

PIVOT TABLE

WHY PIVOT TABLES?

	A	B	C	D
1	State	Year	Total Population	Student Population
2	New Mexico	2002	1,903,289	310,117
3	Nebraska	2003	1,826,341	313,968
4	Maryland	2004	5,884,563	359,210
5	California	2003	37,253,956	8,965,848
6	Montana	2002	926,865	163,067
7	D.C.	2004	917,092	183,811
8	Alaska	2002	655,435	153,920
9	Minnesota	2001	4,919,479	1,195,975
10	Louisiana	2001	4,468,976	626,279
11	Montana	2001	902,195	208,952
12	New Mexico	2004	2,085,538	631,320
13	West Virginia	2004	1,855,413	244,566
14	Louisiana	2004	4,601,893	326,680
15	Arizona	2003	6,329,013	1,837,525
16	Maryland	2001	5,296,486	1,399,498
17	Tennessee	2002	5,900,962	595,648
18	Texas	2002	23,764,231	5,246,483
19	Rhode Island	2003	1,052,567	173,937
20	Utah	2001	2,233,169	388,385
21	Wisconsin	2001	5,363,675	1,415,261
22	Kansas	2004	2,885,905	872,769
23	D.C.	2001	783,600	166,161
24	California	2002	35,893,799	3,598,863
25	Ohio	2003	11,536,502	3,361,193
26	Texas	2003	25,145,561	7,561,350
27	Alabama	2002	4,530,182	1,273,375
28	Utah	2002	2,389,039	460,374
29	Virginia	2003	8,001,024	1,445,224



Looking at a raw data set like the one here, how would you answer the following?

1. Which state had the highest population in 2002?
2. In which year was overall US population the highest?
3. Which states saw a decline in student population rate between 2003 and 2004?

What if you don't even **know** what you're looking for?

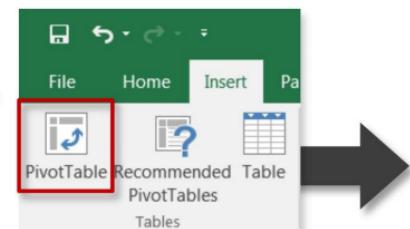
PIVOT TABLE

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27	Alabama	2002	4,530,182	1,273,375
28	Utah	2002	2,389,039	460,374
29	Virginia	2003	8,001,024	1,445,224

PivotTables allow you to easily **organize, filter, summarize, and analyze** raw data

“Analyzing data without a Pivot is like hammering a nail with a noodle”

-Albert Einstein*



	A	B	C	D	E
1	State	Year	Total Pop	% of State Pop	Student Population %
2	Alabama		18,579,040	100.00%	19.15%
3		2001	4,447,100	23.94%	21.33%
4		2002	4,530,182	24.38%	28.11%
5		2003	4,779,735	25.73%	10.39%
6		2004	4,822,023	25.95%	17.42%
7	Alaska		2,724,047	100.00%	12.99%
8		2001	626,932	23.01%	10.72%
9		2002	655,435	24.06%	23.48%
10		2003	710,231	26.07%	7.75%
11		2004	731,449	26.85%	10.63%
12	Arizona		23,756,734	100.00%	17.32%
13		2001	5,130,632	21.60%	27.22%
14		2002	5,743,834	24.18%	6.10%
15		2003	6,329,013	26.64%	29.03%
16		2004	6,553,255	27.58%	8.09%

KEY BENEFITS

1

POWERFUL

- *Uncover insights and answer key questions about your data*

2

BEAUTIFUL

- *Apply custom styles and conditional formatting rules to bring your Pivots to life*

3

FAST

- *Create custom views, filters, and calculated fields on the fly*

4

ACCURATE

- *Automate calculations to minimize human error*

5

FLEXIBLE

- *Manipulate table layouts and create dynamic views in seconds*

DATA STRUCTURE

GOOD!

Satisfaction	Airline Status	Age	Age Range	Gender	Flight Date	Destination City	Destination State	Type of Travel	Class
5	Blue	31	30-39	Male	3/18/2014	Dallas/Fort Worth, TX	Texas	Business travel	Business
4	Blue	56	50-59	Male	1/11/2014	Dallas/Fort Worth, TX	Texas	Business travel	Business
3	Blue	21	20-29	Female	1/25/2014	Dallas/Fort Worth, TX	Texas	Personal travel	Business
5	Blue	43	40-49	Male	7/20/2014	Dallas/Fort Worth, TX	Texas	Business travel	Eco
6	Silver	49	40-49	Male	2/26/2014	Dallas/Fort Worth, TX	Texas	Business travel	Eco
7	Gold	49	40-49	Female	3/6/2014	Dallas/Fort Worth, TX	Texas	Business travel	Eco
8	Gold	35	30-39	Male	3/6/2014	Dallas/Fort Worth, TX	Texas	Business travel	Eco
9	Silver	33	30-39	Male	3/5/2014	Dallas/Fort Worth, TX	Texas	Business travel	Eco
10	Blue	44	40-49	Female	1/21/2014	Dallas/Fort Worth, TX	Texas	Business travel	Eco
11	Blue	51	50-59	Female	1/19/2014	Dallas/Fort Worth, TX	Texas	Business travel	Eco
12	Blue	28	20-29	Male	3/19/2014	Dallas/Fort Worth, TX	Texas	Business travel	Eco
13	Blue	39	30-39	Female	2/4/2014	Dallas/Fort Worth, TX	Texas	Business travel	Eco
14	Platinum	46	40-49	Female	1/15/2014	Dallas/Fort Worth, TX	Texas	Business travel	Eco
15	Silver	26	20-29	Female	2/5/2014	Dallas/Fort Worth, TX	Texas	Business travel	Eco
16	Blue	52	50-59	Female	2/17/2014	Dallas/Fort Worth, TX	Texas	Mileage tickets	Eco
17	Blue	46	40-49	Male	1/9/2014	Dallas/Fort Worth, TX	Texas	Mileage tickets	Eco
18	Silver	62	60-69	Female	1/4/2014	Dallas/Fort Worth, TX	Texas	Personal travel	Eco
19	Blue	24	20-29	Female	2/9/2014	Dallas/Fort Worth, TX	Texas	Personal travel	Eco
20	Blue	75	70-79	Female	3/8/2014	Dallas/Fort Worth, TX	Texas	Personal Travel	Eco
21	Blue	19	0-19	Female	2/16/2014	Dallas/Fort Worth, TX	Texas	Personal Travel	Eco
22	Blue	38	30-39	Female	1/19/2014	Dallas/Fort Worth, TX	Texas	Personal Travel	Eco
23	Blue	62	60-69	Male	1/24/2014	Dallas/Fort Worth, TX	Texas	Personal Travel	Eco
24	Blue	16	0-19	Male	1/15/2014	Dallas/Fort Worth, TX	Texas	Personal Travel	Eco
25	Blue	67	60-69	Female	3/6/2014	Dallas/Fort Worth, TX	Texas	Personal Travel	Eco
26	Blue	47	40-49	Female	3/29/2014	Dallas/Fort Worth, TX	Texas	Personal Travel	Eco
27	Blue	62	60-69	Female	1/21/2014	Dallas/Fort Worth, TX	Texas	Personal Travel	Eco



BAD!

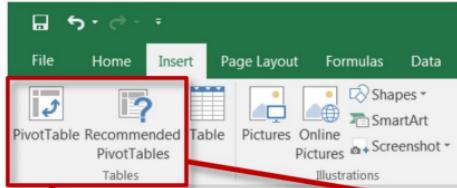
A	B	MARKETING DATA								
		Period1	Period2	Period3	Period4	Period5	Period6	Period7	Period8	
1		Impressions	1,286,982	2,873,987	1,266,721	1,236,237	2,122,113	2,145,532	2,516,782	2,981,727
2		Clicks	627	374	827	263	912	662	723	1283
3		CTR	0.049%	0.013%	0.065%	0.021%	0.043%	0.031%	0.029%	0.043%
4		Column3	79	67	0	88	66	79	95	85
5		Column4	20	6	20	15	12	15	18	17
6		CVR	25%	9%	#DIV/0!	17%	18%	19%	19%	20%
7		Monthly Costs								
8		Jan	\$395							
9		Feb	\$350							
10		Mar	\$206							
11		Apr	\$214							
12		May	\$385							
13		Jun	\$301							
14		Jul	\$263							
15										
16										
17										



