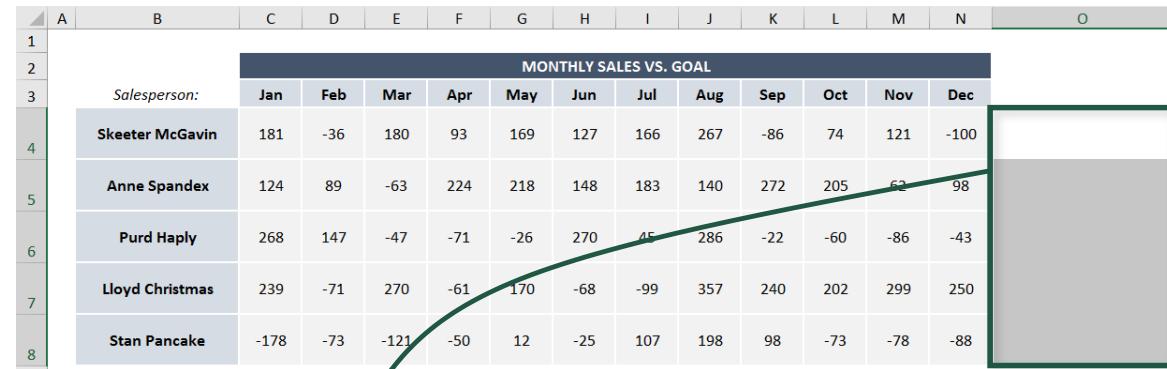
- **Sparklines** are basically tiny charts that live within the confines of a single cell
- While formatting options are somewhat limited, sparklines can be a great way to quickly (*and subtly*) visualize patterns
  - Use the **Sparkline Tools** ribbon to change chart types, highlight specific points (*high/low, first/last, +/-*), and adjust colors, markers, or axis options



DATA VIZ



2 STARS (BASIC)



## COMMON USE CASES:

- Embedding a simple line or column sparkline to show trends at a glance
- Creating KPI cells to show key metrics with sparklines in the background

## PRO TIP

# DESIGN & APPLY CUSTOM CHART TEMPLATES

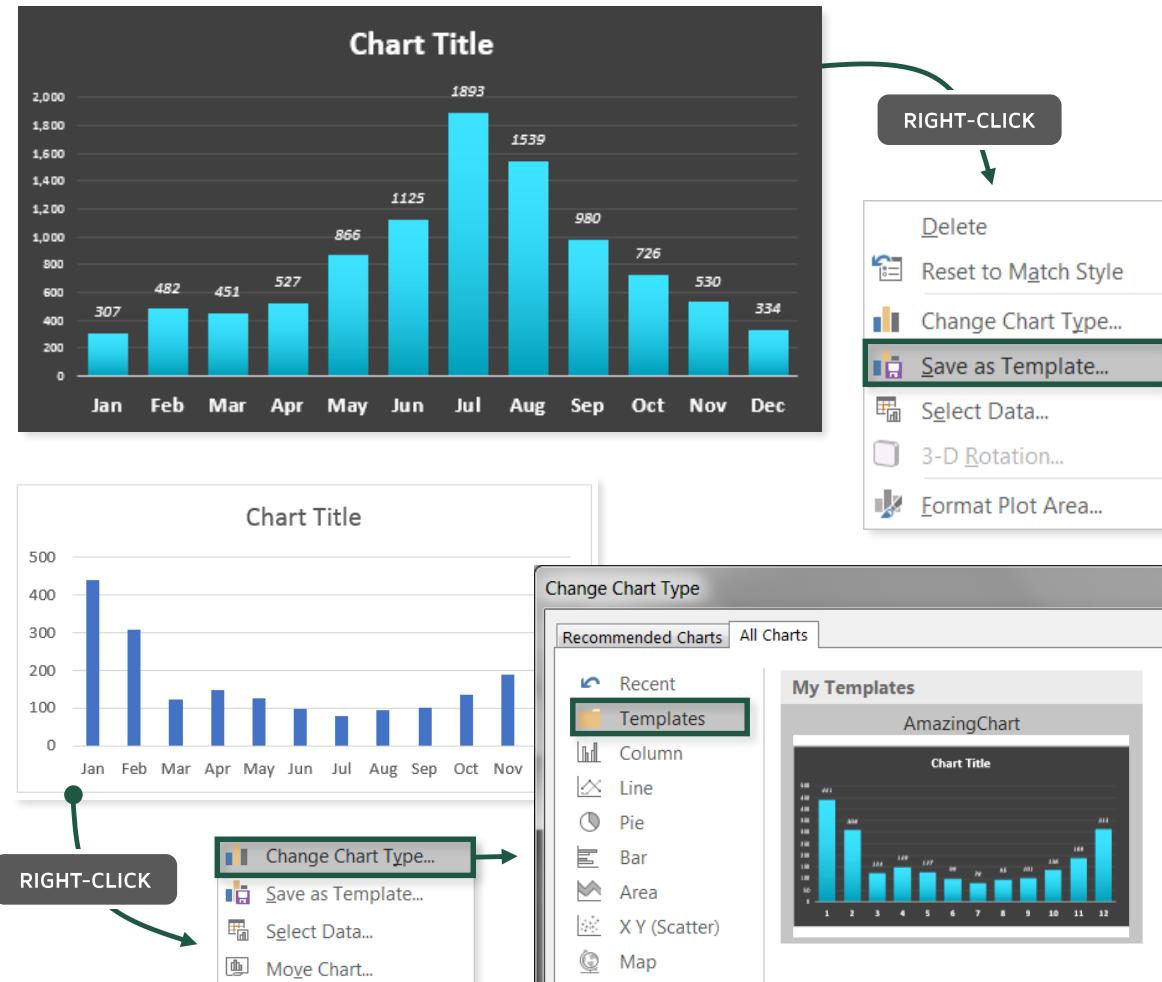
- To apply a specific set of formatting rules across multiple charts, you can create your own **custom chart templates**
  - Once you've applied the formatting you'd like to replicate, **right-click** the chart and select **Save As Template**
  - To apply the template to a new chart, navigate to the **Templates** folder within the **Change Chart Type** dialog box



DATA VIZ



2 STARS (BASIC)



## COMMON USE CASES:

- Saving specific formats for future use in other workbooks
- Ensuring consistent formatting across all visuals in a report

## PRO TIP

# DESIGN YOUR OWN CONDITIONAL HEAT MAPS

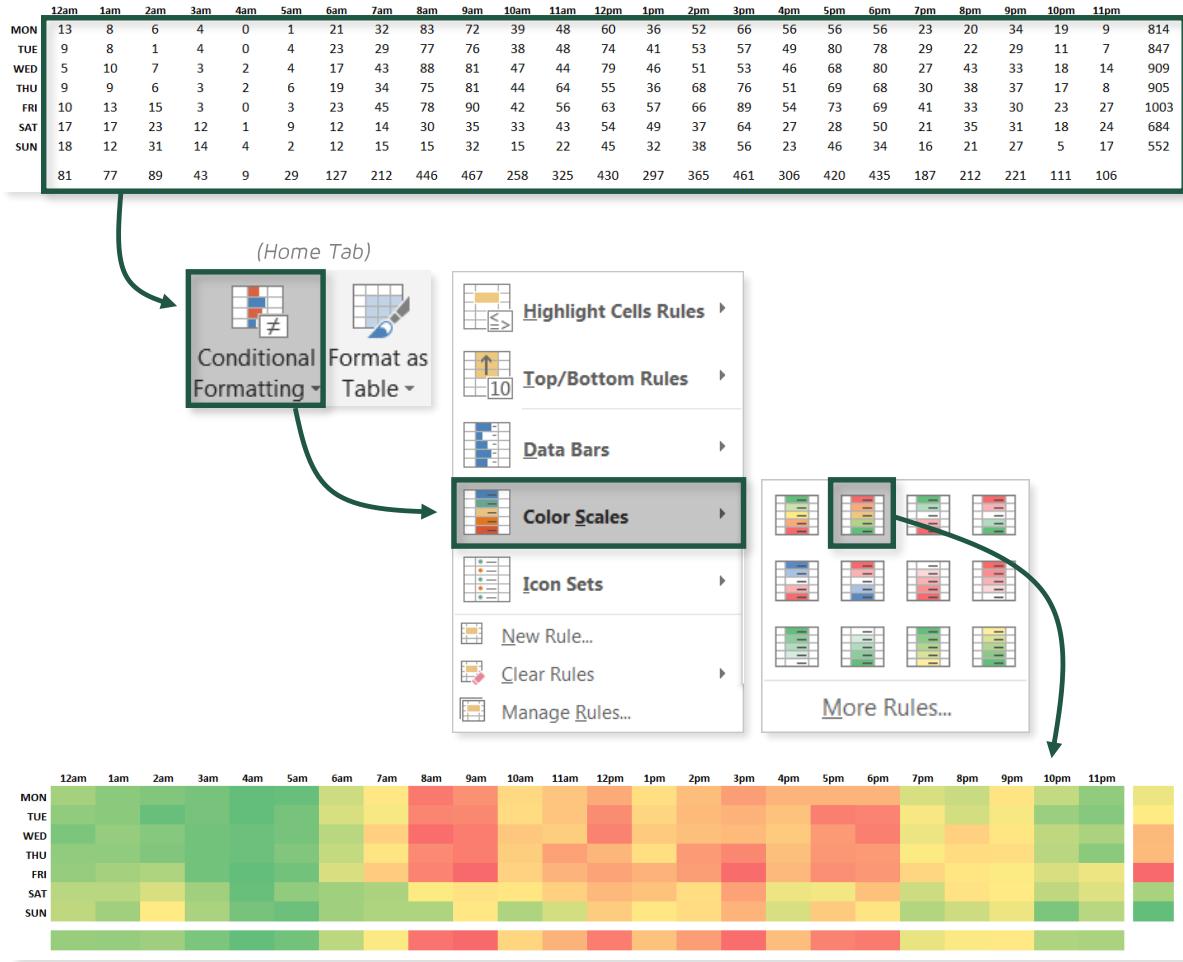
- One of the most effective visualizations in Excel isn't a chart at all, but a **heat map** created with **conditional formatting**
  - Select your source data and navigate to **Home > Conditional Formatting > Color Scales** to format cells based on their values
- **BONUS:** To hide text, apply a **Custom** number format and set the **Type** to “;;”



DATA VIZ



2 STARS (BASIC)



## COMMON USE CASES:

- Quickly identifying patterns or trends in the underlying values using common color scales (red to green, white to red, etc)
- Highlighting “hot spots” or outliers based on the colors alone

# ANALYZE DISTRIBUTIONS WITH HISTOGRAMS

- Histograms** are a great tool to understand and visualize how data is distributed
  - Unlike traditional column charts, Histograms show the **frequency** of observations that fall within given ranges of values (aka “**bins**”)
- NOTE:** Histograms are currently unavailable in older versions of Excel (pre-2016)

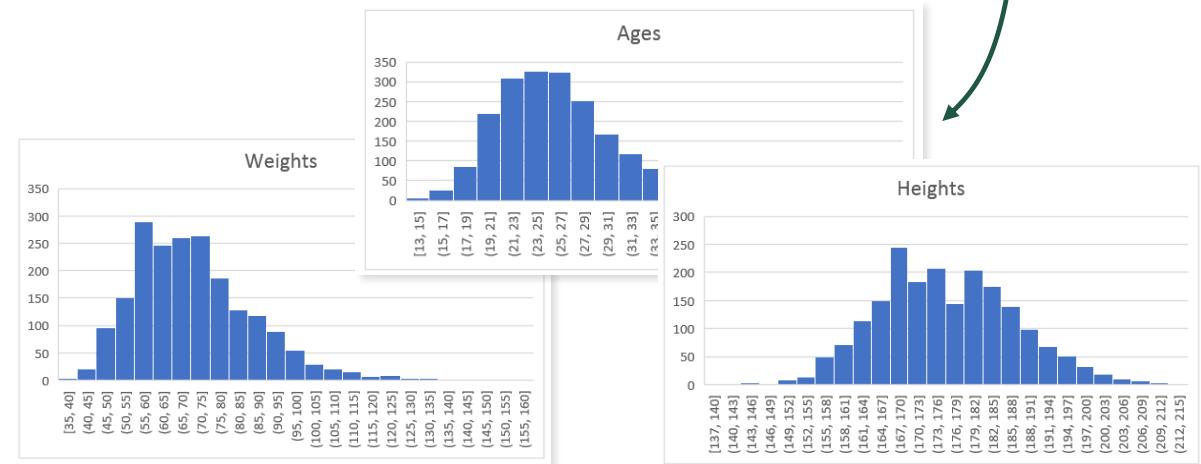
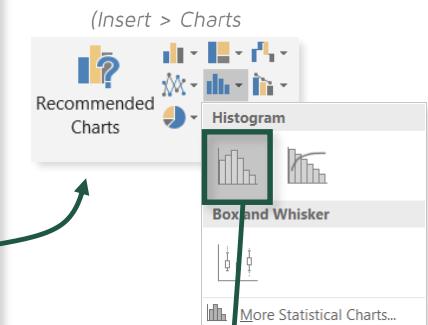


DATA VIZ



3 STARS (MODERATE)

	A	B	C	D	E	F
1	Name	Gender	Sport	Age	Height_cm	Weight_kg
2	Aaron Arthur Cook	M	Taekwondo	25	183	80
3	Aaron Brown	M	Athletics	24	198	79
4	Aaron Gate	M	Cycling	25	181	71
5	Aaron John Royle	M	Triathlon	26	180	67
6	Aaron Russell	M	Volleyball	23	206	93
7	Aaron Younger	M	Water Polo	24	193	100
8	Aauri Lorena Bokesa Abia	F	Athletics	27	180	62
9	aba Silai	M	Swimming	25	185	77
10	Ababel Yeshaneh Birhane	F	Athletics	25	165	54
11	Abadi Hadis Embaye	M	Athletics	18	170	63
12	Abbas Qali	M	Swimming	23	178	77
13	Abbey Weitzel	F	Swimming	19	178	68
14	Abbos Rakhmonov	M	Wrestling	18	161	57
15	Abubaker Mobra	M	Football	22	175	64
16	Abby May Ercog	F	Football	26	177	68
17	Abdallah Haroun Hassan	M	Athletics	19	185	80
18	Abdalla Yousif	M	Athletics	19	177	65
19	Abdel Aziz Mehelba	M	Shooting	27	176	80
20	Abdel Aziz Merzougui Noureddine	M	Athletics	24	175	67
21	Abdel Rahman Salah Orabi Abdalgawwad	M	Boxing	28	185	81



