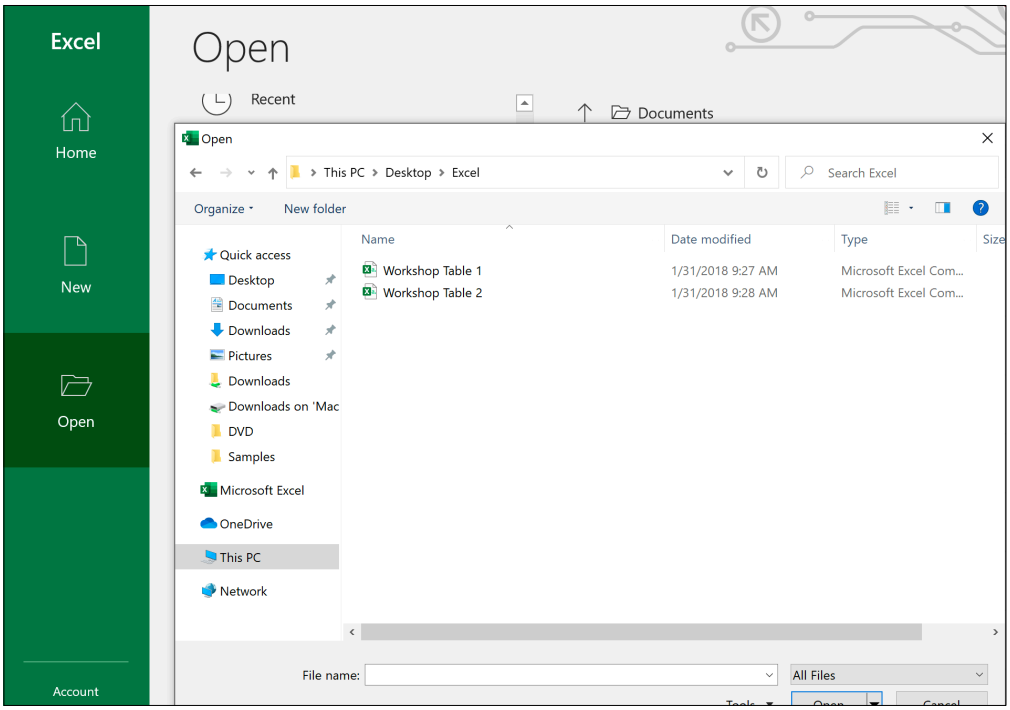
Excel for Research Workshop 7-23-20

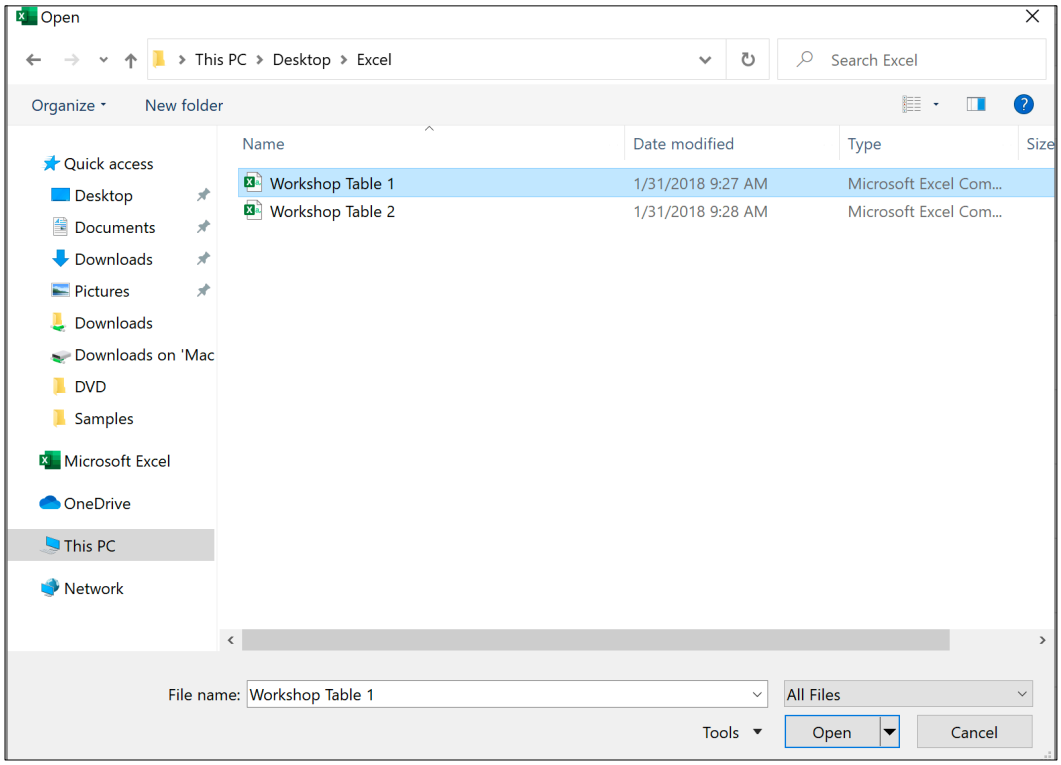
Open Workshop Files

1) Download "**Workshop table 1.csv**" & "**Workshop table 