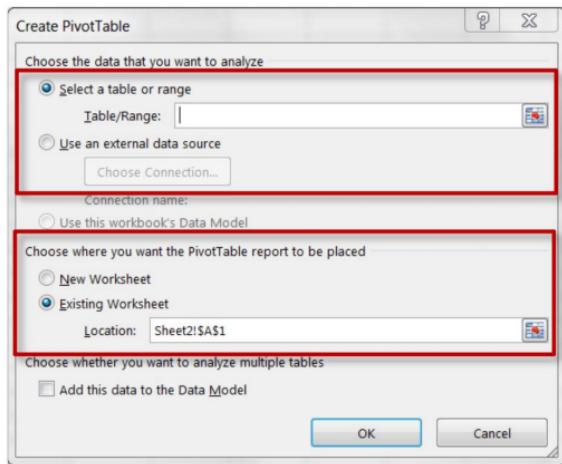
- Rectangular (*variables as columns, observations as rows*)
- No extra formatting
- Contains only dimensions & measures
- Clear column headers
- No extra headers, footers, sub-totals or calculated fields

- Transposed (*variables as rows, observations as columns*)
- Unnecessary formatting
- Contains calculated fields
- Confusing column header names
- Extra header rows

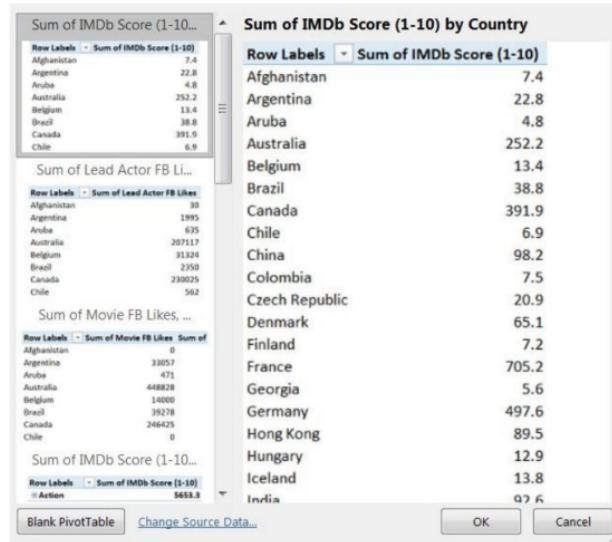
INSERTING A PIVOT TABLE



From the “Insert” menu, select **PivotTable** to create a blank Pivot, or use the **Recommended PivotTables** option to browse pre-populated starting points



(Insert → PivotTable)



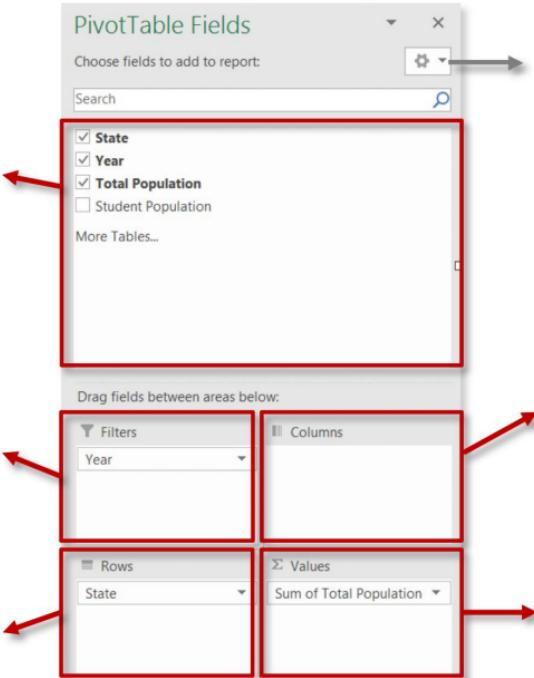
(Insert → Recommended PivotTables)

THE FIELD LIST

The **Field List** shows all the variables in your dataset, and which ones are currently included in the Pivot

If there are fields that you want to use to filter the whole data set, drag them to the **Filters** box

Variables included in the **Rows** field will appear as individual rows within the Pivot



Layout options allow you to adjust the look and feel of the field list

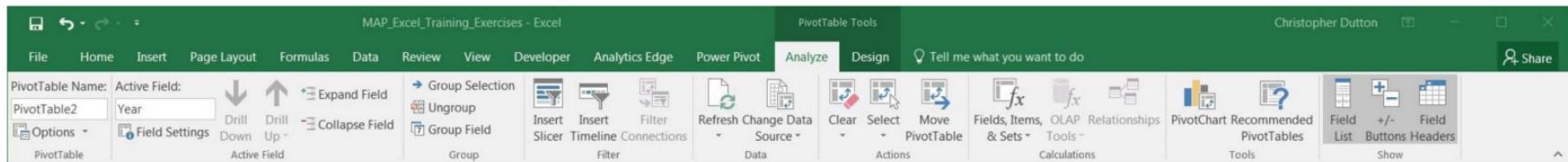
Variables included in the **Columns** field appear as individual *columns* within the Pivot

Numerical variables are almost always included in the **Values** field

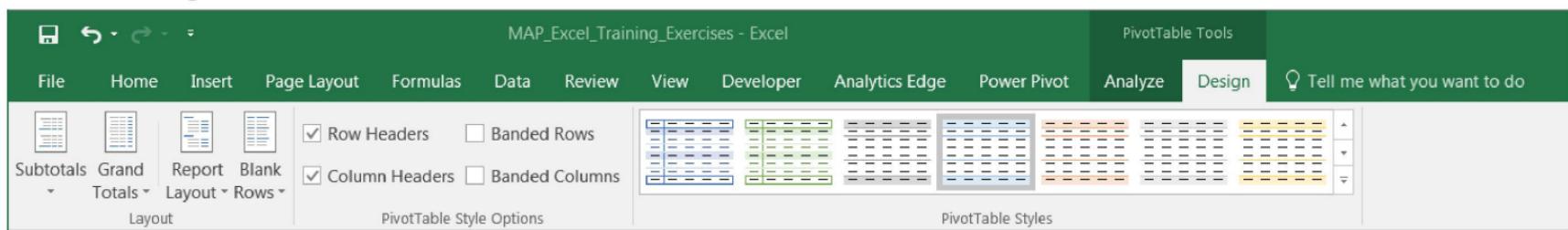
(These are the quantitative measures that you care about: sales, revenue, clicks, etc.)

ANALYZE & DESIGN OPTIONS

The “Analyze” Tab:



The “Design” Tab:



SELECTING, CLEARING & MOVING PIVOTS

PivotTable Name: Active Field: Year
PivotTable2
Options +
PivotTable

File Home Insert Page Layout Formulas Data Review View Developer Analytics Edge Power Pivot Analyze Design Tell me what you want to do

PivotTable Tools

Christopher Dutton Share

Action buttons: Group Selection, Ungroup, Insert Slicer, Refresh, Change Data Source, Clear, Select, Move, Fields, Items, & Sets, PivotChart Recommended PivotTables, Tools, Field List, Buttons Headers, Show.

Callout boxes:

- Clear All**
- Select**: Labels and Values, Values, Labels, Entire PivotTable, Enable Selection
- Move**: Move PivotTable dialog box (Choose where you want the PivotTable report to be placed: New Worksheet (radio button), Existing Worksheet (radio button, selected), Location: Sheet1!A7, OK, Cancel)

Clear options allow you to clear all fields and values from a table, or just any filters that have been applied

Select options (allow you to select entire sections of the PivotTable (or the entire table itself)

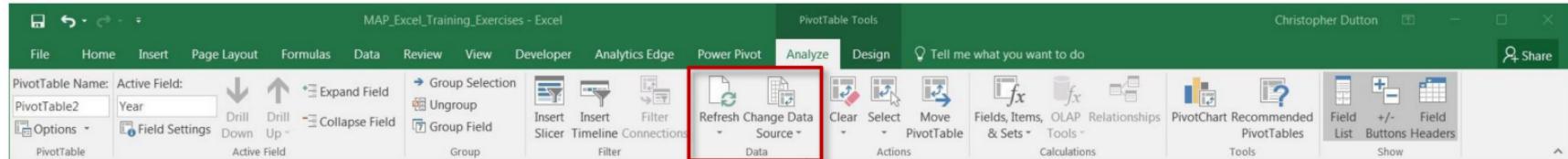
Move options allow you to relocate an existing PivotTable to a new worksheet or a new location within the existing one



PRO TIP:

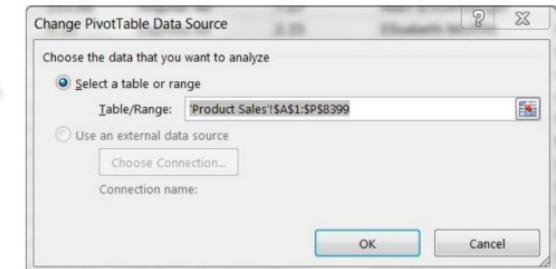
Select → Entire PivotTable, then copy and paste to duplicate an entire Pivot

REFRESHING & UPDATING PIVOTS



The screenshot shows the Microsoft Excel ribbon with the 'Analyze' tab selected. In the 'Data' group of the 'Analyze' tab, the 'Refresh' button is highlighted with a red box. Red arrows point from the text descriptions below to this button and to a separate 'Change PivotTable Data Source' dialog box.