## COMMON USE CASES:

- Visualizing population demographics (height, weight, income, age, etc.)
- Identifying the most and least common values in a sample

## PRO TIP

# TURN DONUTS INTO CUSTOM GAUGE CHARTS

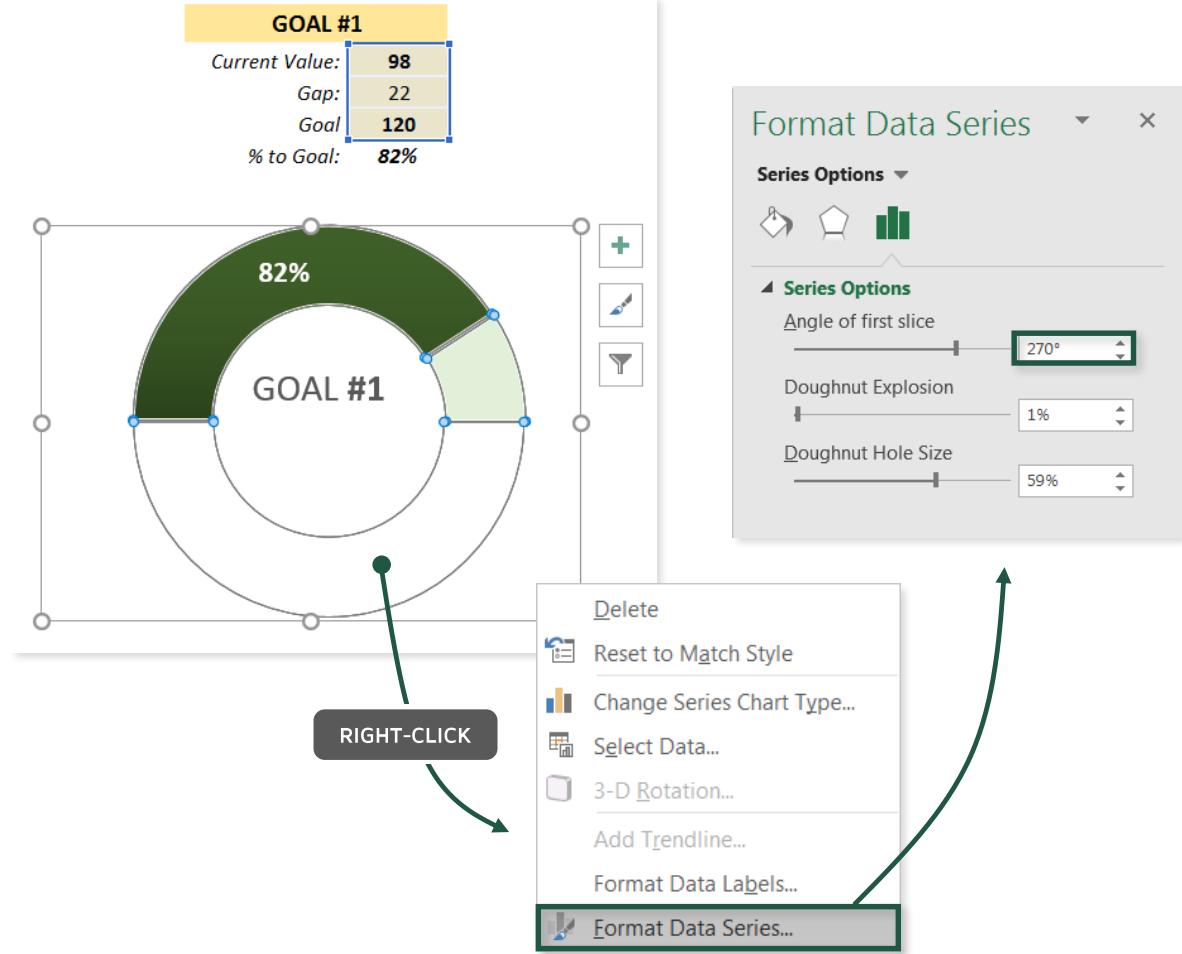
- To show progress towards a goal, create a custom **Gauge Chart** by formatting a standard **Pie or Donut Chart**:
  - STEP 1:** Create cells with 3 values: **Current Value**, **Gap**, and **Goal** (*in that order*)
  - STEP 2:** Insert a **Donut or Pie Chart**, and format the **Goal** series with no fill or border
  - STEP 3:** Format the data series, and change the *Angle of First Slice* to **270 degrees**
- TIP:** Add a "% to Goal" calculation, and insert a data label linked to that cell value



DATA VIZ



3 STARS (MODERATE)



## COMMON USE CASES:

- Tracking performance against benchmarks or goals
- Designing executive scorecards to visualize key metrics at a glance

## PRO TIP

# USE COMBO CHARTS TO HIGHLIGHT DATE RANGES

- Use **Combo Charts** to visually highlight specific time periods within a line chart:
  - **STEP 1:** Add a new column and “flag” key rows with a “1” (leave others **blank** or **0**)
  - **STEP 2:** Add the new series, change the type to **Combo**, and plot it as a **100% Stacked Column**, on the **Secondary Axis**
  - **STEP 3:** Right-click to format the new series and change the **Gap Width** to **0%**
- **TIP:** Apply a custom number format (;;;) to the secondary axis to hide the labels



DATA VIZ



4 STARS (ADVANCED)

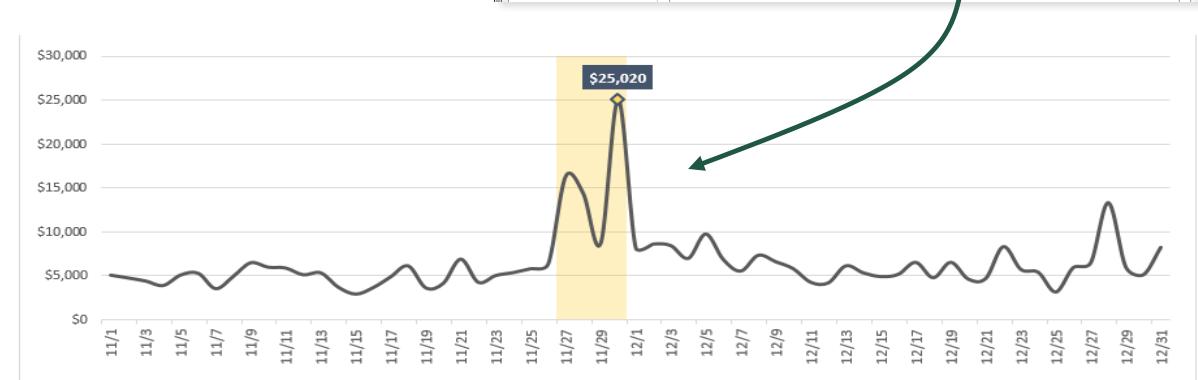
A	B	C	
1	Date	Revenue	Sale?
17	11/16/2015	\$3,598	
18	11/17/2015	\$4,830	
19	11/18/2015	\$6,077	
20	11/19/2015	\$3,572	
21	11/20/2015	\$4,077	
22	11/21/2015	\$6,842	
23	11/22/2015	\$4,201	
24	11/23/2015	\$4,976	
25	11/24/2015	\$5,309	
26	11/25/2015	\$5,749	
27	11/26/2015	\$6,278	
28	11/27/2015	\$16,279	1
29	11/28/2015	\$14,333	1
30	11/29/2015	\$8,638	1
31	11/30/2015	\$25,020	1
32	12/1/2015	\$8,142	
33	12/2/2015	\$8,561	
34	12/3/2015	\$8,390	
35	12/4/2015	\$6,925	
36	12/5/2015	\$9,707	

(Chart Tools > Type)

Daily Revenue Pacing (11/1 - 12/31)  
Revenue volume spiked during the Black Friday/Cyber Monday sale, reaching a new YTD high of \$25,020 on Monday, 11/30

Choose the chart type and axis for your data series:

Series Name	Chart Type	Secondary Axis
Revenue	Line	
Sale?	100% Stacked Column	<input checked="" type="checkbox"/>



## COMMON USE CASES:

- Highlighting sales or promotional periods to add context to the chart
- Drawing attention to seasonal patterns or trends (peak vs. off-peak, weekdays vs. weekends, etc.)

## PRO TIP

# CREATE DYNAMIC SOURCE DATA WITH NAMED RANGES

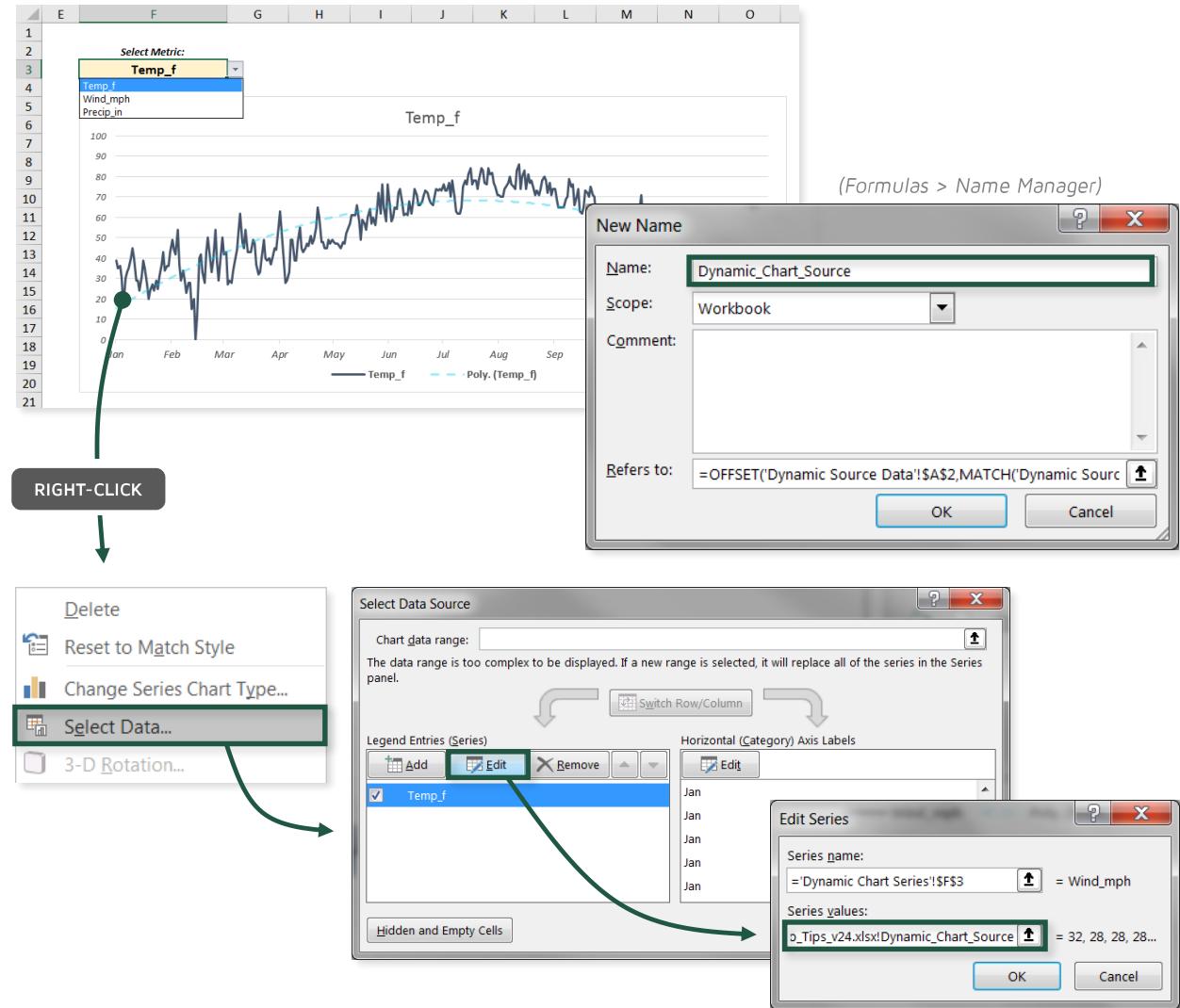
- **Named Ranges** allow you to define dynamic cell references and charts using functions like **OFFSET** and **MATCH**:
  - **STEP 1:** Create a **data validation** list containing each column header
  - **STEP 2:** Add a named range using **OFFSET**, **MATCH** and **COUNTA** to dynamically reference the column selected from the list
  - **STEP 3:** Insert a new chart, edit the data source, and reference the named range in **Series Values** (after the workbook name)



DATA VIZ



5 STARS (EXPERT)



## COMMON USE CASES:

- Creating interactive dashboards with user-controlled charts and graphs
- Consolidating multiple visuals into a single chart template

## PRO TIP

# ADD FORM CONTROLS FOR INTERACTIVE VISUALS

- Use **Form Controls** to create interactive charts based on lists, buttons or scroll bars:
  - **STEP 1:** Insert a **List Box**, with an *Input Range* referencing a unique list of options and a *Cell Link* to store the selected value
  - **STEP 2:** Use cell functions (**INDEX**, **MATCH**, **VLOOKUP**, etc.) to create the chart source data, based on the list box selection
- **NOTE:** If you don't see the **Developer** tab, check **File > Options > Customize Ribbon**