2.csv**" to a location you can find easily like your desktop.

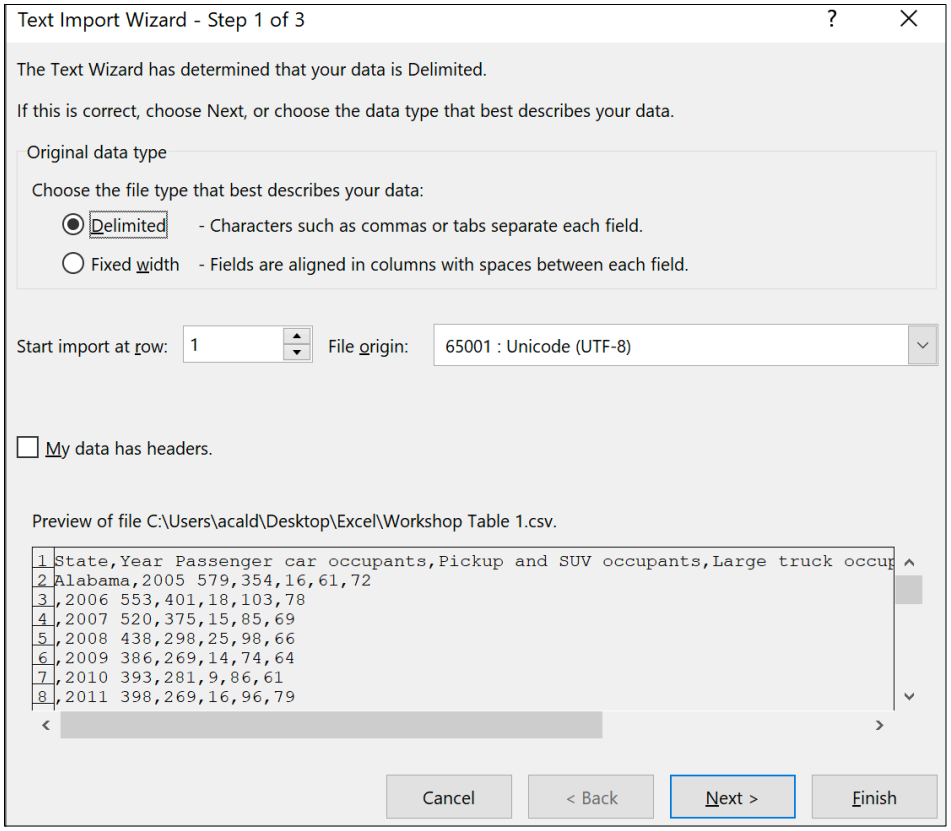
2) Open the workshop files with the "**Open>This PC>Location**", where you downloaded the files.