Refresh updates the PivotTable based on changes made *within* the defined source data range or table



PRO TIP:

Format your source data as a table to dynamically adjust as new columns or rows are added, or use a column-only range reference (i.e. \$A:\$G)



Change Data Source allows you refresh the Pivot to reflect changes *outside* of the defined source range or table (i.e. new columns or rows)

HOW DO PIVOTS ACTUALLY WORK?

	A	B
1	Age	(All)
2		
3	State	Average of Total Population
4	Alabama	719
5	Alaska	103
6	Arizona	973
7	Arkansas	440
8	California	5,672
9	Colorado	763
10	Connecticut	545
11	Delaware	139

STEP 1: Detect/evaluate coordinates

- State = **Arizona**
- Measure = **Total Population**
- Filter = **All ages**



	A	B	C	D
1	State	Age	Total Population	Total Citizen I
2	Alabama	18 to 24	439	428
3	Alabama	25 to 34	576	535
4	Alabama	35 to 44	615	582
5	Alabama	45 to 64	1297	1275
6	Alabama	65+	667	660
7	Alaska	18 to 24	63	61
8	Alaska	25 to 34	109	103
9	Alaska	35 to 44	86	80
10	Alaska	45 to 64	186	182
11	Alaska	65+	72	69
12	Arizona	18 to 24	586	545
13	Arizona	25 to 34	859	709
14	Arizona	35 to 44	870	713
15	Arizona	45 to 64	1656	1502
16	Arizona	65+	892	846
17	Arkansas	18 to 24	288	281
18	Arkansas	25 to 34	362	336

STEP 2: Apply arithmetic

- Summarize Values By: **AVERAGE**
- (vs. SUM, COUNT, MAX, MIN, etc.)

STEP 3: Display result

$$(586+859+870+1656+892)/5 = 973$$

	A	B
1	Age	(All)
2		
3	State	Average of Total Population
4	Alabama	719
5	Alaska	103
6	Arizona	973
7	Arkansas	440

NOTE: You can double-click any specific value in a Pivot to generate a new tab showing the exact source data used to calculate it

PIVOT FORMATTING

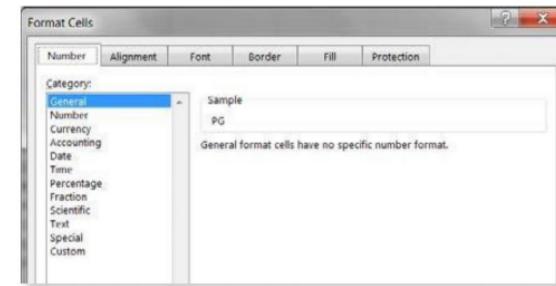
NUMBER FORMATTING

A screenshot of a Microsoft Excel PivotTable context menu. The menu items are:

- Sum of Total Population
- 1 **Number Format...**
- Copy
- Format Cells...
- Number Format...
- Refresh
- Sort
- X Remove "Sum of Total Population"
- 2 Summarize Values By
- Show Values As
- + Show Details
- Value Field Settings...
- 1 PivotTable Options...
- Hide Field List

The item **Number Format...** is highlighted with a red box and has a red arrow pointing to the **Format Cells** dialog box.

Right-click a column header or any individual value within a field to change the number format (number, currency, percentage, date, etc.)



PRO TIP:

Right click, select PivotTable Options, and select the “Layout & Format” tab to customize how you want to display blank or error values

TABLE STYLES

Excel_PivotTable_Exercises_WIP_v2 - Excel

File Home Insert Page Layout Formulas Data Review View Developer Analytics Edge Power Pivot Analyze Design Tell me

Subtotals Grand Totals Report Layout Blank Layout Rows Columns Layout PivotTable Style Options

A3 State

1 Age (All)

2

3 State Average of Total Population

	A	B	C
1	Age (All)		
2			
3	State	Average of Total Population	
4	Alabama	719	
5	Alaska	103	
6	Arizona	973	
7	Arkansas	440	
8	California	5,672	
9	Colorado	763	
10	Connecticut	545	
11	Delaware	139	
12	District Of Columbia	103	
13	Florida	3,007	
14	Georgia	1,436	
15	Hawaii	202	
16	Idaho	226	
17	Illinois	1,930	
18	Indiana	971	
19	Iowa	464	
20	Kansas	424	
21	Kentucky	658	
22	Louisiana	664	
23	Maine	208	
24	Maryland	890	

Select from a range of styles
(right-click to make default), or
customize your own:

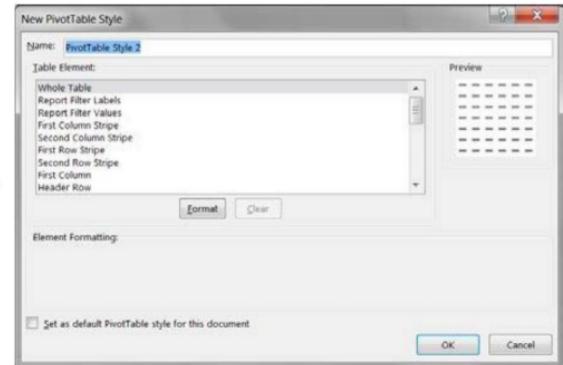


TABLE LAYOUTS: COMPACT VS. OUTLINE

Compact Form (default):

	A	B
1	Order Priority	(All)
2	Region	(All)
3		
4	Row Labels	Sum of Order Quantity
5	Furniture	4,563
6	Bookcases	1,347
7	O'Sullivan 3-Shelf Heavy-Duty Bookcases	500
8	Bush Mission Pointe Library	442
9	O'Sullivan Elevations Bookcase, Cherry Finish	405
10	Chairs & Chairmats	1,674
11	Global High-Back Leather Tilter, Burgundy	666
12	Global Troy™ Executive Leather Low-Back Tilter	550
13	Office Star - Mid Back Dual function Ergonomic High Back Chair	458
14	Tables	1,542
15	Bevis 36 x 72 Conference Tables	619
16	BoxOffice By Design Rectangular and Half-Moon Meeting Room	516
17	Bretford CR8500 Series Meeting Room Furniture	407
18	Office Supplies	4,137
19	Binders and Binder Accessories	1,400
20	Wilson Jones Hanging View Binder, White, 1"	585
21	Storex DuraTech Recycled Plastic Frosted Binders	412
22	Avery Flip-Chart Easel Binder, Black	403
23	Paper	1,379
24	Computer Printout Paper with Letter-Trim Perforations	502

VS.

Outline Form (recommended):

	A	B	C	D
1	Order Priority	(All)		
2	Region	(All)		
3				
4	Product Category	Product Sub-Category	Product Name	Sum of Order Quantity
5	Furniture			4,563
6	Bookcases			1,347
7	O'Sullivan 3-Shelf Heavy-Duty Bookcases			500
8	Bush Mission Pointe Library			442
9	O'Sullivan Elevations Bookcase, Cherry Finish			405
10	Chairs & Chairmats			1,674
11	Global High-Back Leather Tilter, Burgundy			666
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15	Bevis 36 x 72 Conference Tables			619
16	BoxOffice By Design Rectangular and Half-Moon Me			516
17	Bretford CR8500 Series Meeting Room Furniture			407
18	Office Supplies			4,137
19	Binders and Binder Accessories			1,400
20	Wilson Jones Hanging View Binder, White, 1"			585
21	Storex DuraTech Recycled Plastic Frosted Binders			412
22	Avery Flip-Chart Easel Binder, Black			403
23	Paper			1,379
24	Computer Printout Paper with Letter-Trim Perforat			502
25	Xerox 210			473

- Nested fields/dimensions condensed into one column, with one filter option
- Each field/dimension broken out into its own column, with separate column headers and filter options
- Allows you to apply custom filters to each field (i.e. label filters on the **Product Category** field and value filters on the **Product Sub-Category** field)

TABLE LAYOUTS: TABULAR FORM

-  Show in Compact Form
-  Show in Outline Form
-  Show in Tabular Form
-  Repeat All Item Labels
-  Do Not Repeat Item Labels

Tabular Form (*non-repeating*):

Player	(All)		
Team	Position	Sum of Salary	Sum of Games
Anaheim Angels	Catcher	\$2,082,500	341
Anaheim Angels	First Baseman	\$5,250,000	225
Anaheim Angels	Outfielder	\$23,725,000	623
Anaheim Angels	Pitcher	\$37,304,167	1307
Anaheim Angels	Second Baseman	\$2,270,000	109
Anaheim Angels	Shortstop	\$1,150,000	146
Anaheim Angels	Third Baseman	\$7,250,000	83
Baltimore Orioles	Catcher	\$3,830,000	282
Baltimore Orioles	First Baseman	\$8,375,000	396
Baltimore Orioles	Outfielder	\$22,975,000	591
Baltimore Orioles	Pitcher	\$29,142,500	1478
Baltimore Orioles	Shortstop	\$2,850,000	398
Baltimore Orioles	Third Baseman	\$6,705,000	197
Boston Red Sox	Catcher	\$5,505,000	246
Boston Red Sox	First Baseman	\$3,250,000	259