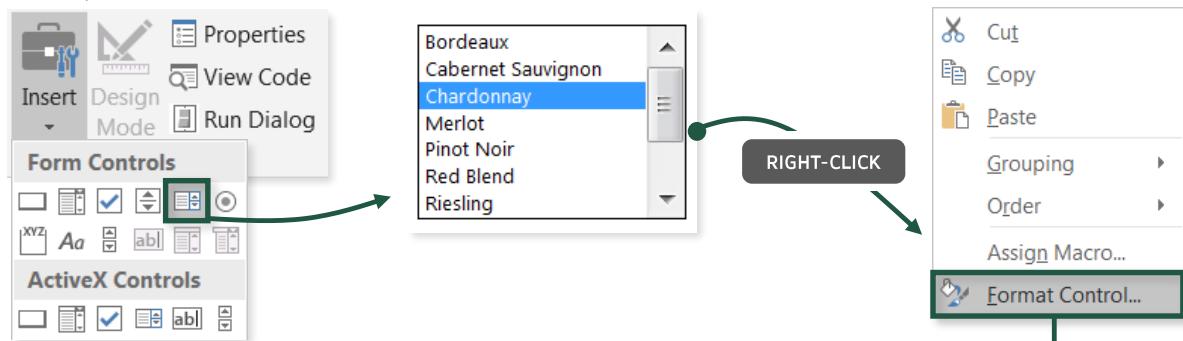


DATA VIZ

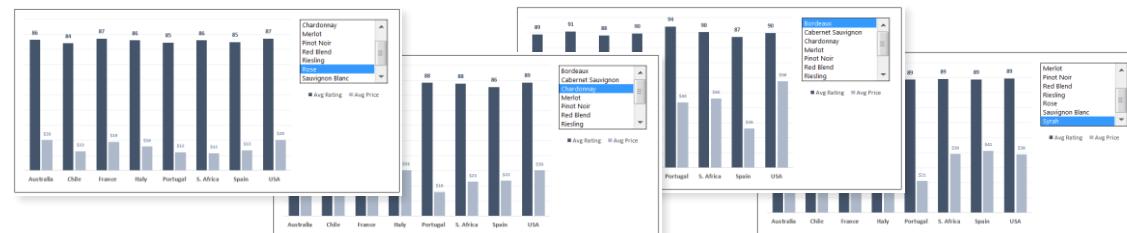


5 STARS (EXPERT)

(Developer > Controls)



	Avg Rating	Avg Price
Australia	89.16	\$22.02
Chile	85.63	\$16.25
France	90.78	\$32.24
Italy	88.25	\$24.50
Portugal	86.50	\$18.00
S. Africa	87.00	\$18.50
Spain	82.00	\$20.00
USA	87.91	\$19.28



## COMMON USE CASES:

- Integrating user controls into a dynamic report or dashboard
- Consolidating multiple visuals into a single chart template

# PIVOT TABLE TIPS

## PRO TIP

# USE FIELD LIST OPTIONS TO STAY ORGANIZED

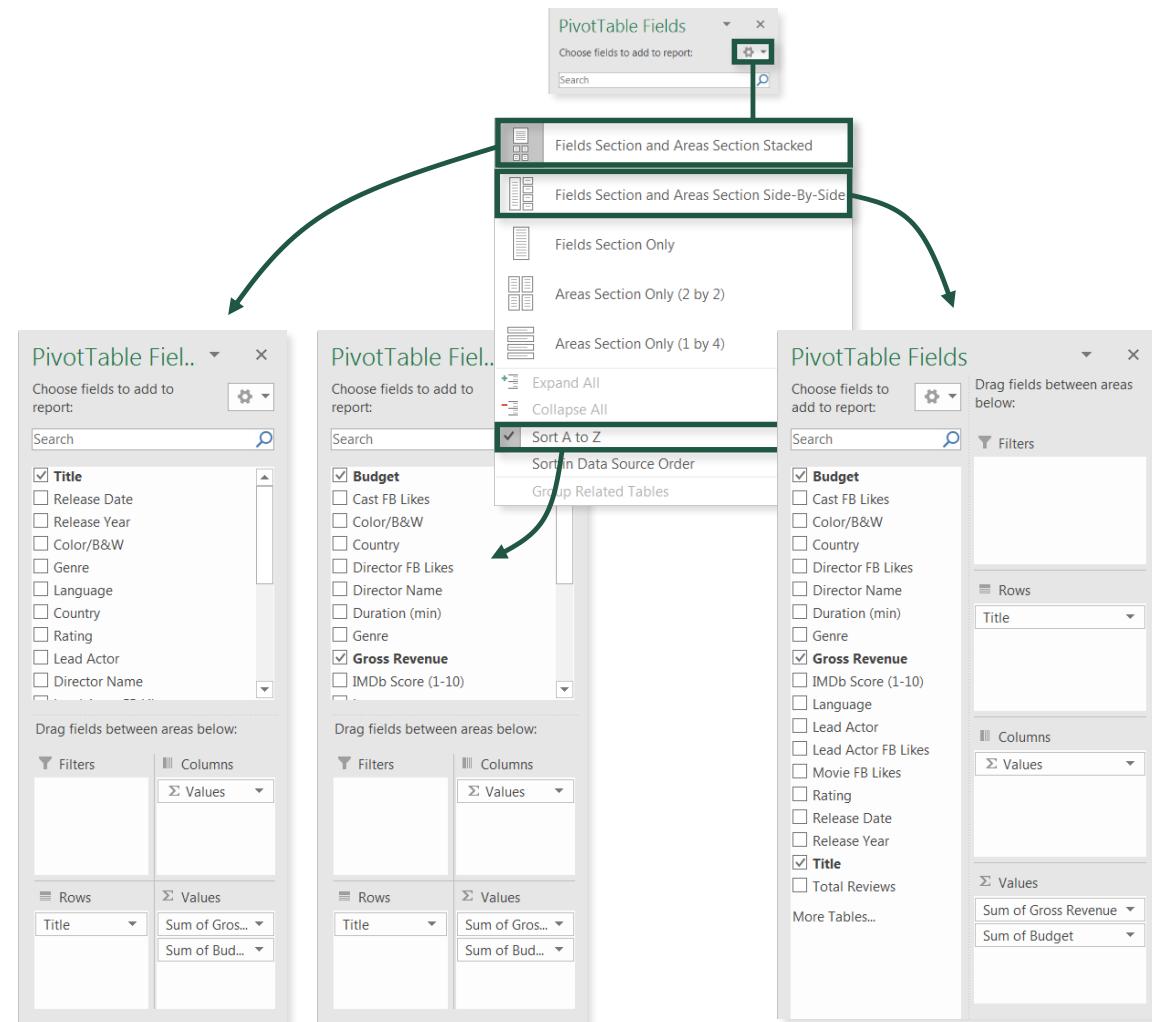
- The **Field List** is typically “stacked” by default, and sorted in **Data Source** order
- If you have a large number of source tables or fields, you may want to adjust settings:
  - Fields & Areas Side-by-Side**: Displays all tables and fields in one vertical pane, next to the Filter/Rows/Columns/Values options
  - Sort A to Z**: Sorts column names in alphabetical order, rather than source order (*note that you can search for fields as well*)



PIVOT TABLES



1 STAR (VERY BASIC)



## COMMON USE CASES:

- Updating the layout to show all tables and fields in one vertical pane for easy access (especially for Power Pivot views with many tables)
- Sorting fields alphabetically when the source order isn't meaningful

## PRO TIP

# PREVENT COLUMNS FROM AUTOFITTING WIDTH

- By default, pivots will **adjust column width** to accommodate the longest value in a field
  - This can be helpful, but inconvenient when working with long, text-based fields
- To prevent automatic resizing, uncheck the “**Autofit Columns Widths**” box in the PivotTable options (**Layout & Format** tab)
- **TIP:** Use the **wrap text** option to make text fields more readable within the pivot



PIVOT TABLES



1 STAR (VERY BASIC)

The screenshot illustrates the process of preventing column widths from auto-adjusting in a PivotTable. It shows the Excel ribbon with the 'PivotTable' tab selected. A callout arrow points from the 'Options' button in the ribbon to the 'PivotTable Options' dialog box, which is displayed in the foreground. In the dialog box, the 'Layout & Format' tab is selected, and the 'Autofit column widths on update' checkbox is highlighted with a red box. The main Excel window shows a PivotTable with two rows of data. The first row contains 'Taster Name' and 'Description'. The second row contains 'Alexander' and a detailed wine description. The 'Description' column is very wide, demonstrating the effect of auto-fit.

(PivotTable Tools > Options)

(Home > Wrap Text)

## COMMON USE CASES:

- Working with text fields like survey results or social media posts
- Forcing the PivotTable column widths to remain fixed, regardless of how the table layout changes

## PRO TIP

# SHOW PIVOTS IN OUTLINE OR TABULAR FORM

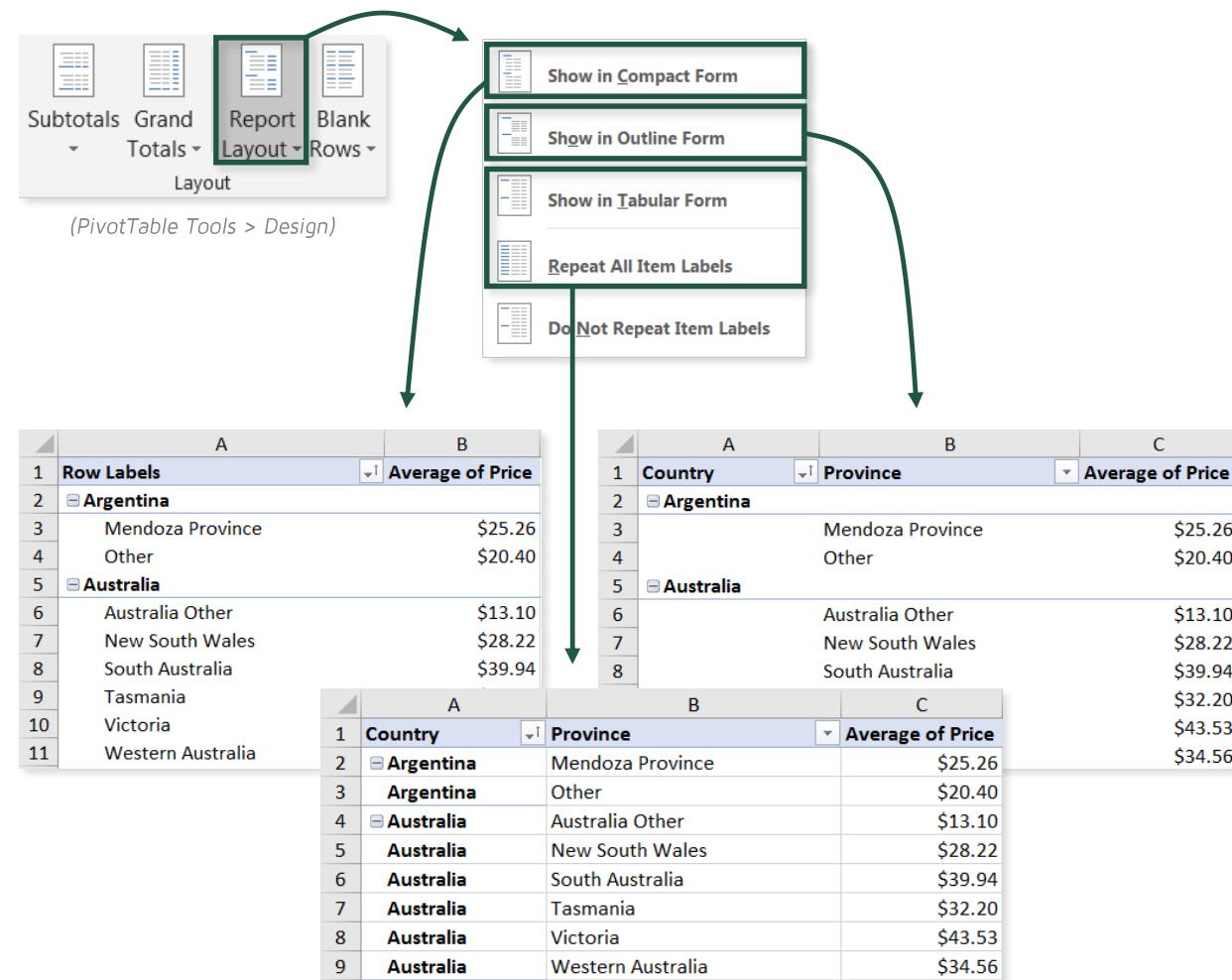
- Pivots typically default to **Compact Form**, grouping all row labels into a single column
- You can change the layout using **PivotTable Tools > Design > Report Layout**:
  - Outline Form**: Splits row labels into separate columns, to sort/filter individually
  - Tabular Form**: Formats the pivot like a table, without extra spacing rows
- NOTE:** Head to **File > Options > Data > Edit Default Layout** to change your default



PIVOT TABLES



1 STAR (VERY BASIC)



## COMMON USE CASES:

- Using **Outline Form** to sort and filter multiple fields individually
- Using **Tabular Form** with repeating item labels and no grand totals or subtotals to create new source data for further analysis

## PRO TIP

# USE PIVOT TABLES TO COUNT TEXT FIELDS

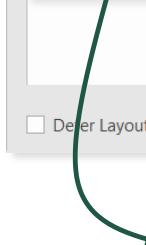
- While the **Values** pane is typically for numerical fields, it can be used to analyze the **count or frequency of text fields**
  - Since you can't aggregate non-numerical fields, use **Count Of** summarization to display frequencies for text-based values
- NOTE:** If a *numerical* field defaults to a count, it typically indicates values formatted as text or blank rows in the source data



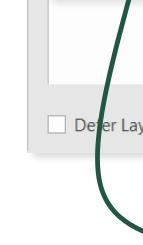
PIVOT TABLES



1 STAR (VERY BASIC)



Genre	Count of Genre
Action	900
Adventure	362
Animation	45
Biography	204
Comedy	1,016
Crime	252
Documentary	43
Drama	672
Family	3
Fantasy	35
Horror	151
Musical	2
Mystery	23
Romance	3
Sci-Fi	8
Thriller	3
Western	3
<b>Grand Total</b>	<b>3,725</b>



Rating	Count of Rating
Approved	17
G	91
GP	1
M	2
NC-17	6
Not Rated	43
Passed	3
PG	553
PG-13	1,248
R	1,679
Unrated	24
X	9
(blank)	
<b>Grand Total</b>	<b>3,676</b>

## COMMON USE CASES:

- Analyzing the number of rows or observations that fall into specific categories (i.e. movie titles by genre, products by category, etc.)
- Generating source data for statistical charts like histograms/pareto charts

## PRO TIP

# GROUP DATES USING PIVOTS OR SOURCE DATA

- PivotTables include standard tools to **group date fields** into months, years, etc.
  - NOTE:** Head to *Options > Data > Data Options* to check whether or not automatic date/time grouping is enabled
- Grouping creates new fields that *only exist in the pivot*, but can be used like any other
- NOTE:** An alternative (*and often more flexible*) approach is to create new fields in the source data using date & time functions



PIVOT TABLES



2 STARS (BASIC)

The screenshot illustrates the process of grouping dates in a source data table. A context menu is open over a selected date cell (A15, 12/7/1947). The 'Group...' option under 'Subtotal "Release Date"' is highlighted. A callout bubble labeled 'RIGHT-CLICK' points to the selected date cell. To the right, a 'Group' dialog box shows settings for grouping by 'Years' (selected), 'Quarters', and 'Days'. Below the dialog, a PivotTable preview shows grouped data by year (1920, 1927, 1929) and quarter (Qtr3, Qtr1, Qtr4). The Excel logo is visible in the bottom right corner.