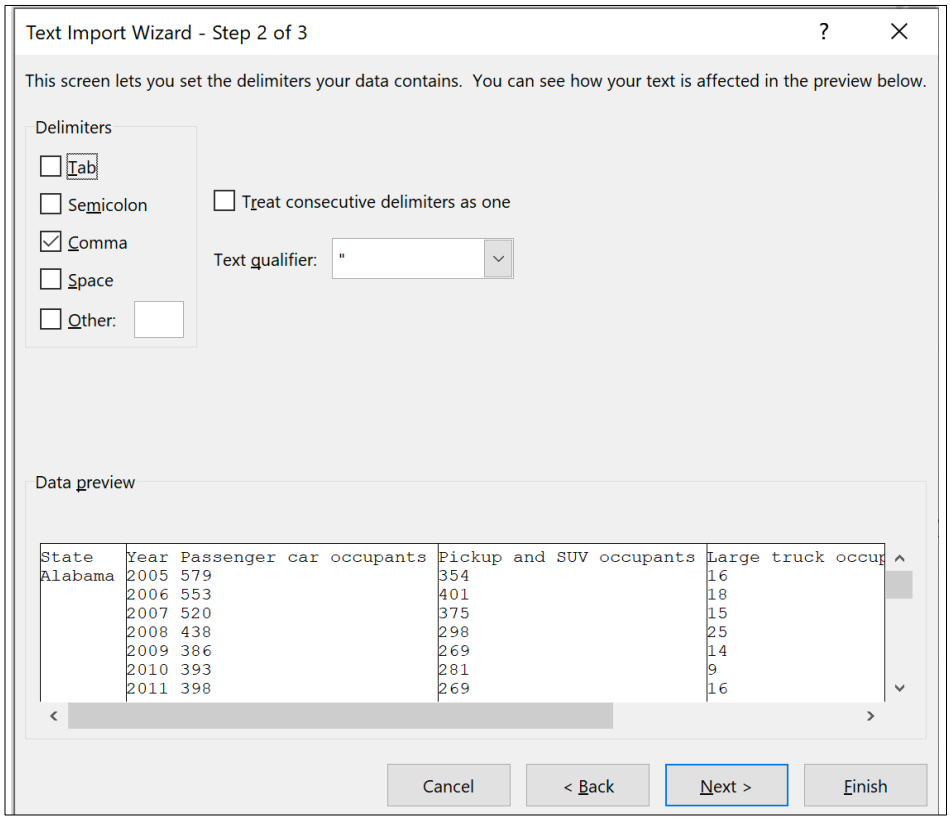
3) Select the file named "**Workshop Table 1.csv**" then click the "**Open**" button.



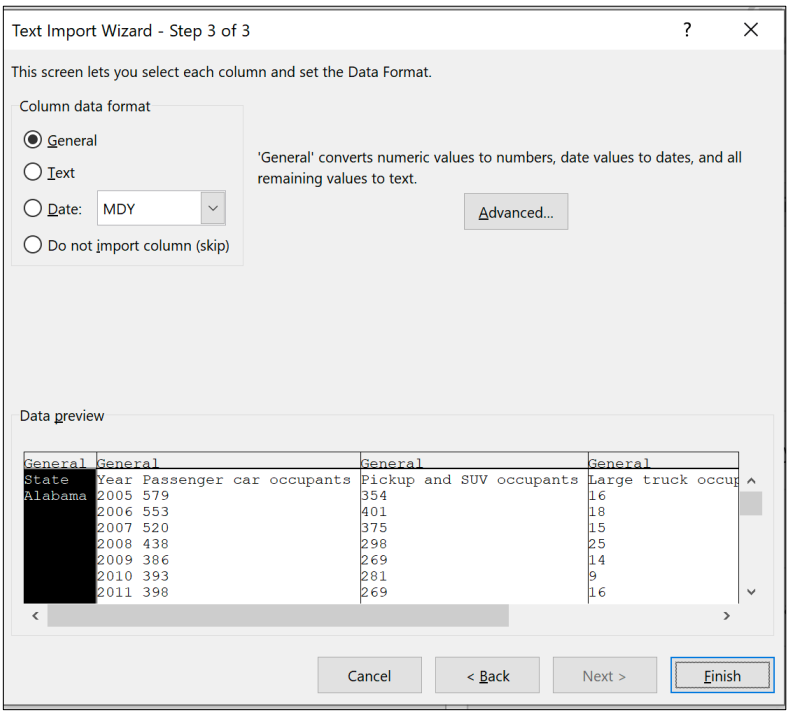
4) When the Text Import Wizard Step 1 dialog box opens click the "**Next**" button (Make no changes).



5) When the Text Import Wizard Step 2 dialog box opens un-check the "**Tab**" checkbox and select the "Comma" checkbox then click on the "**Next**" button.