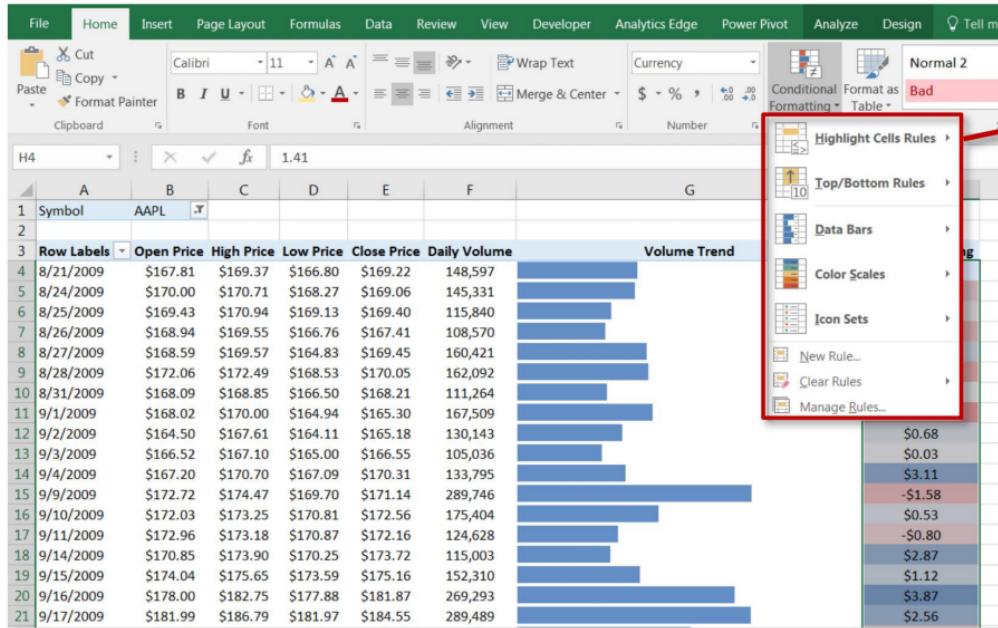
Tabular Form (*repeating*):

Player	(All)		
Team	Position	Sum of Salary	Sum of Games
Anaheim Angels	Catcher	\$2,082,500	341
Anaheim Angels	First Baseman	\$5,250,000	225
Anaheim Angels	Outfielder	\$23,725,000	623
Anaheim Angels	Pitcher	\$37,304,167	1307
Anaheim Angels	Second Baseman	\$2,270,000	109
Anaheim Angels	Shortstop	\$1,150,000	146
Anaheim Angels	Third Baseman	\$7,250,000	83
Baltimore Orioles	Catcher	\$3,830,000	282
Baltimore Orioles	First Baseman	\$8,375,000	396
Baltimore Orioles	Outfielder	\$22,975,000	591
Baltimore Orioles	Pitcher	\$29,142,500	1478
Baltimore Orioles	Shortstop	\$2,850,000	398
Baltimore Orioles	Third Baseman	\$6,705,000	197
Boston Red Sox	Catcher	\$5,505,000	246
Boston Red Sox	First Baseman	\$3,250,000	259
Boston Red Sox	Outfielder	\$33,500,000	530
Boston Red Sox	Pitcher	\$40,109,000	1355

PRO TIP:

Use Outline Form when you are manipulating data within a Pivot, and switch to Tabular form with repeating labels (and no grand totals or subtotals) if you want to create a new raw dataset

CONDITIONAL FORMATTING



Conditional Formatting rules
can be applied to PivotTables just
like normal data ranges

(Home → Conditional Formatting)

Options include:

- **Text and Value-based Formats**
- **Data Bars**
- **Color Scales**
- **Icon Sets**
- **Formula-Based Rules**

SORTING, FILTERING & GROUPING

SORTING & FILTERING

A screenshot of a spreadsheet application showing student population data by state and year. The interface includes a ribbon bar at the top with tabs like 'File', 'Home', 'Insert', etc. Below the ribbon, there's a toolbar with icons for copy, paste, and search. The main area shows a table with columns for 'State', 'Year', and 'Sum of Total Population'. A context menu is open over the 'State' column header, listing options: 'Sort A to Z', 'Sort Z to A', and 'More Sort Options...'. Another context menu is open over the 'Label Filters' section, with 'Label Filters' and 'Value Filters' highlighted. A third context menu is open over the 'Value Filters' section, with 'Manual Selections' highlighted. At the bottom left, there's a 'Search' bar and a 'Clear Filter From "State"' button.

2 Student Population (All)

3

4 State Year Sum of Total Population

A↓ Sort A to Z

Z↓ Sort Z to A

More Sort Options...

Clear Filter From "State"

Label Filters

Value Filters

Search

(Select All) Alabama Alaska Arizona Arkansas California Colorado Connecticut

Manual Selections

OK Cancel

24 2004

25 California

26

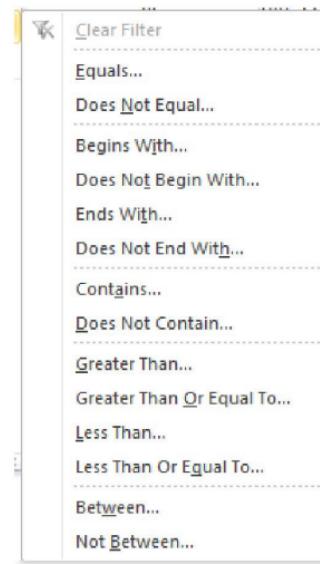
18579040
4447100
4530182
4779735
4822023
2724047
626932
655435
710231
731449
23756734
5130632
5743834
6329013
6553255
11291081
2673400
2752629
2915921
2949131
145060833

Hit this button (or right-click one of the values) to drill into **Sorting & Filtering** options

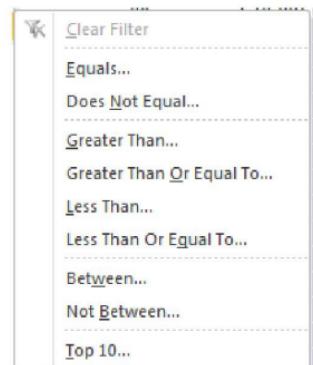
More Sort Options:



Label Filters:

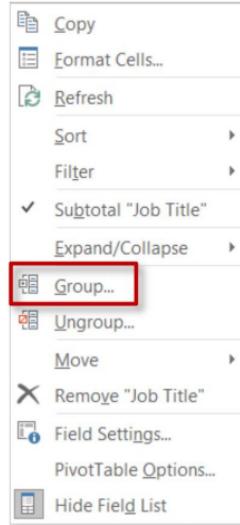


Value Filters:



GROUPING DATA

	A	B	C
1	Year	2012	
2	Employee Name	(All)	
3			
4	Job Title	Sum of Base Pay	Sum of Overtime Pay
5	Fusion Welder	\$187,928	\$4,230
6	Forensic Autopsy Technician	\$73,899	\$530
7	Food Service Worker	\$832,014	\$236,773
8	Food Service Supervisor	\$120,515	\$12,307
9	Firefighter	\$15,547,896	\$3,740,214
10	Fire Safety Inspector I	\$249,959	\$1,854
11	Fire Safety Inspector II	\$523,823	\$153,958
12	Fire Protection Engineer	\$77,376	\$0
13	Fire Fighter Paramedic	\$3,275,200	\$485,124
14	Fire Alarm Dispatcher	\$25,720	\$0
15	Fingerprint Technician II	\$94,278	\$6,587
16	Fingerprint Technician III	\$65,894	\$998
17	Fingerprint Technician II	\$172,595	\$9,040
18	Feasibility Analyst, Port	\$89,376	\$0
19	Farmer	\$61,625	\$0
20	Fare Inspections Supervisor/Investigator	\$107,439	\$0
21	Fare Collections Receiver	\$228,800	\$46,455



	A	B
1	Year	2012
2	Employee Name	(All)
3		
4	Job Title2	Job Title
5	Fusion Welder	Fusion Welder
6	Forensic Autopsy Technician	Forensic Autopsy Technician
7	Food Service Worker	Food Service Worker
8	Food Service Supervisor	Food Service Supervisor
9	Group1	
10	Firefighter	
11	Fire Safety Inspector I	
12	Fire Safety Inspector II	
13	Fire Protection Engineer	
14	Fire Fighter Paramedic	
15	Fire Alarm Dispatcher	
16	Fingerprint Technician II	Fingerprint Technician II
17		
18		
19		
20		
21		