A	B	C
1	Years	Quarters
2	1920	
3		Qtr3
4	1927	Sep
5		Qtr1
6	1929	Jan
7		Qtr4
8		Nov

## COMMON USE CASES:

- Rolling up daily data to analyze trends by month or quarter
- Creating high-level summary tables or charts from granular source data

## PRO TIP

# APPLY MULTIPLE FILTERS TO A SINGLE PIVOT FIELD

- By default, you can apply **label filters** or **value filters** to a single field, *but not both*
  - To change this, head to **PivotTable Options** and check the "**Allow Multiple Filters Per Field**" box in the **Totals & Filters** tab
- This will allow you to filter PivotTable fields based on both **text** and **value** attributes



PIVOT TABLES



2 STARS (BASIC)

(PivotTable Tools > Options)

PivotTable Options

PivotTable Name: PivotTable9

Printing Data Alt Text

Layout & Format Totals & Filters Display

Grand Totals

Show grand totals for rows (checked)

Show grand totals for columns (checked)

Filters

Subtotal filtered page items (unchecked)

Allow multiple filters per field (checked)

Sorting

Use Custom Lists when sorting (checked)

A: Title

B: Sum of Gross Revenue

Sort A to Z

Sort Z to A

More Sort Options...

Clear Filter From "Title"

Label Filters

Value Filters

Search

(Select All)

Friday

May

November

[Rec] 2

10 Days in a Madhouse

10 Things I Hate About You

OK Cancel

1 Shrek 2  
2 Spider-Man 2  
3 Despicable Me 2  
4 Iron Man 2  
5 The Twilight Saga: Breaking Dawn - Part 2  
6 The Hunger Games: Mockingjay - Part 2  
7 Toy Story 2  
8 Rush Hour 2  
9 X-Men 2  
10 The Amazing Spider-Man 2  
11 Cars 2  
12 Pitch Perfect 2  
13 How to Train Your Dragon 2  
14 Hotel Transylvania 2  
15 2012  
16 Kung Fu Panda 2  
17 American Pie 2  
18 Taken 2  
19 The Santa Clause 2  
20 Grown Ups 2  
21 Rio 2

436,471,036  
373,377,893  
368,049,635  
312,057,433  
292,298,923  
281,666,058  
245,823,397  
226,138,454  
214,948,780  
202,853,933  
191,450,875  
183,436,380  
176,997,107  
169,692,572  
166,112,167  
165,230,261  
145,096,820  
139,852,971  
139,225,854  
133,668,525  
131,536,019

Titles that end with "2" AND drove \$100,000,000+ in Gross Revenue

## COMMON USE CASES:

- Applying more complex or custom filters that incorporate both text and value-based criteria

## PRO TIP

# USE PIVOT TABLES TO GROUP NUMERICAL VALUES

- Just like text, you can **group numerical fields** into custom buckets
  - Pull a numerical field into rows, right-click and select **Group**, and specify a **start value**, **end value**, and **group size**
  - To undo, right-click and select **Ungroup**
- Value grouping is a great way to analyze data distribution, or create bins as source data for a Histogram or Pareto Chart



PIVOT TABLES



2 STARS (BASIC)

The screenshot illustrates the steps to group numerical values in Excel:

- A table of numerical values (Price) from 1 to 25 is shown.
- An arrow labeled "RIGHT-CLICK" points to the context menu for cell A15 (containing the value 17).
- The context menu is open, showing options like Copy, Format Cells..., Refresh, Sort, Filter, Subtotal "Release Date", Expand/Collapse, Group..., Ungroup..., Move, and Remove "Release Date".
- An arrow points from the "Group..." option in the menu to the "Grouping" dialog box.
- The "Grouping" dialog box shows settings for Auto grouping: Starting at: 0, Ending at: 1000, and By: 100.
- The resulting grouped data table (B) shows the count of wine names for price ranges: 0-99, 100-199, 200-299, 300-399, 400-499, 500-599, 600-699, 700-799, 800-899, 900-1000, and >1000.

A	B
Price	Count of Wine Name
0-99	48,383
100-199	1,282
200-299	185
300-399	62
400-499	40
500-599	20
600-699	7
700-799	9
800-899	6
900-1000	3
>1000	3
Grand Total	50,000

## COMMON USE CASES:

- Analyzing the count or frequency of observations that fall into specific groups or "bins" of values
- Creating high-level summary tables or charts from granular data

## PRO TIP

# ANALYZE DATA USING VALUE CALCULATIONS

- **Value Calculations** allow you to display values from several different angles:
  - **% of Column/Row**: Displays values as a percentage of the row or column total
  - **% of Parent**: Displays values as a percentage of a given “parent” category
  - **Difference From**: Displays values in terms of the difference from a given base item
  - **Running Total**: Displays values as a cumulative total within a given base field
  - **Rank**: Displays values as a rank based on volume (*low to high or high to low*)



PIVOT TABLES

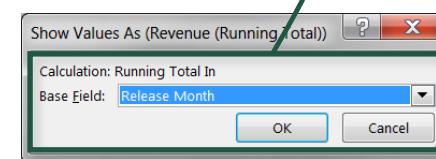
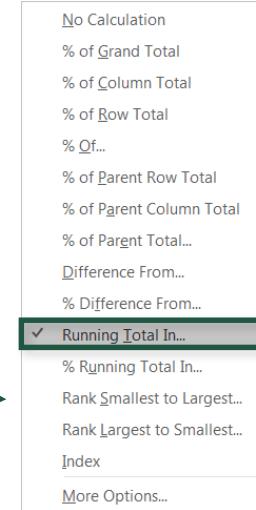
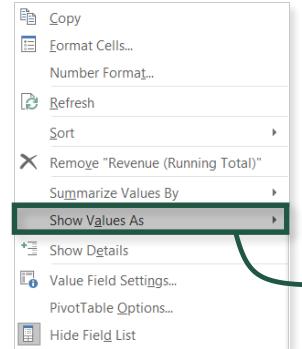


3 STARS (MODERATE)

TIP: Drag in multiple copies of the field to keep an original

3	Release Month	Gross Revenue	Revenue (% of Column)	Revenue (Rank)	Revenue (Running Total)
4	1	\$1,241,690,062	14.57%	2	\$1,241,690,062
5	2	\$1,080,470,947	12.68%	3	\$2,322,161,009
6	3	\$739,670,617	8.68%	6	\$3,061,831,626
7	4	\$1,258,644,348	14.77%	1	\$4,320,475,974
8	5	\$487,598,739	5.72%	8	\$4,808,074,713
9	6	\$928,755,990	10.90%	4	\$5,736,830,703
10	7	\$783,958,882	9.20%	5	\$6,520,789,585
11	8	\$591,889,024	6.94%	7	\$7,112,678,609
12	9	\$214,029,146	2.51%	12	\$7,326,707,755

RIGHT-CLICK



## COMMON USE CASES:

- Analyzing time-series data as a running total by day, month or year
- Exploring the composition of values in terms of percent share by category

## PRO TIP

# CUSTOMIZE ERRORS & BLANKS WITHIN A PIVOT

- By default, pivots won't display row labels where values don't exist; however, you can choose to **show items with no data**
  - Right-click the header, select **Field Settings**, and check the "**Show items with no data**" box in the **Layout & Print** tab
- **TIP:** To customize how **empty values** and **errors** are displayed, go to the **Layout & Format** tab in the **Options** menu



PIVOT TABLES



3 STARS (MODERATE)

The diagram illustrates the steps to enable 'items with no data' in a PivotTable:

- Open the context menu by right-clicking the header cell.
- Select "Field Settings..." from the menu.
- In the "Layout & Print" tab of the ribbon, check the "Show items with no data" box.
- The PivotTable will now display all genre items, including those with zero revenue.

**PivotTable Data (Original):**

Country	Genre	Sum of Gross Revenue
Afghanistan	Drama	\$1,127,331
Argentina	Crime	\$1,221,261
Aruba	Drama	\$20,471,548
Australia	Action	\$10,076,136
	Action	\$1,506,979,847
	Adventure	\$843,261,855
	Animation	\$274,765,505
	Biography	\$63,992,328
	Comedy	\$40,246,592
	Crime	\$77,873,417
	Drama	
	Horror	
	Mystery	

**PivotTable Data (Customized):**

Country	Genre	Sum of Gross Revenue
Afghanistan	Action	\$0
	Adventure	\$0
	Animation	\$0
	Biography	\$0
	Comedy	\$0
	Crime	\$0
	Documentary	\$0
	Drama	\$1,127,331
	Family	\$0
	Fantasy	\$0
	Horror	\$0
	Musical	\$0
	Mystery	\$0
	Romance	\$0
	Sci-Fi	\$0
	Thriller	\$0
	Western	\$0
Argentina	Action	\$0
	Adventure	\$0
	Animation	\$0
	Biography	\$0
	Comedy	\$0
	Crime	\$1,221,261

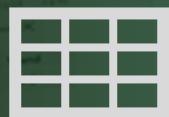
## COMMON USE CASES:

- Displaying all possible items within the PivotTable (even for blanks), to create a consistent layout or template
- Reformatting blanks or errors to clean up user-facing reports or dashboards

## PRO TIP

# ADD VISUAL FILTERS WITH SLICERS & TIMELINES

- **Slicers** are essentially interactive versions of filters, and **Timelines** are slicers designed to work specifically with dates
- Use the **Report Connections** option to link slicers to multiple PivotTables (assuming they share the same source data)
- **NOTE:** It typically makes sense to hide or indicate options with no data (via **Slicer Settings**), but note that this may cause slow performance for very large tables



PIVOT TABLES



3 STARS (MODERATE)

The screenshot illustrates the process of creating a visual filter using a slicer. It shows the 'PivotTable Fields' ribbon, a context menu for the 'Sport' field, and two PivotTables demonstrating report connections.

**PivotTable Fields Ribbon:** Shows fields to add to the report, including Athlete Name, Sport, and Medal. The 'Sport' field is selected and has a context menu open.

**Context Menu for Sport:** Options include Add to Report Filter, Add to Row Labels, Add to Column Labels, Add to Values, Add as Slicer (highlighted in green), and Add as Timeline.

**RIGHT-CLICK:** A callout points to the 'Sport' field in the PivotTable Fields ribbon and the 'Add as Slicer' option in the context menu.

**Report Connections:** A callout points to the 'Report Connections' icon in the Slicer Tools ribbon.

**PivotTables:**

- Event PivotTable:** Shows Medal Count by Event.

Event	Medal Count
Cross Country Skiing Men's 15 kilometres	285
Cross Country Skiing Men's Sprint	228
Cross Country Skiing Women's 10 kilometres	225
Cross Country Skiing Men's 30 km Skathlon	208
Cross Country Skiing Men's 50 kilometres	196
Cross Country Skiing Women's 15 km Skathlon	194
Cross Country Skiing Women's 4 x 5 kilometres Relay	188
Cross Country Skiing Women's Sprint	187
Cross Country Skiing Men's 4 x 10 kilometres Relay	184
Cross Country Skiing Women's 30 kilometres	171
Cross Country Skiing Men's Team Sprint	136
Cross Country Skiing Women's Team Sprint	100
<b>Grand Total</b>	<b>2302</b>
- Athlete Name PivotTable:** Shows Medal Count by Athlete Name.