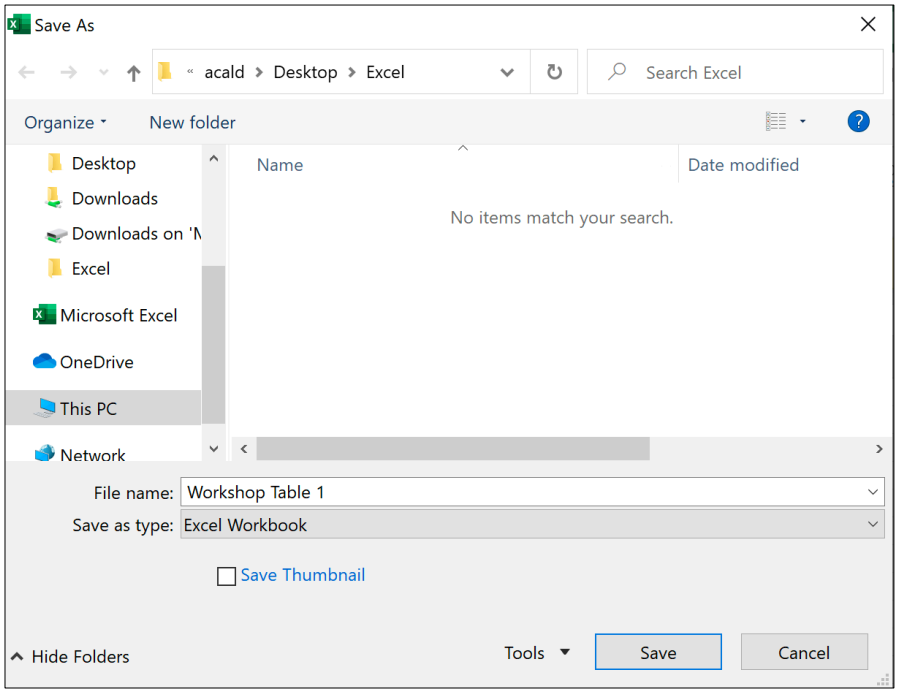
6) When the Text Import Wizard Step 3 dialog box opens just click on the "**Finish**" button.



7) You should see a warning along the bottom to the tool bar indicating you should save your workbook as Excel format.

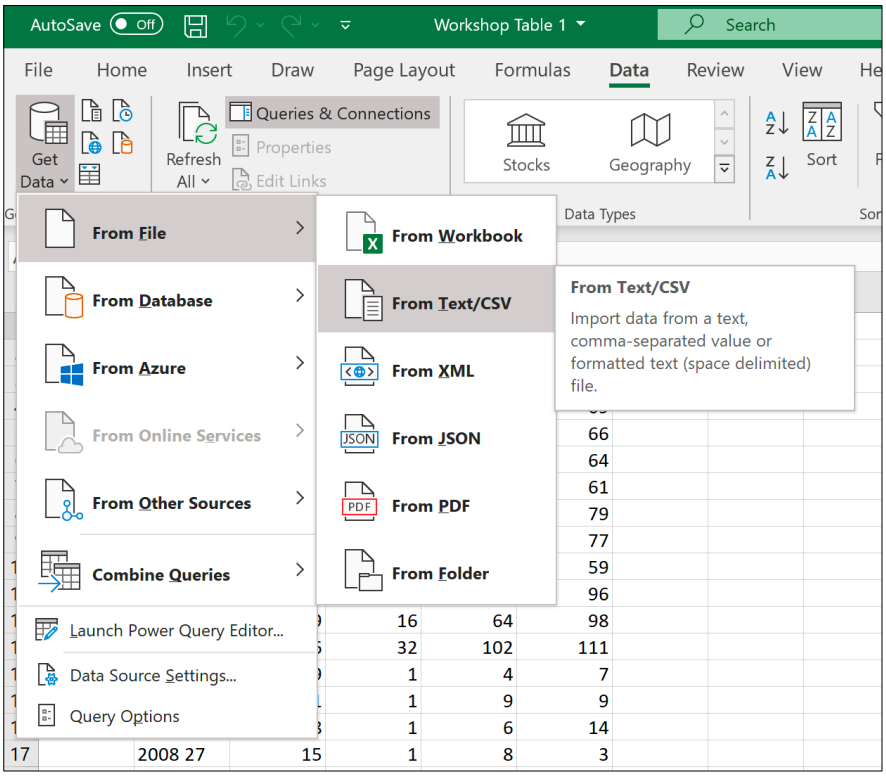
8) Click the "**Save As..**" Button in the warning banner.

9) When the Save As dialog window opens make sure you change the format to "**Excel Workbook (.xlsx)**" format (note failure to do this will prevent several features form working as described in this tutorial).