Select values that you'd like to group
(in this case fire-related job titles)

Right-click and
select **Group**

A new field is created ("Job Title2")
containing the new group ("Group1")

Note: Both names can be customized

SLICERS & TIMELINES

MAP_Excel_Training_Exercises_COMPLETE - Excel

File Home Insert Page Layout Formulas Data Review View Developer Analytics Edge Power Pivot Analyze Design Format Tell me what you want to do

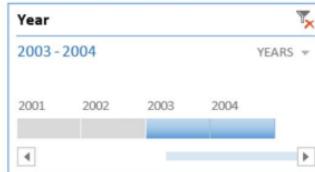
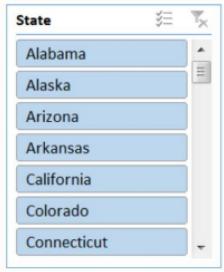
Chart Name: Active Field: Chart 4 Options PivotChart

Active Field: Drill Down Drill Up Expand Field Collapse Field

Insert Slicer Insert Timeline Filter Refresh Change Data Source Clear Move Fields, Items, OLAP Relationships Tools Calculations Actions

Field List Show/Hide

Insert **Slicers** or **Timelines**



Basically a prettier version of a filter!

A filter designed specifically for dates



PRO TIP:

Slicers and Timelines work just like regular report filters, but with user-friendly interfaces

REPORT FILTER PAGES

	A	B	C	D
1	Year	(All)		
2	Employee Name	Search		
3		(All)		
4	Job Title			
5	Account Clerk	2011	\$16,160	\$26,448
6	Accountant	2012	\$0	\$0
7	Accountant I	2013	\$0	\$0
8	Accountant II		\$0	\$31,851
9	Accountant III		\$0	\$9,318
10	Accountant Intern		\$0	\$6,715
11	Accountant IV		\$0	\$29,264
12	Acupuncturist		\$0	\$1,220
13	Admin Analyst 3		\$0	\$5,826
14	Admin Hearing Examiner		\$223,203	\$0
15	Administrative Analyst		\$4,439,753	\$140
16	Administrative Analyst I		\$5,416	\$0
17	Administrative Analyst II		\$118,747	\$0
18	Administrative Engineer		\$836,305	\$0
19	Administrative Services Mgr		\$183,985	\$470

PivotTable Name: Active Field:

PivotTable4 Year

Options Field Settings

Options

Show Report Filter Pages...

Generate GetPivotData

(PivotTable Tools → Analyze)

Show Report Filter Pages

Show all report filter pages of:

Employee Name

Year

OK

Cancel

	A	B	C	D
1	Year	(All)		
2	Employee Name	2011		
3	Job Title	(All)	Sum of Base Pay	Sum of Overtime Pay
4	Account Clerk	\$16,160	\$1,812	\$7,448
5	Accountant	\$136,061	\$0	\$0
6	Accountant I	\$13,207	\$0	\$10,413
7	Accountant II	\$1,496,133	\$0	\$12,406
8	Accountant III	\$25,808	\$0	\$4,458
9	Accountant Intern	\$0	\$0	\$0
10	Accountant IV	\$984,311	\$0	\$0
11	Administrative Analyst	\$1,547,454	\$0	\$9,318
12	Administrative Analyst I	\$71,346	\$0	\$0
13	Administrative Analyst II	\$275,656	\$0	\$0
14	Administrative Analyst III	\$34,000	\$0	\$4,000
15	Administrative Analyst IV	\$1,765,900	\$21,999	\$10,683
16	Administrative Analyst V	\$233,634	\$11,120	\$15,683
17	Airport Communications Operat	\$724,908	\$80,960	\$862
18	Airport Communications Operat	\$433,370	\$0	\$0
19	Airport Electricians	\$568,088	\$60,913	\$26,042
20	Airport Electricians Supervisor	\$917,352	\$26,802	\$12,444
21	Airport Operations Supervisor	\$140,809	\$11,348	\$2,747

Year = 2011

	A	B	C	D
1	Year	(All)		
2	Employee Name	2012		
3	Job Title	(All)	Sum of Base Pay	Sum of Overtime Pay
4	Account Clerk	\$641,207	\$0	\$16,706
5	Accountant	\$57,105	\$0	\$0
6	Accountant I	\$4,612	\$0	\$1,547
7	Accountant II	\$1,164,739	\$0	\$15,460
8	Accountant III	\$5,164,860	\$0	\$5,776
9	Accountant Intern	\$381,458	\$0	\$2,040
10	Accountant IV	\$267,793	\$0	\$0
11	Administrative Analyst	\$264,524	\$0	\$12,200
12	Administrative Analyst I	\$95,216	\$0	\$5,826
13	Administrative Analyst II	\$1,507,889	\$0	\$6,648
14	Administrative Analyst III	\$43,142	\$0	\$4,434
15	Administrative Analyst IV	\$1,547,454	\$0	\$9,318
16	Administrative Analyst V	\$233,634	\$11,120	\$15,683
17	Airport Communications Operat	\$724,908	\$80,960	\$862
18	Airport Communications Operat	\$433,370	\$0	\$0
19	Airport Electricians	\$568,088	\$60,913	\$26,042
20	Airport Electricians Supervisor	\$917,352	\$26,802	\$12,444
21	Airport Operations Supervisor	\$140,809	\$11,348	\$2,747

Year = 2012

	A	B	C	D
1	Year	(All)		
2	Employee Name	2013		
3	Job Title	(All)	Sum of Base Pay	Sum of Overtime Pay
4	Account Clerk	\$497,646	\$7,442	\$14,055
5	Accountant	\$65,312	\$0	\$0
6	Accountant I	\$5,408	\$0	\$1,547
7	Accountant II	\$1,164,739	\$0	\$15,460
8	Accountant III	\$5,164,860	\$0	\$5,776
9	Accountant Intern	\$381,458	\$0	\$2,040
10	Accountant IV	\$267,793	\$0	\$0
11	Administrative Analyst	\$264,524	\$0	\$12,200
12	Administrative Analyst I	\$95,216	\$0	\$5,826
13	Administrative Analyst II	\$1,507,889	\$0	\$6,648
14	Administrative Analyst III	\$43,142	\$0	\$4,434
15	Administrative Analyst IV	\$1,547,454	\$0	\$9,318
16	Administrative Analyst V	\$233,634	\$11,120	\$15,683
17	Airport Communications Operat	\$724,908	\$80,960	\$862
18	Airport Communications Operat	\$433,370	\$0	\$0
19	Airport Electricians	\$568,088	\$60,913	\$26,042
20	Airport Electricians Supervisor	\$917,352	\$26,802	\$12,444
21	Airport Operations Supervisor	\$140,809	\$11,348	\$2,747

Year = 2013

Use the “Show Report Filter Pages” option to create new tabs for each value that a given filter (i.e. Year) can take

CALCULATED VALUES & FIELDS

SUMMARIZE VALUES BY

The screenshot shows a Microsoft Excel ribbon interface. A context menu is open over a data field named "Sum of Order Qua". The menu items include: Copy, Format Cells..., Number Format..., Refresh, Sort, Remove "Sum of Order Quantity", Summarize Values By (which is highlighted with a red box), Show Values As, Value Field Settings..., PivotTable Options..., and Show Field List. Below the menu, a data table is visible with the following values:

	Sum of Order Qua
1	493
2	482
3	474
4	473
5	468
6	466
7	465
8	465
9	458

A secondary dropdown menu is also open under the "Summarize Values By" option, listing Sum, Count, Average, Max, Min, Product, and More Options... (also highlighted with a red box).

Summarize Values By determines how numbers should be treated when they are rolled up or aggregated (sum, count, average, max, etc.)



SHOW VALUES AS

A screenshot of a Microsoft Excel PivotTable context menu. The menu items listed vertically are: Copy, Format Cells..., Number Format..., Refresh, Sort, Remove "Sum of Order Quantity", Summarize Values By, Show Values As (which is highlighted with a red box), Value Field Settings..., PivotTable Options..., and Show Field List. A secondary menu, also with a red box around it, is displayed under 'Show Values As'. This secondary menu lists various calculation options: No Calculation, % of Grand Total, % of Column Total, % of Row Total, % Of..., % of Parent Row Total, % of Parent Column Total, % of Parent Total..., Difference From..., % Difference From..., Running Total In..., % Running Total In..., Rank Smallest to Largest..., Rank Largest to Smallest..., Index, and More Options... .

Show Values As options allow you to apply additional calculations to change the way values are shown, such as the Percent of a Total or Subtotal, Running Value, Rank, etc.