Athlete Name	Medal Count
Yelena Vladimirovna Kolomina	16
Marit Bjørgen	16
Aino-Kaisa Saarinen	15
Justyna Kowalczyk	14
Li Hongxue	13
Sami Olavi Jauhojoki	12
Valentyna Yevhenivna Shevchenko	12
Stefanie Böhler	12
Kateryna Vasylivna Hryhorenko	12
Aivar Rehemaa	12
Devon Kershaw	12
Kikkan Lewis Randall (-Ellis)	12
<b>Grand Total</b>	<b>158</b>

## COMMON USE CASES:

- Adding user-friendly, visual filters to reports built from PivotTables
- Using slicers to clearly and visually indicate how a table is being filtered

## PRO TIP

# BRING PIVOTS TO LIFE WITH CONDITIONAL FORMATTING

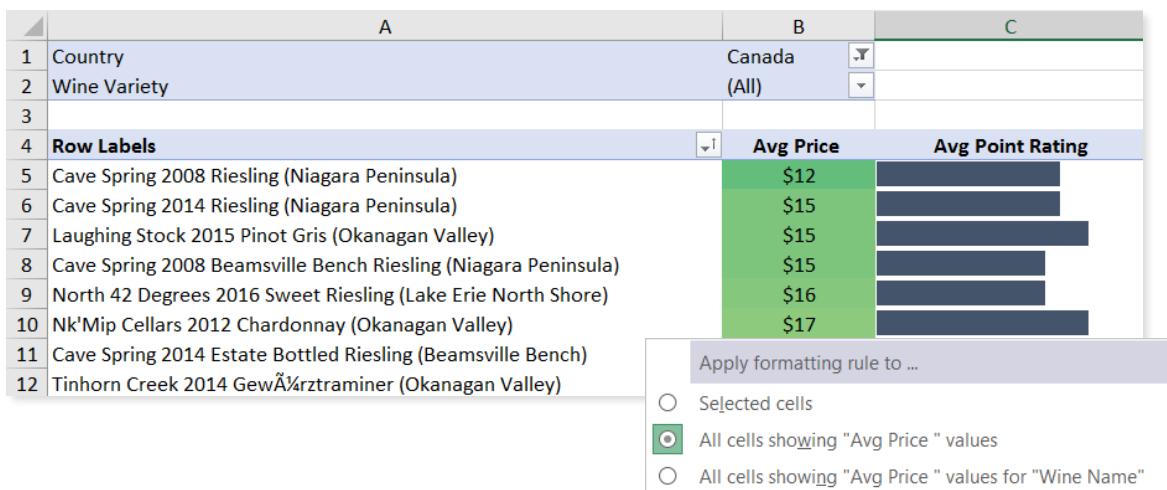
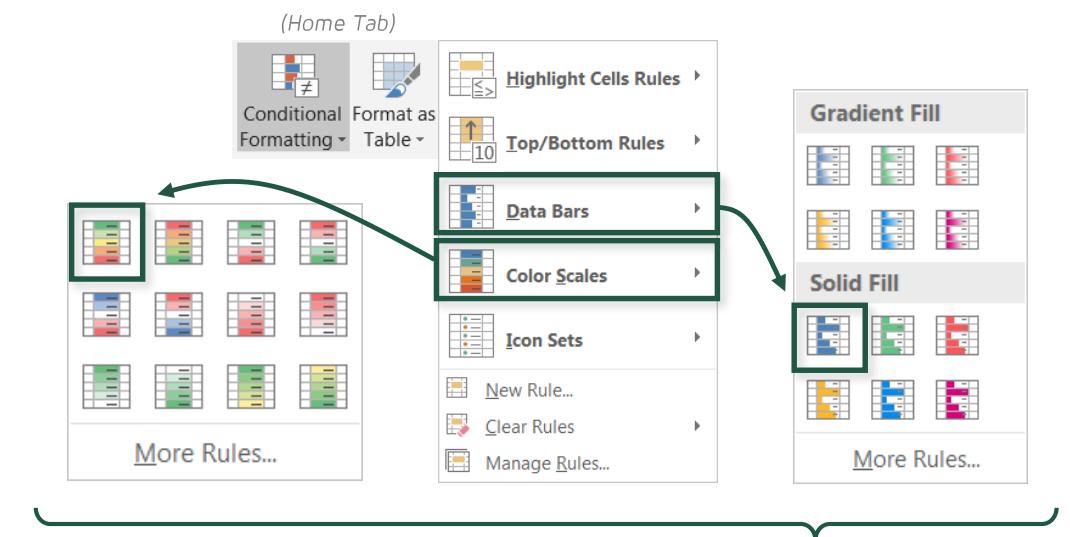
- Add **conditional formatting rules** (*data bars, color scales, icon sets, etc.*) to highlight patterns or trends in the pivot
- Unlike traditional cell formatting, you can specify how PivotTable formats react to changes in the table layout
  - **TIP:** Use “*All cells showing [X] values*” to apply the same rule to different layouts



PIVOT TABLES



4 STARS (ADVANCED)



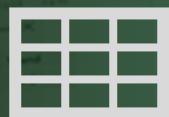
## COMMON USE CASES:

- Using color scales to draw attention to patterns or trends in the data
- Applying formatting rules that “stick” regardless of how the pivot layout changes

## PRO TIP

# REMOVE & REVIVE PIVOT TABLE DATA FROM CACHE

- When a new PivotTable is created, a **Pivot Cache** is generated as well, which is a compressed duplicate of the source data
  - The cache allows you to **delete the original source data** without impacting the pivot, which can significantly reduce file size
- To **revive the source data** from cache, double-click an unfiltered, Grand Total cell in the pivot (**NOTE:** make sure "Show Details" is enabled from the Options menu)



PIVOT TABLES

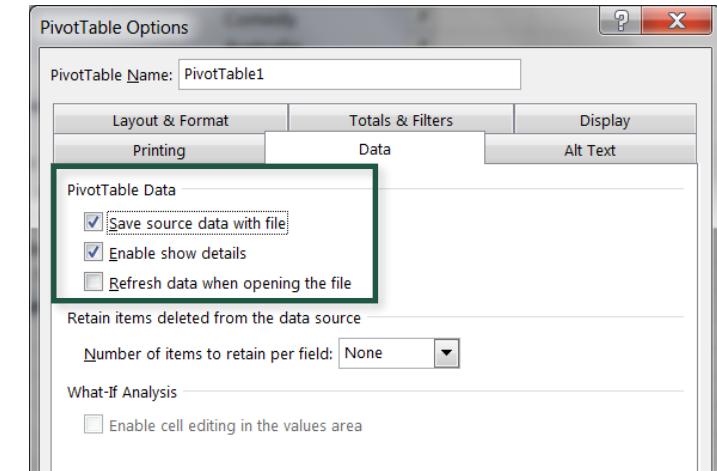


4 STARS (ADVANCED)

A	B
1 Year	Average of Base Pay
2 2011	\$65,045
3 2012	\$65,938
4 Grand Total	\$65,496

DOUBLE-CLICK

(PivotTable Tools > Options)



A	B	C	D	E
1 Employee Name	2 Year	3 Job Title	4 Base Pay	5 Overtime Pay
A Bernard Fatooh	2011	Sheriff'S Property Keeper	19969.37	0
Aaric Pingree	2011	Carpenter	0	0
Aaron Richmond	2011	Public Svc Aide-Public Works	2175.41	0
Aaron A Hipolito	2011	Museum Guard	10954.9	0
Aaron C Ballonado	2011	Police Officer 3	123471.15	8199.27
Aaron D Lynch	2011	Deputy Sheriff	87296.9	3265.58
Aaron Del Tredici	2011	Physician Specialist	124568.92	0
Aaron E Vurek	2011	Roofer	79136.84	883.8
Aaron Hipolito	2011	Museum Guard	10233.46	70.35
Aaron M Del Tredici	2011	Physician Specialist	129528.39	0
Aaron Patterson	2011	Ps Aide Health Services	15131.57	0
Aaron S Duran	2011	Automotive Mechanic	73376.2	568.85
Aaron Sher	2011	Public Service Aide-Assistant To Professionals	4666.32	0

## COMMON USE CASES:

- Removing static source data to reduce file size or increase processing speed
- Limiting accessibility in order to prevent users from changing the raw data

## PRO TIP

# ORGANIZE FIELDS USING CUSTOM SORT LISTS

- Excel has several built-in **sort lists** to help organize fields such as **weekdays** or **month names** (which use non-standard sort rules)
- To add your own **custom sort lists**, head to **File > Options > Advanced** and click the **Edit Custom Lists** option
  - Once a list is defined, A-Z sorting will default to the custom list, rather than standard alphabetical order



PIVOT TABLES



5 STARS (EXPERT)

	A	B	C
1	Sport	Medal	Count of Medal
2	Alpine Skiing	Bronze	31
3		Gold	31
4		NA	1,900
5		Silver	29
6	Archery		594
7		Bronze	24
8		Gold	24
9		NA	522
10	Athletics	Silver	24
11			7,030
12		Bronze	184
13		Gold	193
14	NA	NA	6,461
15		Silver	192
16			

(File > Options > Advanced)

### General

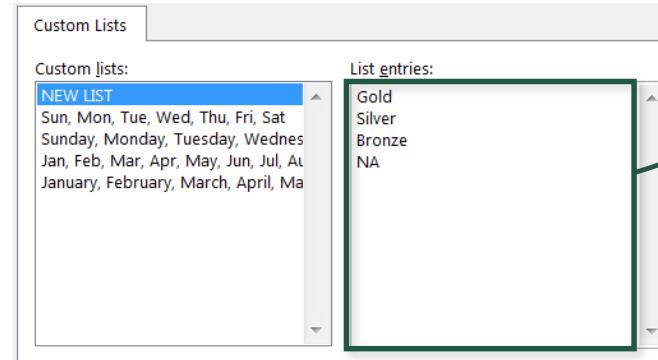
- Ignore other applications that use Dynamic Data Exchange (DDE)
- Ask to update automatic links
- Show add-in user interface errors
- Scale content for A4 or 8.5 x 11" paper sizes

At startup, open all files in:

Web Options...

- Enable multi-threaded processing

Create lists for use in sorts and fill sequences: [Edit Custom Lists...](#)



	A	B	C
1	Sport	Medal	Count of Medal
2	Alpine Skiing	Gold	31
3		Silver	29
4		Bronze	31
5		NA	1,900
6	Archery		594
7		Gold	24
8		Silver	24
9		Bronze	24
10	Athletics	NA	522
11		Gold	193
12		Silver	192
13		Bronze	184
14	NA	NA	6,461
15			
16			



## COMMON USE CASES:

- Organizing fields which can't be sorted using standard tools, such as apparel sizes (S, M, L) or Olympic medals (Gold, Silver, Bronze)
- Creating custom **fiscal calendars** to override standard month sorting

## PRO TIP

# CHANGE THE SOLVE ORDER FOR PIVOT CALCULATIONS

- If your pivot contains multiple calculated items and fields which could overlap, use the **Solve Order** to determine priority
  - In the **Solve Order** dialog box, the *last* formula in the list overrides those above
- **NOTE:** The **List Formulas** option generates a new tab documenting all calculated items and fields, as well as the sort order



PIVOT TABLES



5 STARS (EXPERT)

The diagram illustrates the process of changing solve order. It shows the 'PivotTable Tools' ribbon with the 'Calculated Field...', 'Calculated Item...', and 'Solve Order...' options. An arrow points from the 'Solve Order...' option to the 'Calculated Item Solve Order' dialog box, which displays a 'Solve order' list: '% English Titles' = English/(English+Spanish), 'North America' = Canada+USA, 'Central America' = Mexico, and 'South America' = Argentina+Chile+Colombia+Peru. Another arrow points from the 'Solve Order...' option to a screenshot of the 'List Formulas' tab in Excel, which contains two sections: 'Calculated Field' and 'Calculated Item'. The 'Calculated Field' section lists Profit, ROI, Total FB Likes, and Lead Actor Popularity with their respective formulas. The 'Calculated Item' section lists '1% English Titles', 'North America', 'Central America', and 'South America' with their formulas. A note at the bottom of the tab explains that when a cell is updated by more than one formula, the value is set by the formula with the last solve order.

A	B	C	
1	<b>Calculated Field</b>		
2	<b>Solve Order</b>	<b>Field</b>	<b>Formula</b>
3	1	Profit	=Gross Revenue'-Budget
4	2	ROI	=Gross Revenue'/Budget
5	3	Total FB Likes	=Lead Actor FB Likes'+Cast FB Likes'+Director FB Likes'+Movie FB Likes'
6	4	Lead Actor Popularity	=Lead Actor FB Likes/Total FB Likes'
7			
8	<b>Calculated Item</b>		
9	<b>Solve Order</b>	<b>Item</b>	<b>Formula</b>
10	1	'1% English Titles'	=English/(English+Spanish)
11	2	'North America'	=Canada+USA
12	3	'Central America'	=Mexico
13	4	'South America'	=Argentina+Chile+Colombia+Peru
14			
15			
16	<b>Note:</b>	When a cell is updated by more than one formula, the value is set by the formula with the last solve order.	
17			
18			
19		To change the solve order for multiple calculated items or fields, on the Options tab, in the Calculations group, click Fields, Items, & Sets, and then click Solve Order.	
20			
21			

## COMMON USE CASES:

- Determining which calculations should take priority in conflicting cases
- Producing documentation for complex PivotTables containing a large number of calculated items and fields

# ANALYTICS TIPS

## PRO TIP

# EXPLORE YOUR DATA WITH QUICK ANALYSIS TOOLS

- Select a cell range and click the pop-up (or **CTRL-Q**) to access **Quick Analysis** tools
  - These tools allow you to quickly add **conditional formats**, **charts**, **calculated rows & columns**, **tables** & **sparklines** to help explore and analyze your data
- **NOTE:** Options may be unavailable if they aren't compatible with the selected data

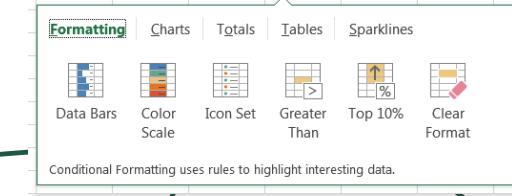


ANALYTICS



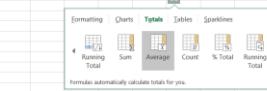
1 STAR (VERY BASIC)

	A	B	C	D	E	F
1		Avg IMDb Score				
2		2011	2012	2013	2014	2015
3	Action	6.26	6.35	6.56	6.45	6.41
4	Adventure	6.40	6.76	6.60	6.81	6.86
5	Animation	5.35	7.33	7.00	7.20	7.00
6	Biography	6.81	7.19	7.49	6.86	7.22
7	Comedy	6.25	6.15	6.21	6.13	6.32
8	Crime	6.94	6.53	6.75	6.86	6.78
9	Documentary	6.15	6.80	5.75	6.95	7.10
10	Drama	6.66	6.84	6.66	6.54	6.55
11	Fantasy	5.40	7.00	6.27	4.70	6.10
12	Horror	5.43	5.24	6.08	5.72	5.35
13						



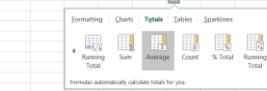
Conditional Formatting uses rules to highlight interesting data.

A	B	C	D	E	F	G	H	I	J
1		2011	2012	2013	2014	2015	Average		
2	Action	6.26	6.35	6.45	6.41	6.41			
3	Adventure	6.40	6.76	6.60	6.81	6.86	6.69		
4	Animation	5.35	7.33	7.00	7.20	7.00	6.78		
5	Biography	6.81	7.19	7.49	6.86	7.22	7.11		
6	Comedy	6.25	6.15	6.21	6.13	6.32	6.21		
7	Crime	6.94	6.53	6.75	6.86	6.78	6.77		
8	Documentary	6.15	6.80	5.75	6.95	7.10	6.55		
9	Drama	6.66	6.84	6.66	6.54	6.51	6.64		
10	Fantasy	5.40	7.00	6.27	4.70	6.10	5.89		
11	Horror	5.43	5.24	6.08	5.72	5.35	5.57		
12									

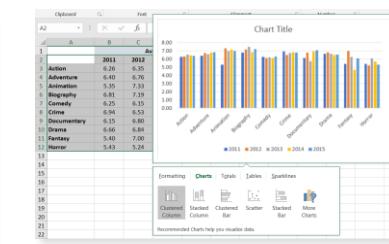


Formulas automatically calculate totals for you.