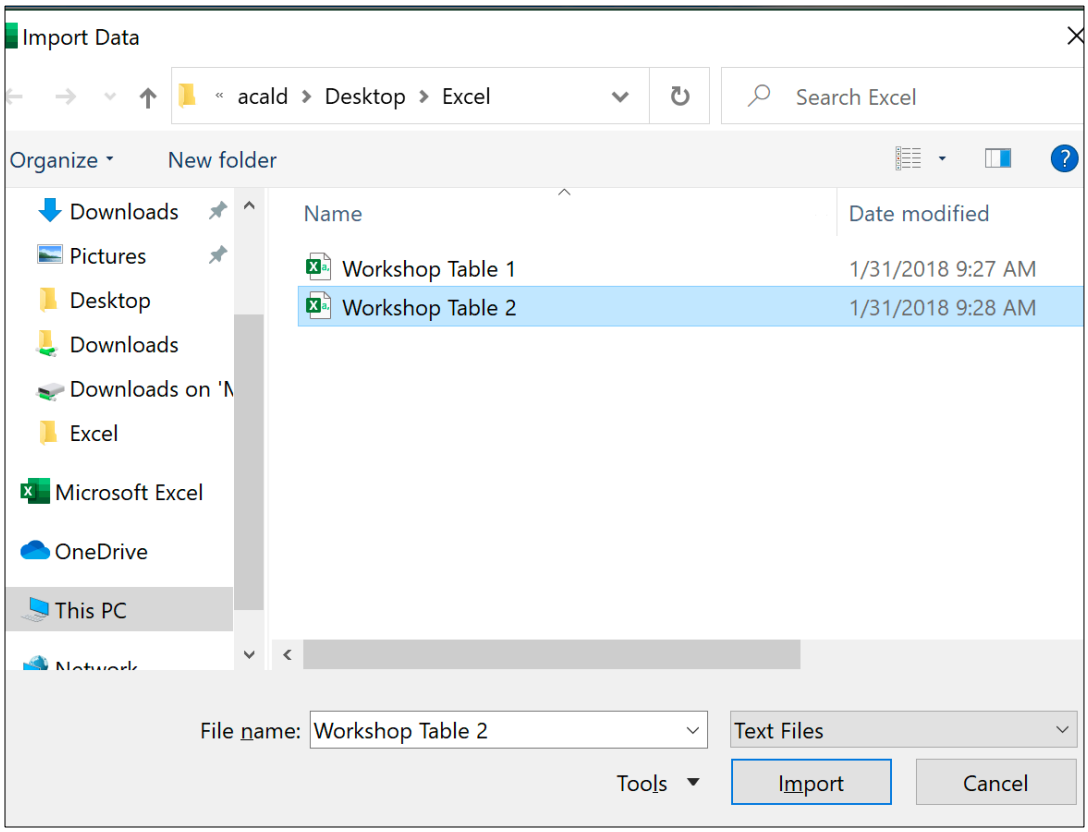


10) Select a location to save the file where you can find it again file like the desktop.