In this case, we're showing **Order Quantity** values as **% of Column Total**, rather than whole numbers

SHOW VALUES AS - EXAMPLES

In this example we're summarizing the same Revenue field **6 different ways**:

Genre	Year	Revenue	Revenue2	Revenue3	Revenue4	Revenue5	Revenue6
Action		\$12,521,476,890	58.01%	100.00%			
Adventure	2010	\$2,939,932,519	13.62%	23.48%		\$2,939,932,519	4
	2011	\$3,326,029,678	15.41%	26.56%	13.13%	\$6,265,962,197	1
	2012	\$3,181,127,752	14.74%	25.41%	-4.36%	\$9,447,089,949	2
	2013	\$3,074,386,941	14.24%	24.55%	-3.36%	\$12,521,476,890	3
Animation		\$8,130,146,101	37.67%	100.00%			
	2010	\$2,194,189,209	10.17%	26.99%		\$2,194,189,209	3
	2011	\$1,180,009,072	5.47%	14.51%	-46.22%	\$3,374,198,281	4
	2012	\$2,346,041,792	10.87%	28.86%	98.82%	\$5,720,240,073	2
Grand Total	2013	\$2,409,906,028	11.16%	29.64%	2.72%	\$8,130,146,101	1
		\$933,080,437	4.32%	100.00%			
	2010	\$251,501,645	1.17%	26.95%		\$251,501,645	2
	2011	\$10,134,754	0.05%	1.09%	-95.97%	\$261,636,399	4
	2012	\$183,600,836	0.85%	19.68%	1711.60%	\$445,237,235	3
	2013	\$487,843,202	2.26%	52.28%	165.71%	\$933,080,437	1
		\$21,584,703,428	100.00%				

SHOW VALUES AS - INDEX

The **Index** calculation uses an aggregated weighted average to reveal the impact of one number within the context of a data set

Revenue Genre	Country	Australia	Canada	France	UK	USA
Action	\$843,261,855	\$718,355,657	\$1,076,178,688	\$3,099,974,501	\$59,778,470,770	
Adventure	\$274,765,505	\$260,123,835	\$73,505,978	\$2,823,401,894	\$26,748,337,472	
Animation	\$63,992,328		\$11,517,100	\$132,206,052	\$3,528,074,076	
Biography	\$40,246,592	\$33,855,526	\$53,902,093	\$950,806,244	\$6,288,688,296	
Comedy	\$77,873,417	\$231,856,600	\$159,028,092	\$980,270,042	\$35,675,230,901	
Crime	\$2,300,604	\$1,882,581	\$8,478,574	\$366,995,069	\$7,485,361,502	
Documentary		\$24,784	\$107,581,601	\$5,352,503	\$435,104,871	
Drama	\$150,361,951	\$103,169,476	\$360,552,216	\$1,236,661,845	\$17,705,898,861	
Family					\$447,481,433	
Fantasy		\$123,792,202		\$14,564,027	\$1,257,990,540	
Horror	\$49,460,140	\$101,747,280	\$3,658,281	\$195,236,323	\$4,729,877,904	
Musical					\$184,168,000	
Mystery	\$4,717,455	\$489,220	\$15,523,168		\$1,036,780,660	



Each Revenue number is converted to an **Index** representing its importance within each column, using the following formula:

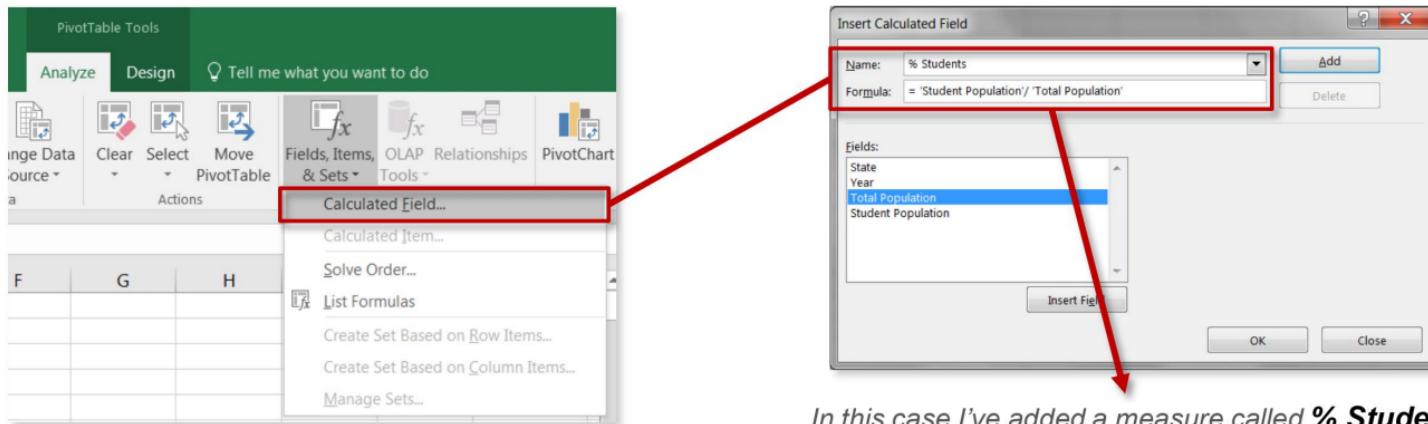
$$(\text{Cell Value} * \text{Grand Total}) / (\text{Row Total} * \text{Column Total})$$

Documentaries index very high in France, meaning that a global increase in Documentary ticket prices would impact the French film industry significantly more than any other country

Revenue Genre	Country	Australia	Canada	France	UK	USA
Action		1.54	1.25	1.58	0.87	0.99
Adventure		1.09	0.99	0.23	1.72	0.97
Animation		2.05	0.00	0.30	0.65	1.03
Biography		0.65	0.53	0.70	2.37	0.93
Comedy		0.25	0.71	0.41	0.48	1.05
Crime		0.03	0.03	0.10	0.86	1.04
Documentary		0.00	0.01	18.90	0.18	0.86
Drama		0.92	0.60	1.78	1.16	0.99
Family		0.00	0.00	0.00	0.00	1.09
Fantasy		0.00	10.13	0.00	0.19	0.98
Horror		1.16	2.29	0.07	0.71	1.01
Musical		0.00	0.00	0.00	0.00	1.09
Mystery		0.53	0.05	1.41	0.00	1.07

CALCULATED FIELDS

Calculated Fields allow you to create new measures based on existing, numerical fields:



In this case I've added a measure called **% Students**, equal to **Student Population / Total Population**



PRO TIP:

Don't calculate rate metrics (i.e. CTR, CPC) in your raw data, use calculated fields in your Pivot. This ensures that they calculate properly no matter how your data is rolled up

CALCULATING USING COUNTS

Calculated fields are **always** based on the **SUM** of other fields (even if they are shown as **count**, **max**, **average**, etc.). But what if you want to make a calculation based on the **COUNT** of a field?

Ex) Create a field to calculate the **Likes per Post** on each date

The diagram shows a flow from left to right. On the left is a screenshot of a Microsoft Word document containing a table of posts. An arrow points to the right, leading to a screenshot of a Microsoft Excel spreadsheet where a new column 'Count' has been added. Another arrow points to the right, leading to a screenshot of the 'Insert Calculated Field' dialog box. A final arrow points down to the resulting table on the far right.

	A	B	C
1	Page	Spartan Race	2,286
2	Post Type	photo	
3			
4	Date of Post	Post Copy	Sum of Likes
5	10/1/2016		2,286
6	If you missed the #SpartanWC16, you missed	336	
7	Tap that bell then celebrate with a refreshin	218	
8	The biggest race of the Spartan calendar is h	604	
9	Your 2016 #SpartanWC16 top finishers: Zuza	1,128	
10	10/2/2016		7,266
11	"Couldn't wait to get home and put it all tog	534	
12	#SpartanRace founder practicing what he pr	1,467	
13	Tahoe had one last surprise for us Spartans t	2,000	
14	The 26+ mile, 70+ obstacle #SpartanWC16 U	1,743	
15	This #SpartanMedal is one for the mantle! P	572	
16	Your top finishers at this year's #SpartanWC:	663	
17	Your top finishers at this year's #SpartanWC:	287	
18	10/3/2016		12,022
19	AROO to all the racers, fans and volunteers t	749	
20	As the sun sets on another World Champion:	1,079	
21	Cold, mud, obstacles and snow could not ste	865	
22	How many Spartans out there are feeling so	963	
23	Start the week off strong, and keep it going a	2,926	
24	When Randy Moss,one of the greatest footb	5,440	