A	B	C	D	E	F	G	H	I	J
1		2011	2012	2013	2014	2015	Average		
2	Action	6.26	6.35	6.45	6.41	6.41			
3	Adventure	6.40	6.76	6.60	6.81	6.86	6.69		
4	Animation	5.35	7.33	7.00	7.20	7.00	6.78		
5	Biography	6.81	7.19	7.49	6.86	7.22	7.11		
6	Comedy	6.25	6.15	6.21	6.13	6.32	6.21		
7	Crime	6.94	6.53	6.75	6.86	6.78	6.77		
8	Documentary	6.15	6.80	5.75	6.95	7.10	6.55		
9	Drama	6.66	6.84	6.66	6.54	6.51	6.64		
10	Fantasy	5.40	7.00	6.27	4.70	6.10	5.89		
11	Horror	5.43	5.24	6.08	5.72	5.35	5.57		
12									



Formulas automatically calculate totals for you.



## COMMON USE CASES:

- Quickly exploring a variety of data analysis tools, without having to manually navigate through different options
- Adding calculated rows or columns without typing a single formula

## PRO TIP

# COMPARE OUTPUTS WITH THE SCENARIO MANAGER

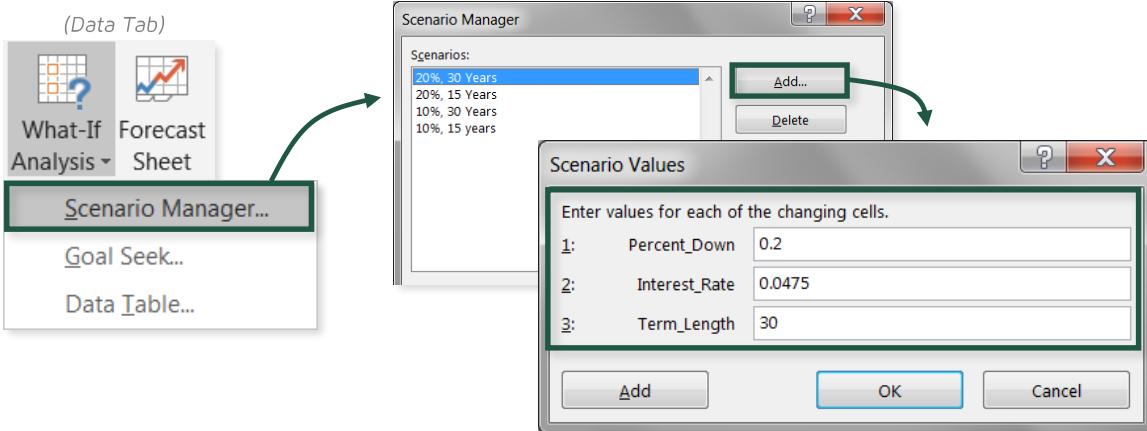
- Use the **Scenario Manager** to save and access specific combinations of cell values (*Data > What-If Analysis > Scenario Manager*)
  - This is often used for modeling exercises, allowing you to fix combinations of *inputs* in order to evaluate a calculated *output*
- **TIP:** Give your input cells meaningful names (i.e. "*Interest\_Rate*" vs. *\$A\$1*)



ANALYTICS



2 STARS (BASIC)



### Scenario #1

PROPERTY COST	
Purchase Price	\$899,000
Tax Rate	\$9.50
LOAN COST	
Down Payment %	20%
Interest Rate	4.75%
Term Length (yrs)	30
Loan Amount	\$719,200
Est. Closing Costs	\$17,980

Cash to Close:  
**\$197,780**

Monthly Expenses:  
**\$4,813**

### Scenario #2

PROPERTY COST	
Purchase Price	\$899,000
Tax Rate	\$9.50
LOAN COST	
Down Payment %	20%
Interest Rate	4.00%
Term Length (yrs)	15
Loan Amount	\$719,200
Est. Closing Costs	\$17,980

Cash to Close:  
**\$197,780**

Monthly Expenses:  
**\$6,382**

### Scenario #3

PROPERTY COST	
Purchase Price	\$899,000
Tax Rate	\$9.50
LOAN COST	
Down Payment %	10%
Interest Rate	5.75%
Term Length (yrs)	30
Loan Amount	\$809,100
Est. Closing Costs	\$17,980

Cash to Close:  
**\$107,880**

Monthly Expenses:  
**\$5,783**

### Scenario #4

PROPERTY COST	
Purchase Price	\$899,000
Tax Rate	\$9.50
LOAN COST	
Down Payment %	10%
Interest Rate	5.00%
Term Length (yrs)	15
Loan Amount	\$809,100
Est. Closing Costs	\$17,980

Cash to Close:  
**\$107,880**

Monthly Expenses:  
**\$7,460**

## COMMON USE CASES:

- Building forecasts based on several variables (seasonality, interest rate, etc.)
- Modeling several potential outcomes in cases where uncertainty is a factor (i.e. stock portfolio returns)

## PRO TIP

# SOLVE FOR INDIVIDUAL OUTPUTS WITH GOAL SEEK

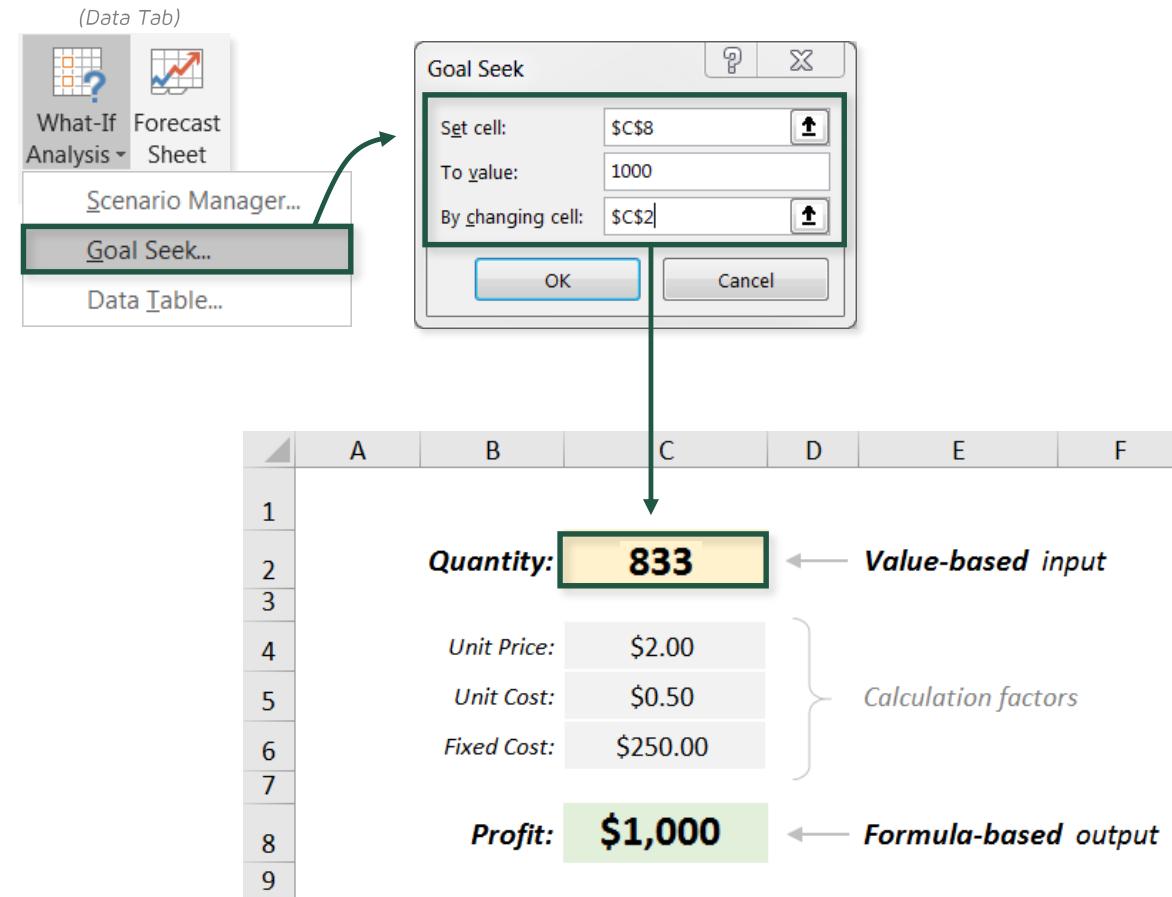
- Use **Goal Seek** to find the result you want by changing the value of a given input cell (*Data > What-If Analysis > Goal Seek*)
  - **Goal Seek** requires a single, hard-coded *input* cell and a single, formula-based *output* cell; you cannot test multiple inputs
- **TIP:** To evaluate multiple inputs, add constraints, or solve complex optimization problems, use Excel's **Solver** tool (*requires the Solver Add-In*)



ANALYTICS



2 STARS (BASIC)



## COMMON USE CASES:

- Determining the ideal input required to produce a specific goal or target outcome (i.e. number of sales required to yield a positive profit)
- Solving simple optimization problems based on a single input variable

## PRO TIP

# CREATE FORECAST SHEETS FROM HISTORICAL DATA

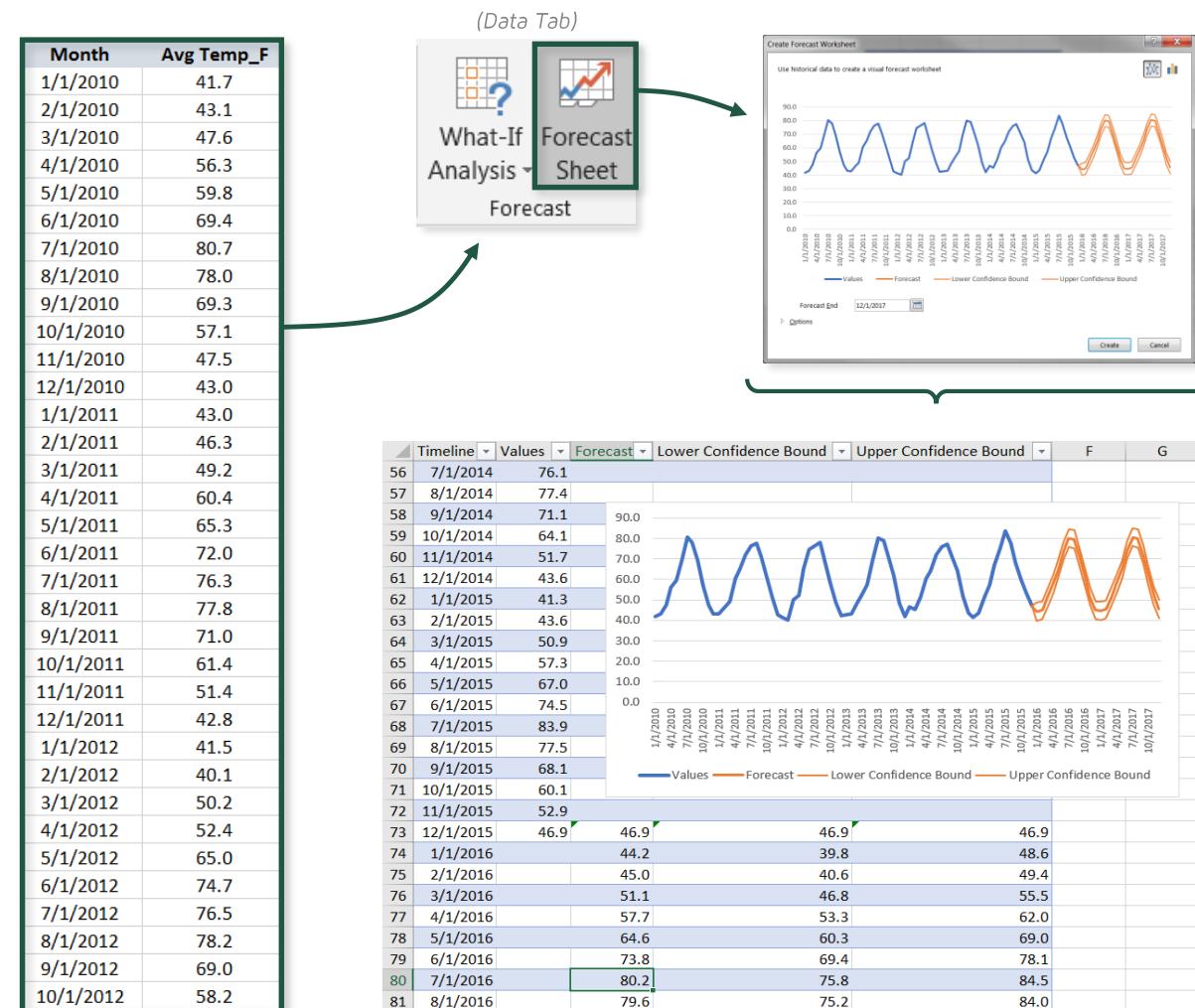
- Recent versions of Excel (2016/365) include a built-in **Forecast Sheet** tool to calculate forecasts based on given historical data
  - The **Forecast Sheet** dialog box allows you to set the **forecast length** and **confidence interval**, detect **seasonality**, and customize handling of **missing** or **duplicate** values
- NOTE:** Trendlines can be used for simple forecast exercises, but do not account for confidence or seasonality



ANALYTICS



3 STARS (MODERATE)



## COMMON USE CASES:

- Predicting future values such as interest rates or stock returns
- Calculating an expected range of future outcomes based on a given level of confidence

## PRO TIP

# FIND OUTLIERS WITH STATS FUNCTIONS & FORMATTING

- Use functions like **MEDIAN** and **QUARTILE** to **calculate statistical outliers**, and **conditional formatting** to highlight them
  - Outliers are commonly defined using a “**fence**” based on how far a value falls outside of the **interquartile range (IQR)**
- **TIP:** For simple “**Top N**” or “**Top %**” calculations, use basic conditional formats

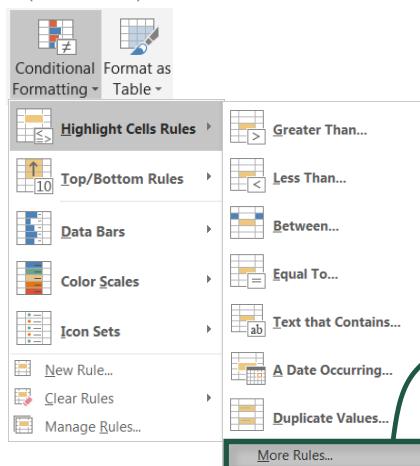


ANALYTICS



4 STARS (ADVANCED)

(Home Tab)



New Formatting Rule

Select a Rule Type:  
► Format all cells based on their values  
► Format only cells that contain  
► Format only top or bottom ranked values  
► Format only values that are above or below average  
► Format only unique or duplicate values  
► Use a formula to determine which cells to format

Edit the Rule Description:

Format only cells with:  
Cell Value ▾ not between ▾ =:\$F\$8 [Format...] and =:\$F\$11 [Format...]