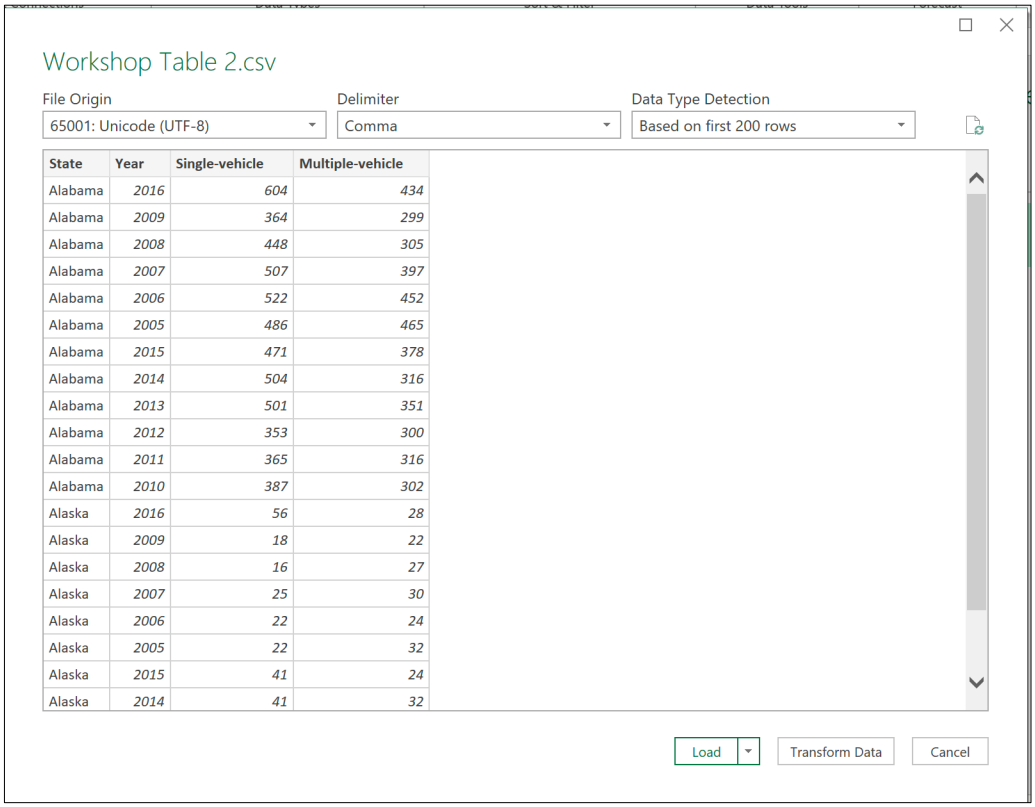
11) The next step is to import the second file as a new sheet in the workbook. Select the "**Data Tab**" then select "**Get Data > From File > From Text/CSV**".



12) When the Import Data dialog opens select the "**Workshop Table 2**" file then press the "**Import**" button.

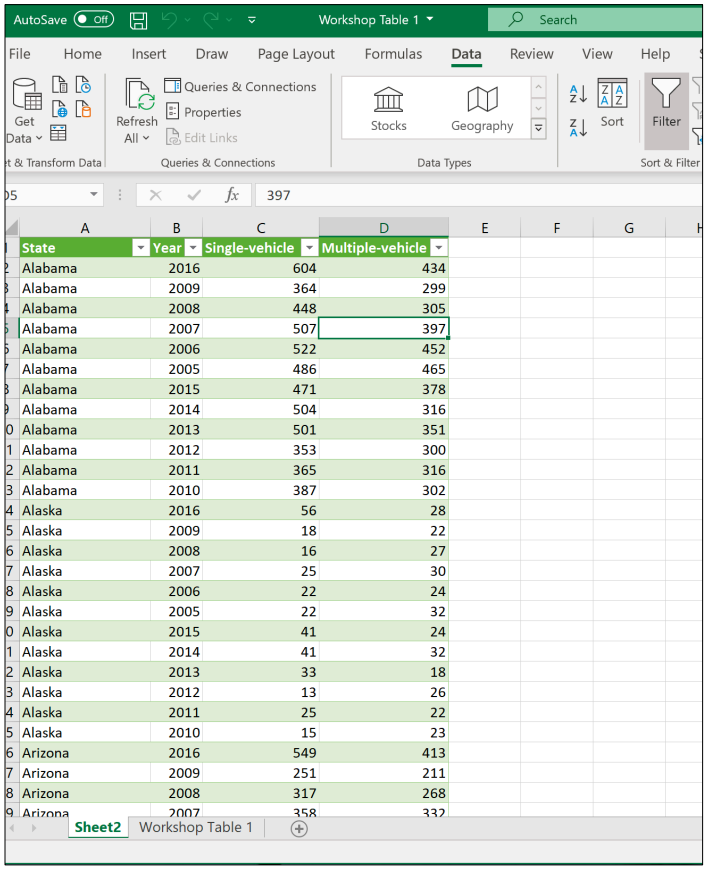


13) When the import dialog box opens, make sure "**Comma**" is selected as the Delimiter then click the "**Load**" button at the bottom of the dialog window



State	Year	Single-vehicle	Multiple-vehicle
Alabama	2016	604	434
Alabama	2009	364	299
Alabama	2008	448	305
Alabama	2007	507	397
Alabama	2006	522	452
Alabama	2005	486	465
Alabama	2015	471	378
Alabama	2014	504	316
Alabama	2013	501	351
Alabama	2012	353	300
Alabama	2011	365	316
Alabama	2010	387	302
Alaska	2016	56	28
Alaska	2009	18	22
Alaska	2008	16	27
Alaska	2007	25	30
Alaska	2006	22	24
Alaska	2005	22	32
Alaska	2015	41	24
Alaska	2014	41	32

14) The file will be loaded into a new worksheet and converted to a table.