STEP 1: Create a new “Count” column (=1) in the source data

	A	B	C
1	Count	Page	Date of Post
2	1	Spartan Race	8/30/2016
3	1	Spartan Race	8/30/2016
4	1	Spartan Race	8/30/2016
5	1	Spartan Race	8/30/2016
6	1	Spartan Race	8/30/2016
7	1	Spartan Race	8/31/2016
8	1	Spartan Race	8/31/2016
9	1	Spartan Race	8/31/2016
10	1	Spartan Race	8/31/2016
11	1	Spartan Race	8/31/2016
12	1	Spartan Race	8/31/2016
13	1	Spartan Race	8/31/2016
14	1	Spartan Race	8/31/2016
15	1	Spartan Race	8/31/2016
16	1	Spartan Race	8/31/2016
17	1	Spartan Race	9/1/2016
18	1	Spartan Race	9/1/2016
19	1	Spartan Race	9/1/2016
20	1	Spartan Race	9/1/2016
21	1	Spartan Race	9/1/2016

STEP 2: Create a calculated field defined as **Likes/Count**

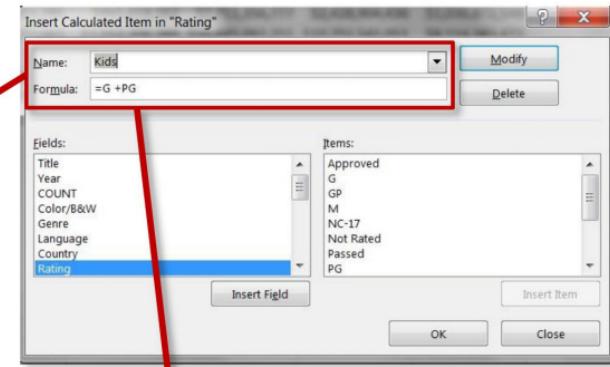
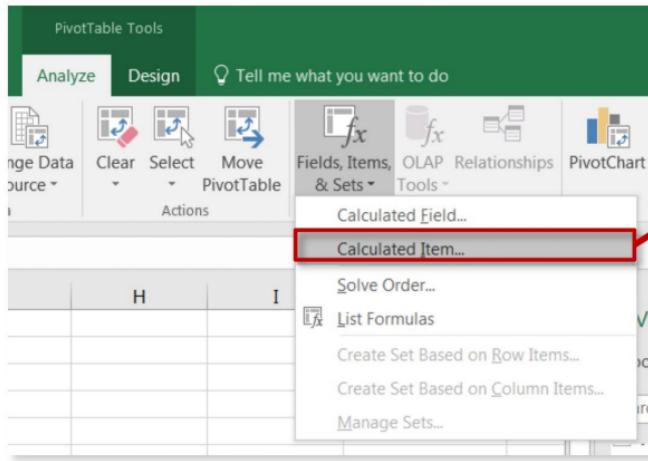
Insert Calculated Field

Name: Likes/Post
Formula: = Likes/ Count

	A	B	C	D
4	Date of Post	Post Copy	Sum of Likes	Sum of Likes/Post
5	10/1/2016		2,286	572
6	If you missed the #SpartanWC16,		336	336
7	Tap that bell then celebrate with .		218	218
8	The biggest race of the Spartan cc		604	604
9	Your 2016 #SpartanWC16 top fini		1,128	1,128
10	10/2/2016		7,266	1,038
11	"Couldn't wait to get home and p		534	534
12	#SpartanRace founder practicing		1,467	1,467
13	Tahoe had one last surprise for us		2,000	2,000
14	The 26+ mile, 70+ obstacle #Spart		1,743	1,743
15	This #SpartanMedal is one for the		572	572
16	Your top finishers at this year's #		663	663
17	Your top finishers at this year's #		287	287

CALCULATED ITEMS

Calculated Items allow you to create new dimensions or categories based on existing dimensions:



In this case I've added a new category called "**Kids**", which combines **G** and **PG** movie ratings



PRO TIP:

DON'T USE CALCULATED ITEMS UNLESS YOU NEED TO; you're usually better off simply grouping fields or adding new category columns within your source data itself

SOLVE ORDER

The screenshot shows a Microsoft Excel window titled "Excel_PivotTable_Exercises_WIP_v2 - Excel". The ribbon is set to "PivotTable Tools" with "Analyze" selected. In the "Calculated Items" section of the ribbon, a dropdown menu is open, with "Solve Order..." highlighted. A red arrow points from this menu item to a separate "Calculated Item Solve Order" dialog box. This dialog box contains the following text:

```
%Color = Color /Color + Black and White
Rating[Kids] = G + PG
```

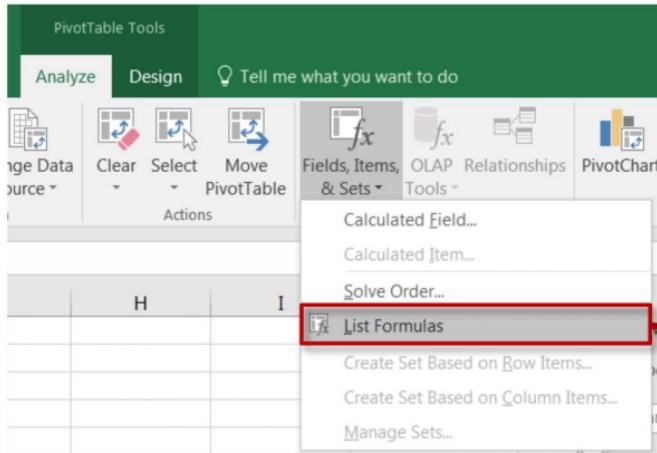
Below the formulas, it says: "If the value in a PivotTable cell is affected by two or more calculated items, the value is determined by the last formula in the solve order." At the bottom of the dialog are buttons for "Move Up", "Move Down", "Delete", and "Close".

The main Excel worksheet area displays a PivotTable with the following data:

	A	B	C	D	E	F	G	H	I
1	Year	(All)							
2	Country	USA							
3	Language	(All)							
4	Title	(All)							
5									
6	Sum of Gross Revenue								
7	Color/B&W	G	PG	PG-13	R	Kids			
8	Black and White	\$163,245	\$607,540,245	\$1,671,131,048	\$1,016,898,017	\$607,703,490			
9	Color	\$6,984,837,347	\$36,016,414,525	\$72,851,333,140	\$45,446,884,984	\$43,001,251,872			
10	%Color	100.00%	98.34%	97.76%	97.81%	198.34%			

If you've defined multiple calculated items, the **Solve Order** can be used to determine which calculations to prioritize (value is determined by the last formula in the list)

LIST FORMULAS



A	B	C	D	E	F
Calculated Field					
2	Solve Order	Field	Formula		
3	1	Profit	='Gross Revenue' -Budget		
4	2	Weighted IMDB Score	='Raw Score' /'Total Reviews'		
5	3	Lead Actor Like %	'Lead Actor FB Likes' /'Cast Total FB Likes'		
6					
Calculated Item					
7	8	Solve Order	Item	Formula	
9	1	%Color		=Color /('Color' + 'Black and White')	
10	2	Rating[Kids]		=G +PG	
11					
12					
13	Note:		When a cell is updated by more than one formula, the value is set by the formula with the last solve order.		
14					
15					
16			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.		
17					
18					

The **List Formulas** tool produces a new tab summarizing all calculated fields and items associated with a given Pivot, along with the current solve order

PIVOT CHARTS

PIVOT CHART

A **PivotChart** is simply a chart that is tied to a specific PivotTable; as you adjust filters and fields in your Pivot, the PivotChart updates dynamically

The screenshot shows a Microsoft Excel interface with the title bar "2014_Excel_Training - Excel". The ribbon menu is open, with the "Insert" tab selected. In the "Charts" section of the ribbon, the "PivotChart" icon is highlighted with a red box and a large red arrow pointing from it towards the "Insert Chart" dialog box. The "Insert Chart" dialog box is also highlighted with a red box and has a red arrow pointing from the "PivotChart" icon in the ribbon towards it. The dialog box shows various chart types like Clustered Column, Line, Bar, etc., with "Clustered Column" selected. To the right of the dialog box is a PivotTable with columns "State" and "Sum of Population", and a PivotChart below it showing population data for various US states.

1) Select your pivot and choose PivotChart from either the “**Insert**” tab or the “**Analyze**” tab

2) Select a chart type

3) The PivotChart will be inserted, and dynamically tied to the pivot
(note: you can filter the view using either the pivot table or the chart itself)

State	Sum of Population
Alabama	18,579,040
Alaska	2,724,047
Arizona	23,756,734
Arkansas	11,291,081
California	145,060,833
Colorado	19,119,442
Connecticut	14,073,613
D.C.	3,428,990
Delaware	2,359,628
Florida	71,498,418
Georgia	36,623,434
Hawaii	5,226,991
Idaho	5,850,525
Illinois	50,838,814
Indiana	25,339,188
Iowa	12,001,311

PIVOT CHART OPTIONS

The “Analyze” Tab:

This screenshot shows the Microsoft Excel ribbon with the 'PivotChart Tools' tab selected. The 'Analyze' tab is highlighted in blue. The ribbon tabs include File, Home, Insert, Page Layout, Formulas, Data, Review, View, Developer, Analytics Edge, Power Pivot, Analyze, Design, Format, and a 'Tell me what you want to do' search bar. The 'Analyze' tab has several groups: Fields, Items, & Sets, OLAP Relationships, Tools, Calculations, Field List, Field Buttons, and Show/Hide.