Preview: AaBbCcYyZz [Format...]

OK Cancel

	A	B	C	D	E	F
1	Player Name	Height (in)	Weight (lbs)		OUTLIER CALCULATIONS	
2	Jon Rauch	83	260		Median: 74	
3	Randy Johnson	82	231		1st quartile: 72	
4	Chris Young	82	250		3rd quartile: 75	
5	Andrew Sisco	81	260		IQR: 3	
6	Mark Hendrickson	81	230		Fence Multiplier: 1.5	
7	Kyle Snyder	80	220			
8	Richie Sexson	80	237		Inner Fence (lower): 67.5	
9	Scott Elarton	80	240			
10	Phil Stockman	80	240		Outer Fence (upper): 79.5	
11	Jason Hirsh	80	250			
12	Daniel Cabrera	79	230			
13	Jered Weaver	79	205			
14	C.C. Sabathia	79	290			

{ Outlier calculations }

## COMMON USE CASES:

- Identifying statistical anomalies in a dataset, based on custom criteria
- Finding and removing values that may have been incorrectly entered

## PRO TIP

# EVALUATE VARIABLE INPUTS WITH DATA TABLES

- **Data Tables** allow you to calculate an array of results based on a range of input values (*Data > What-If Analysis > Data Table*)
  - **Data Tables** can be used to evaluate formula results based on changes to either a *single* input variable or *multiple* variables
- **TIP:** Change the calculation mode to “Automatic Except for Data Tables” to prevent them from constantly recalculating



ANALYTICS



4 STARS (ADVANCED)

A	B	C	D	E	F	G	H	I	J	K
1										
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19										

**PROPERTY DETAILS**



Address: 63 Evergreen Zip Code: 01730  
MLS #: 72393006 Year Built: 2018  
Beds/Baths: 3/2+ Listing Date: 9/1/2018  
Sq Ft: 2,059 \$/Sq. Ft: \$436.62  
Notes: Close to town center and schools, borders preservation land and walking trails

**PROPERTY COST**

Purchase Price	\$899,000
Tax Rate	\$9.50

**LOAN COST**

Down Payment %	20%
Interest Rate	3.00%
Term Length (yrs)	15
Loan Amount	\$719,200
Est. Closing Costs	\$17,980

**MONTHLY EXPENSES**

Mortgage Costs	\$4,967
Property Tax	\$712
Utilities	\$150
Home Insurance	\$200
HOA Fees	\$0

**Interest Rate**   **Monthly Cost**

Selected	\$4,967
3.0%	\$4,967
3.5%	\$5,141
4.0%	\$5,320
4.5%	\$5,502
5.0%	\$5,687
5.5%	\$5,876
6.0%	\$6,069
6.5%	\$6,265
7.0%	\$6,464
7.5%	\$6,667
8.0%	\$6,873
8.5%	\$7,082
9.0%	\$7,295
9.5%	\$7,510
10.0%	\$7,729

(Data Tab)

What-If Analysis Forecast Sheet Forecast Scenario Manager... Goal Seek... Data Table...

**Data Table**

Row input cell:  Column input cell:  OK Cancel

Interest Rate   Monthly Cost

Selected	\$4,967
3.0%	\$4,967
3.5%	\$5,141
4.0%	\$5,320
4.5%	\$5,502
5.0%	\$5,687
5.5%	\$5,876
6.0%	\$6,069
6.5%	\$6,265
7.0%	\$6,464
7.5%	\$6,667
8.0%	\$6,873
8.5%	\$7,082
9.0%	\$7,295
9.5%	\$7,510
10.0%	\$7,729

## COMMON USE CASES:

- Calculating a matrix of results based on combinations of input values (i.e. monthly payments based interest rates and down payments)
- Identifying the optimal outcome given multiple variable inputs

## PRO TIP

# CONNECT & SHAPE DATA WITH POWER QUERY

- Power Query (aka “*Get Data*” or “*Get & Transform*”) is used to connect, transform, and load data from external sources
  - All operations are saved with the query as “**Applied Steps**”, and repeated each time the connection is refreshed (*like a macro*)
- Data can be loaded to worksheets or to the **Data Model**, where you can store much more data and build relational models to connect tables from multiple sources



ANALYTICS



4 STARS (ADVANCED)

(Data Tab)

(Query Preview)

Get & Transform Data

From Text/CSV

Recent Sources

From Web

Existing Connections

Get Data

From Table/Range

File

Close & Load

Refresh

Preview

Advanced Editor

Properties

Home

Transform

Add Column

View

Close

Choose Columns

Remove Columns

Keep Rows

Remove Rows

Split Column

Group By

Replace Values

Data Type: Currency

Use First Row as Headers

Merge Queries

Append Queries

Combine Files

Parameters

Manage Parameters

New Source

Recent Sources

Combine

Source settings

Data Sources

New Query

Queries

in\_category

deadline

launched

A<sup>b</sup>c state

A<sup>b</sup>c backers

A<sup>b</sup>c country

\$ usd\_pledged\_real

\$ usd\_goal\_real

1 /video 11/1/2017 9/2/2017 4:43:57 AM failed 15 US 2421 30000

2 /video 8/29/2015 7/4/2015 8:35:03 AM canceled 14 US 1283 19500

3 4/1/2016 2/26/2016 1:38:27 PM successful 224 US 52375 50000

4 3/17/2016 2/1/2016 8:05:12 PM failed 40 US 453 25000

5 3/25/2016 2/9/2016 11:01:12 PM failed 0 US 0 200000

6 2/28/2015 1/29/2015 2:10:53 AM failed 11 US 664 2500

7 /ng 5/10/2015 4/10/2015 9:20:54 PM failed 20 US 789 3000

8 /ideo 5/3/2017 4/3/2017 5:11:33 PM successful 840 US 57577.31 50000

9 10/8/2016 9/7/2016 1:14:26 PM successful 549 US 47266 1000

10 1/27/2016 12/23/2015 9:47:29 PM failed 2 US 17 3000

11 12/20/2016 12/9/2016 8:27:02 PM successful 34 US 2100 2100

12 3/27/2017 3/2/2017 4:01:43 AM failed 25 US 856 1500

13 1/2/2016 11/22/2015 10:47:44 PM failed 4 US 90 1200

14 /aphy 10/30/2017 9/25/2017 5:17:43 PM failed 2 US 6 9500

15 5/8/2015 4/8/2015 2:53:18 AM failed 3 US 3 7500

16 /ng 2/1/2016 1/2/2016 8:06:07 AM failed 0 US 0 13500

17 6/23/2015 5/24/2015 12:47:52 PM successful 448 US 37199 25000

18 /ideo 6/18/2016 4/19/2016 11:53:22 PM failed 2 US 65 250000

19 6/22/2016 5/23/2016 6:10:04 PM failed 8 US 587 5000

20 4/27/2015 3/13/2015 6:33:08 PM successful 2784 US 124998 15000

21 4/9/2015 2/23/2015 12:10:28 AM failed 13 US 485 850

22 /ogy 3/25/2016 2/29/2016 8:30:27 PM canceled 15 US 2030 87000

23

Properties

Name: kickstarter\_projects

All Properties

Applied Steps

Source

Promoted Headers

Changed Type

Filtered Rows

Filtered Rows1

Removed Columns

Changed Type1

Query Settings

EXCEL

## COMMON USE CASES:

- Connecting to flat files or database sources, and transforming or filtering the data before loading into Excel for further analysis
- Creating an automated ETL (**extract, transform, load**) process that can be refreshed as new data becomes available

## PRO TIP

# BUILD RELATIONAL DATA MODELS IN EXCEL

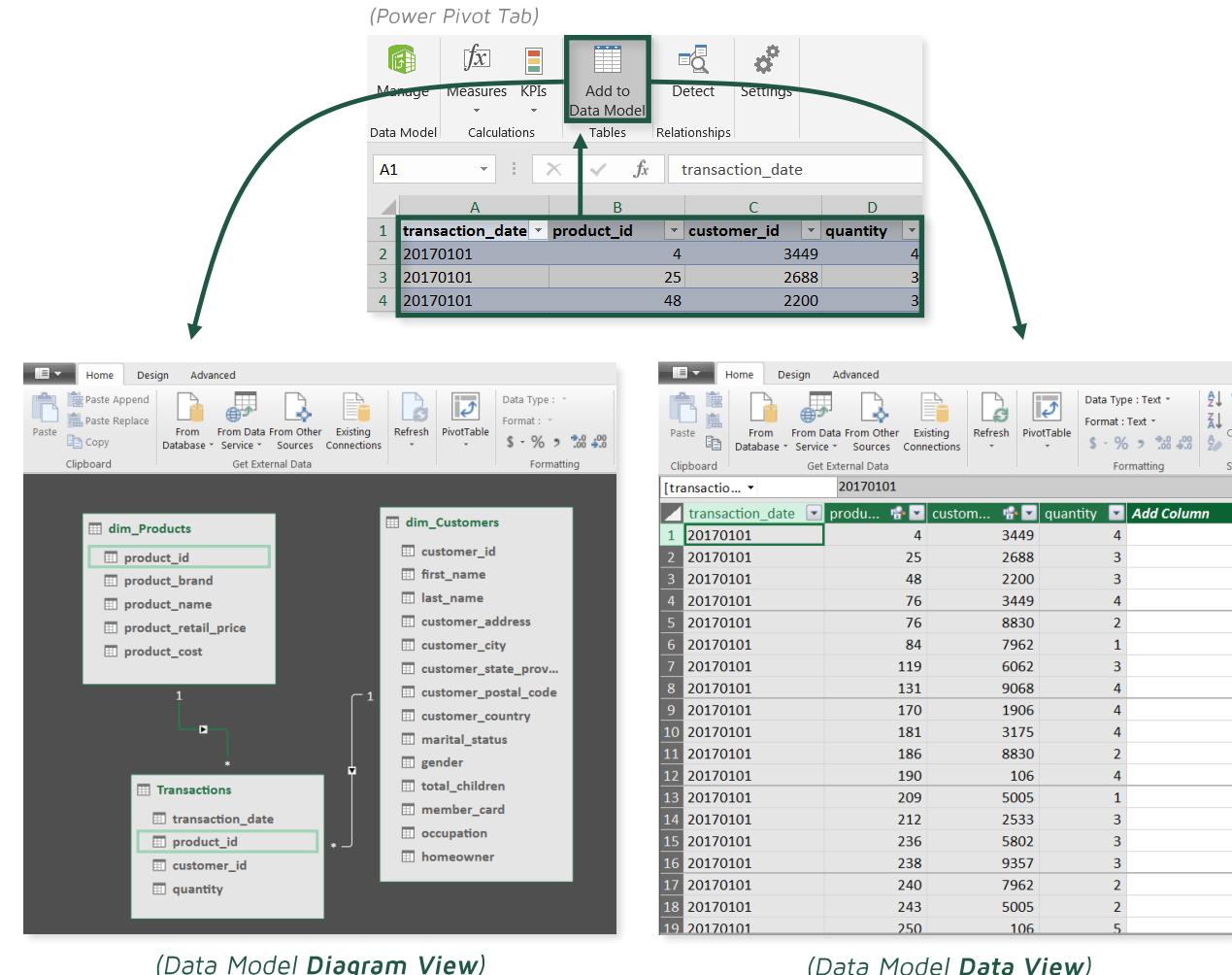
- Use Excel's **Data Model** to compress large amounts of data, create table relationships, and add calculated measures with DAX
  - Once table relationships are defined, use **Power Pivot** to explore and analyze data from multiple sources in a single view
- **NOTE:** Some versions of Excel may not have access to data modeling tools; if you don't see Power Pivot, check (**File > Options > Add-Ins > COM Add-Ins**)



ANALYTICS



4 STARS (ADVANCED)



(Data Model Diagram View)

(Data Model Data View)

## COMMON USE CASES:

- Combining information from multiple sources without actually "stitching" the data together by merging or using LOOKUP/INDEX functions
- Building robust business intelligence solutions that integrate and blend data across many sources (sales, HR, finance, marketing, etc.)