State	Year	Single-vehicle	Multiple-vehicle
Alabama	2016	604	434
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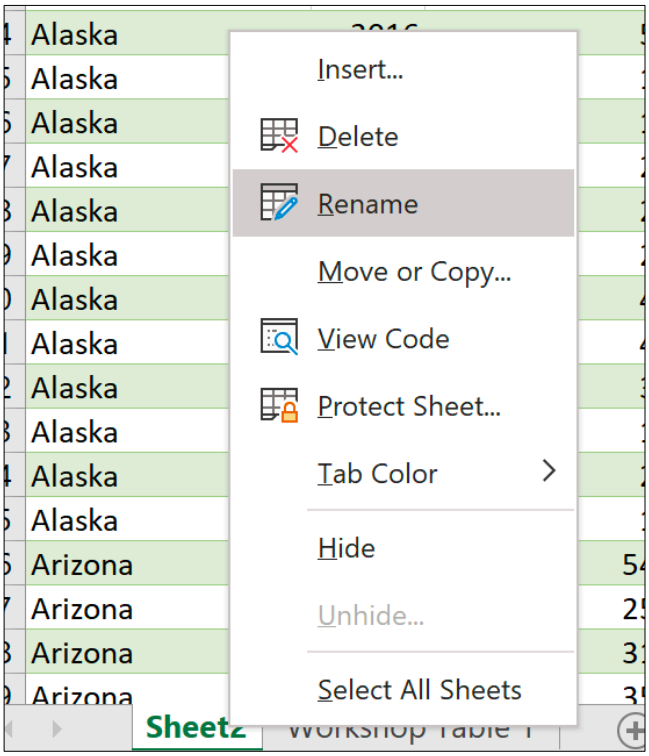
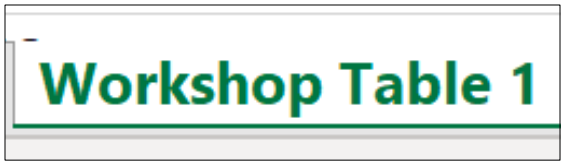
Alabama	2014	504	316
Alabama	2013	501	351
Alabama	2012	353	300
Alabama	2011	365	316
Alabama	2010	387	302
Alaska	2016	56	28
Alaska	2009	18	22
Alaska	2008	16	27
Alaska	2007	25	30
Alaska	2006	22	24
Alaska	2005	22	32
Alaska	2015	41	24
Alaska	2014	41	32
Alaska	2013	33	18
Alaska	2012	13	26
Alaska	2011	25	22
Alaska	2010	15	23
Arizona	2016	549	413
Arizona	2009	251	211
Arizona	2008	317	268
Arizona	2007	358	332

15) Change the name of the worksheet from Sheet2 to Workshop Table 2. To do this, "**Right Click**," the sheet tab, and select "**Rename**."

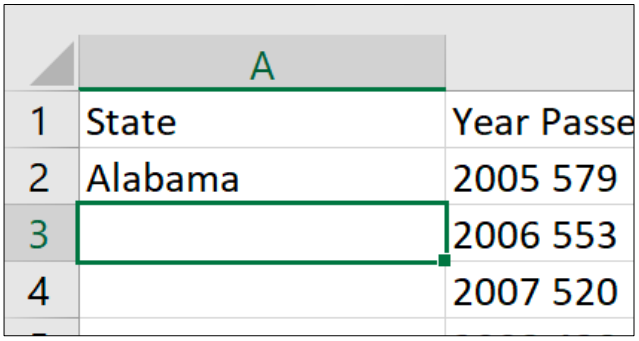


Data Cleaning

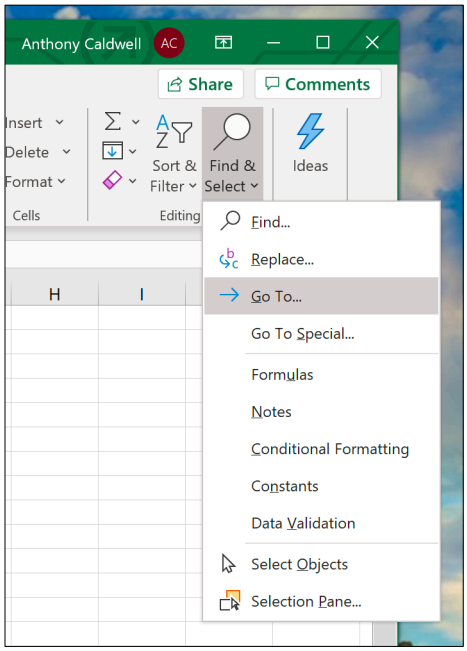
1) Switch back to the first worksheet named "**Workshop Table 1.**"