The “Design” Tab:

This screenshot shows the Microsoft Excel ribbon with the 'PivotChart Tools' tab selected. The 'Design' tab is highlighted in blue. The ribbon tabs are the same as the previous screenshot. The 'Design' tab has several groups: Chart Styles, Data, Type, and Location.

The “Format” Tab:

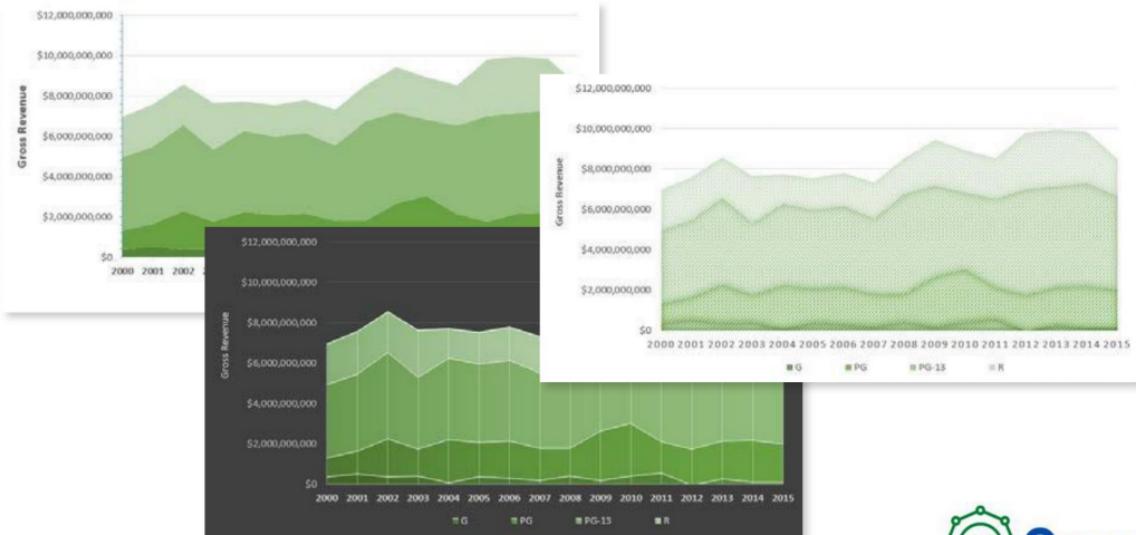
This screenshot shows the Microsoft Excel ribbon with the 'PivotChart Tools' tab selected. The 'Format' tab is highlighted in blue. The ribbon tabs are the same as the previous screenshots. The 'Format' tab has several groups: Shape Styles, WordArt Styles, Arrange, and Size.

PIVOT CHART LAYOUTS & STYLES

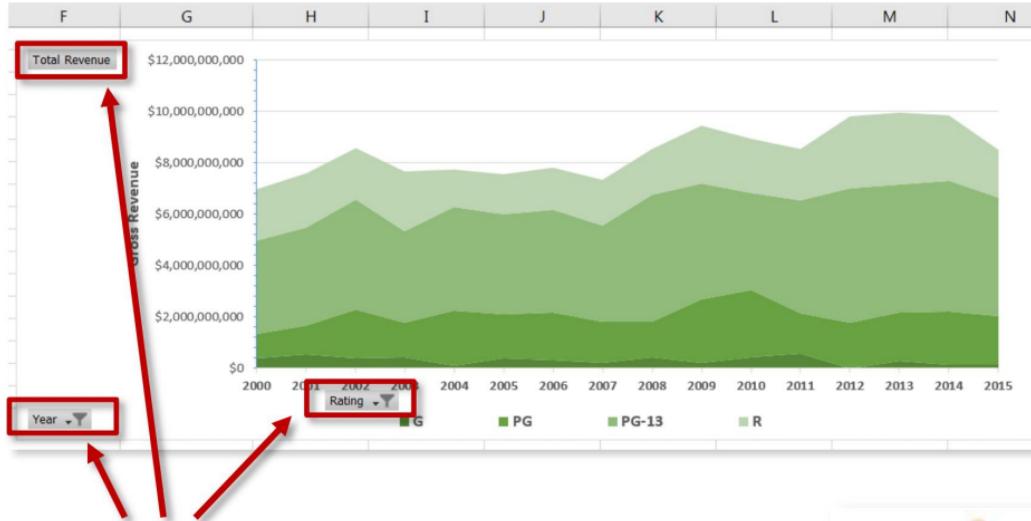


The screenshot shows the Microsoft Excel ribbon with the 'PivotChart Tools' tab selected. The 'Design' tab is highlighted. Below it, the 'Chart Styles' section is selected, indicated by a red box. This section includes a dropdown menu with various chart styles and a preview area showing a green-themed chart.

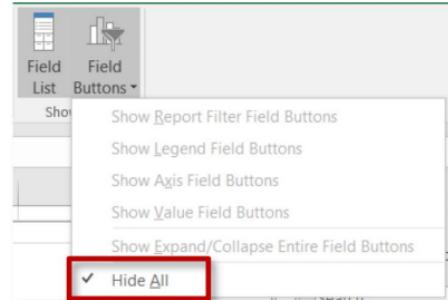
Chart Layouts & Styles
allow you to adjust the look
and feel of a PivotChart,
including adding elements,
changing color palettes, or
applying pre-set templates



PIVOT CHART FIELD BUTTONS



Field Buttons allow you to apply or adjust filters directly within the chart



Select **PivotChart Tools** → **Analyze** → **Field Buttons** to hide them from the chart (or right click one of them from the chart itself)



PRO TIP:

You can format PivotCharts exactly like normal Excel charts – the only difference is that PivotCharts are dynamically tied to a PivotTable

ADDING SLICERS

A **Slicer** is basically a “prettier” version of a PivotTable filter; it works exactly the same way by filtering the data you see in your PivotTable and PivotCharts

The screenshot shows the Microsoft Excel ribbon with the "PivotTable Tools" tab selected. A red arrow points from the "Insert Slicer" button in the "Filter" group of the ribbon to the "Insert Slicer" dialog box. Another red arrow points from the "Insert Slicer" dialog box to the PivotTable and PivotChart below.

1) Select a PivotTable and choose “Insert Slicer” from the “PivotTable Tools” tab

2) Select the field(s) that you want to filter

3) The Slicer will be inserted next to your table, allowing you to filter on specific values (or combinations, using the **CTRL key)**

State	Sum of Population
Arizona	23,756,734
California	145,060,833
Colorado	19,119,442
D.C.	3,428,990
Florida	71,498,418
Grand Total	262,864,417

PivotTable Name: Active Field: **PivotTable3**

Insert Slicer

PivotTable Tools

PivotTable

PivotChart

Sum of Population

Total

160,000,000
140,000,000
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
0

Arizona California Colorado D.C. Florida

State

2) Select the field(s) that you want to filter

3) The Slicer will be inserted next to your table, allowing you to filter on specific values (or combinations, using the **CTRL key)**

ADDING TIMELINES

A **Timeline** works just like a Slicer – it's just formatted to work specifically with Date & Time fields

The screenshot shows a Microsoft Excel interface with a PivotTable named "PivotTable3". The PivotTable displays the sum of population by state. The "Review" tab is selected in the ribbon, and a context menu is open over the PivotTable area. The menu includes options like "Group Selection", "Ungroup", "Group Field", "Insert Slicer", "Insert Timeline", "Filter", and "Connections". The "Insert Timeline" option is highlighted with a red box and a red arrow points from the text "1) Select your pivot table and choose 'Insert Timeline' from the 'PivotTable Tools' tab" to this button. Another red arrow points from the text "2) Select the date/time field(s) that you want to filter" to the "Insert Timelines" dialog box, which is also highlighted with a red box. This dialog box shows a single checkbox labeled "Year" with a checked checkedmark. The "OK" and "Cancel" buttons are visible at the bottom. To the right of the PivotTable, there is a bar chart titled "Total" showing population for states: Arizona (~12.8M), California (~38.1M), Colorado (~1.8M), and D.C. (~0.2M). Below the chart is a timeline slicer titled "Year" showing the range "2003 - 2004" with four bars corresponding to the years 2001, 2002, 2003, and 2004.

2) Select the date/time field(s) that you want to filter

3) The Timeline is inserted, allowing you to filter on specific time frames
(Note: may need to adjust unit of time (month, year, etc.))