## PRO TIP

# EXPLORE DATA MODELS WITH CUBE FUNCTIONS

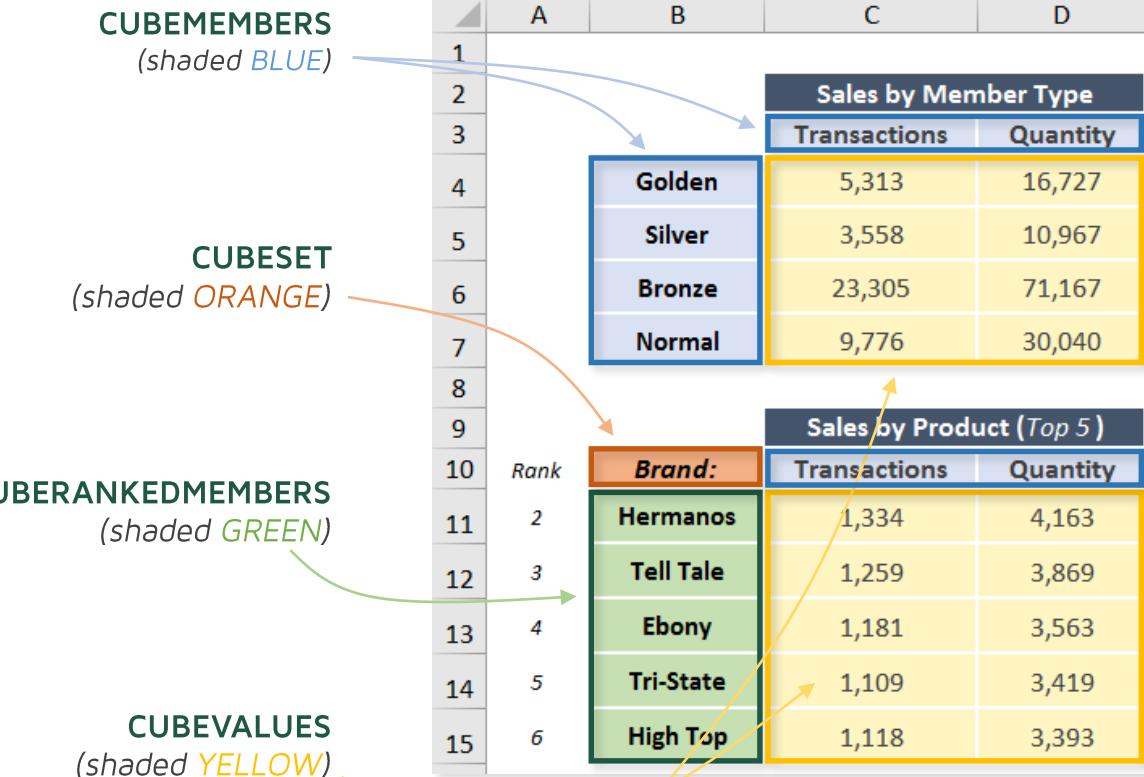
- Use **CUBE functions** (vs. Pivots) to pull values from a Data Model *directly into cells*:
  - **CUBESET**: A collection of items or members (*i.e. one column from a table in the model*)
  - **CUBEMEMBER**: A single item within a cubeset (*i.e. one item from a table column*)
  - **CUBERANKEDMEMBER**: A single item within a cubeset, based on an ordered rank
  - **CUBEVALUE**: An aggregated numerical value based on a set of member expressions
- **MORE INFO:** <http://bit.ly/2PYgdo0>



ANALYTICS



5 STARS (EXPERT)



## COMMON USE CASES:

- Building spreadsheet-based reports or dashboards from data in the Data Model without relying on PivotTables
- Documenting all of the sets and members within a data model

## PRO TIP

# BUILD A MONTE CARLO SIMULATION MODEL

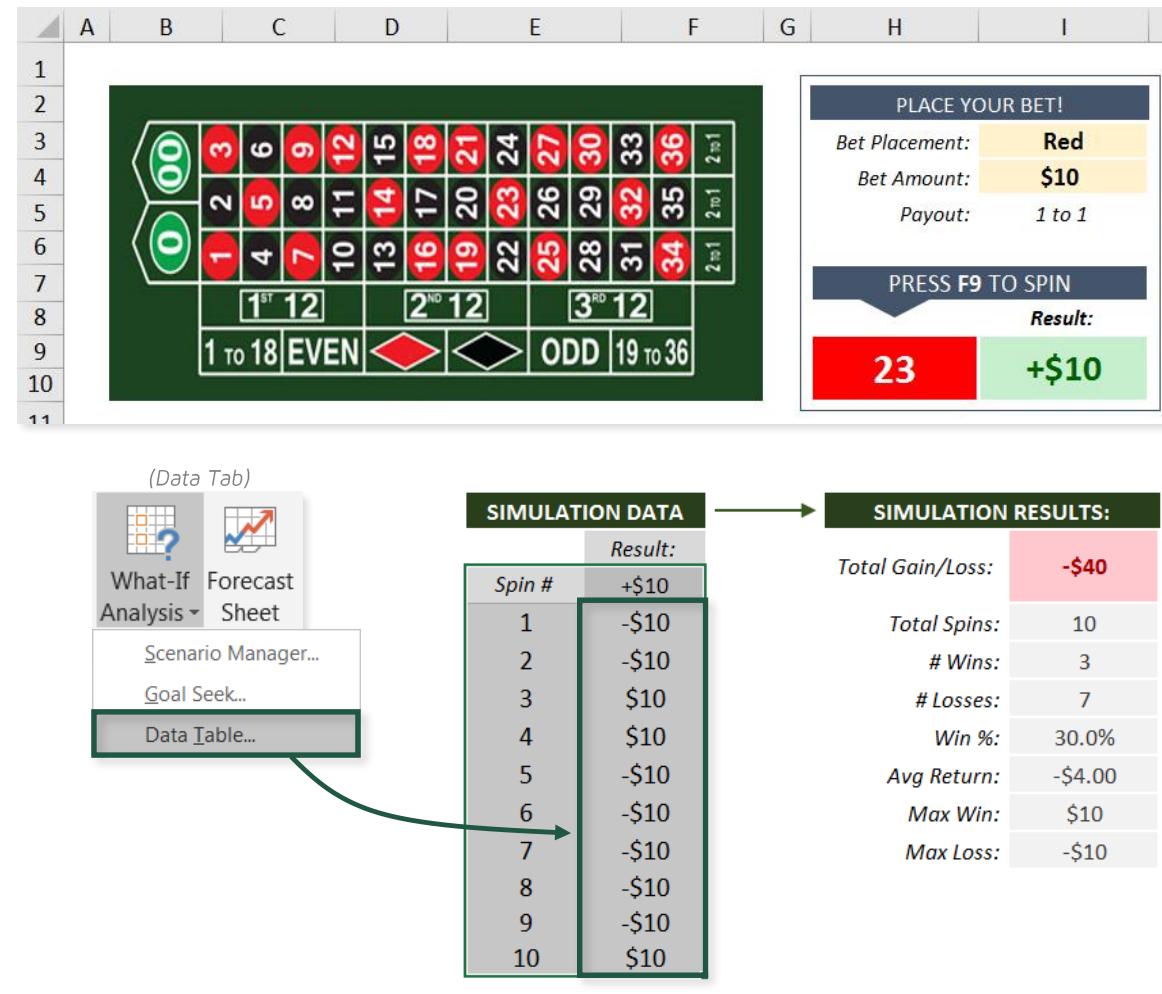
- Monte Carlo simulation is commonly used to predict the probability of given outcomes based on repeated random sampling
- In Excel, use RAND or RANDBETWEEN to randomize formula inputs, and Data Tables to generate an array of results
  - Based on the resulting array, you can use stats functions like FREQUENCY or COUNTIF to calculate outcome probabilities
  - TIP: Referencing a blank cell as the Data Table input allows each row to randomize



ANALYTICS



5 STARS (EXPERT)



## COMMON USE CASES:

- Randomly simulating a model thousands of times in order to understand the probability of certain outcomes (i.e. probability of a profit vs. loss)
- Building predictive models that account for a given degree of uncertainty for one of more inputs (i.e. future interest rates, supply costs, etc.)

## PRO TIP

# OPTIMIZE COMPLEX MODELS WITH SOLVER

- Use **Solver** to solve complex optimization problems that require multiple decision variables and constraints
  - Unlike Goal Seek, **Solver** allows you to *minimize*, *maximize*, or *target* an objective value by changing multiple input cells, subject to given constraints
  - Select **Simplex LP** for linear optimizations, and **GRG** or **Evolutionary** for non-linear
- **NOTE:** To use Solver, activate the plug-in (*File > Options > Add-Ins > Excel Add-Ins*)



ANALYTICS



5 STARS (EXPERT)

	A	B	C	D	E	F	G	H	I
1									
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23									
24									
25									

Shipping Cost/Unit

	DISTRIBUTION CENTER			
FACTORY	Boston	Dallas	Seattle	Baltimore
Miami	\$15.00	\$17.68	\$30.33	\$4.02
NYC	\$12.86	\$15.47	\$28.40	\$1.88
Chicago	\$13.79	\$9.67	\$20.43	\$7.02
Oakland	\$31.06	\$17.23	\$8.56	\$28.13

Inventory:

1,000
2,000
2,500
500

Units Demanded:

1,250
975
3,250
525

6,000

Units Shipped

	DISTRIBUTION CENTER			
FACTORY	Boston	Dallas	Seattle	Baltimore
Miami	0	0	0	0
NYC	0	0	0	0
Chicago	0	0	0	0
Oakland	0	0	0	0

Units Shipped:

0
0
0
0

Units Received:

0
0
0
0

Total Shipping Cost:

\$0.00
--------

DECISION VARIABLES

OBJECTIVE (minimize)

CONSTRAINTS

Units Shipped

	DISTRIBUTION CENTER			
FACTORY	Boston	Dallas	Seattle	Baltimore
Miami	225	0	250	525
NYC	1,025	975	0	0
Chicago	0	0	2,500	0
Oakland	0	0	500	0

Units Shipped:

1,000
2,000
2,500
500

Units Received:

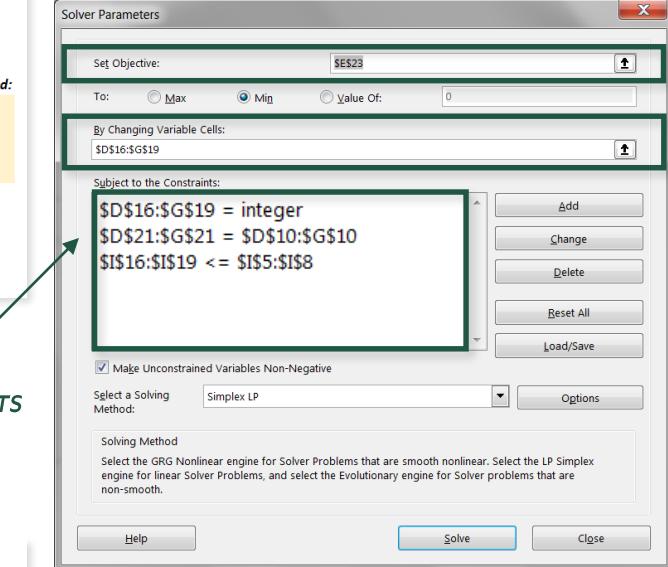
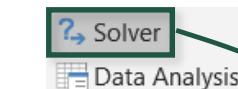
1,250
975
3,250
525

6,000

Total Shipping Cost:

\$96,687.75
-------------

(Data Tab)



## COMMON USE CASES:

- Determining optimal results subject to real-world constraints (i.e. limited inventory, price floors, integer values, etc.)

## PRO TIP

# EXPLORE DATA WITH THE ANALYSIS TOOLPAK

- **Analysis ToolPak** is a built-in Excel plug-in that supports a range of advanced **data analysis** and **statistical** methods (Anova, Covariance, Regression, T-Tests, etc.)
  - It can also be used to quickly generate key **descriptive statistics**, such as mean, mode, variance, range, count, skewness, etc.
- **NOTE:** You'll need to activate the plug-in (*File > Options > Add-Ins > Excel Add-Ins*)



ANALYTICS



5 STARS (EXPERT)

A	B	C	D
Athlete Name	Age	Height (cm)	Weight (kg)
Th Anh	20	165	58
Th Ngn Thng	23	147	47
Th Ngn Thng	19	147	47
A Lamusi	23	170	60
A. Joshua "Josh" West	31	207	105
Aadam Ismaael Khamis	19	172	67
Aarik Wilson	25	191	88
Aarn Sarmiento Padilla	25	180	72
Aarn Sarmiento Padilla	21	180	72
Aaron Arthur Cook	25	183	80
Aaron Arthur Cook	17	183	80
Aaron Blunck	17	180	78
Aaron Brown	24	198	79
Aaron Brown	20	198	79
Aaron Feltham	26	190	94
Aaron Gate	25	181	71
Aaron Gate	21	181	71
Aaron J. "AJ" Bear	29	170	82
Aaron James Ramsey	21	178	70
Aaron James Scott	22	177	72

(Data Tab)

Solver

Data Analysis

Analysis Tools

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

Age	Height	Weight
Mean	26.17	Mean
Standard Error	0.027019	Standard Error
Median	26	Median
Mode	25	Mode
Standard Deviation	5.368748	Standard Deviation
Sample Variance	28.82346	Sample Variance
Kurtosis	2.579227	Kurtosis
Skewness	1.019345	Skewness
Range	59	Range
Minimum	12	Minimum
Maximum	71	Maximum
Sum	1033244	Sum
Count	39482	Count
Largest(1)	71	Largest(1)
Smallest(1)	12	Smallest(1)
Confidence Level(95	0.052958	Confidence Level(95
		0.107343
		Confidence Level(95
		0.155281

	Age	Height	Weight
Age	100%		
Height	11%	100%	
Weight	18%	78%	100%

## COMMON USE CASES:

- Quickly generating descriptive statistics without using cell formulas
- Exploring or analyzing data using more advanced statistical methods or tools (analyzing variance, building predictive models, etc.)

# RESOURCES & NEXT STEPS

# RESOURCES & NEXT STEPS

**1** Round out your skills with the full **Excel Maven** course stack:

- Advanced Excel Formulas & Functions
- Data Visualization with Excel Charts & Graphs
- Data Analysis with Excel PivotTables
- Intro to Power Query, Power Pivot & DAX

**2** Check out **support.office.com** for resources & documentation:

- **PC Shortcuts:** <http://bit.ly/2Cx0gCa>
- **Mac Shortcuts:** <http://bit.ly/2QwyqZQ>
- **Custom number formats:** <http://bit.ly/2A1JFUD>
- **CUBE functions:** <http://bit.ly/2PYgdo0>
- **Solver:** <http://bit.ly/2JcZfQu>
- **Analysis ToolPak:** <http://bit.ly/2NXT17D>

**3** Remember to **leave a review** if you enjoyed the course!

# THANK YOU