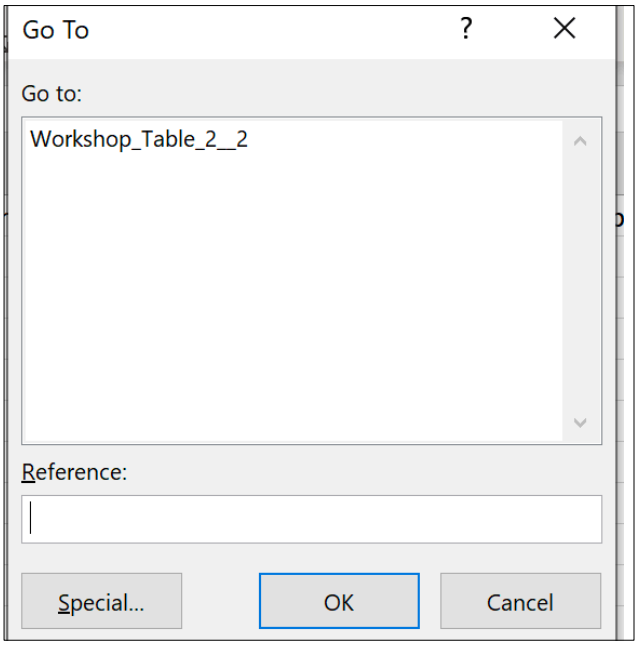
2) Select cell "**A3**."



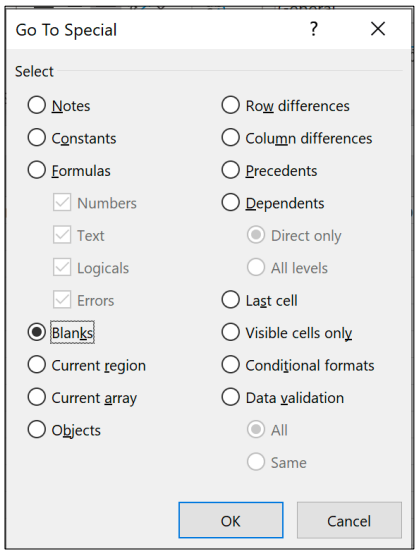
3) Click on the "**Home**" Tab then in the Editing section of the toolbar click and select "**Find and Select> Go To..**"



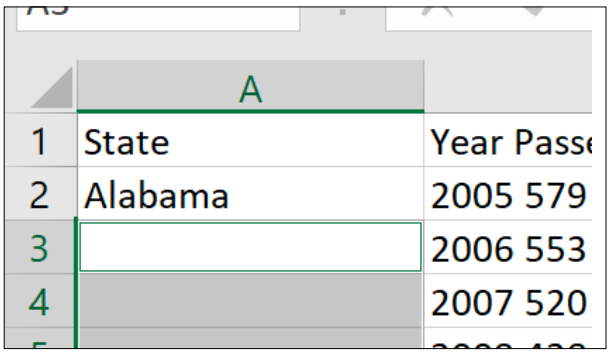
4) When the Go To dialog box opens, click the "**Special...**" button.



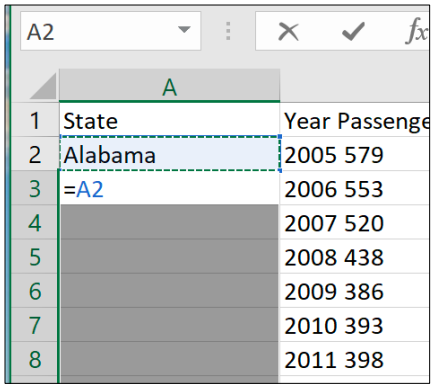
5) On the Go To Special dialog box, select "**Blanks**," then click "**OK**."



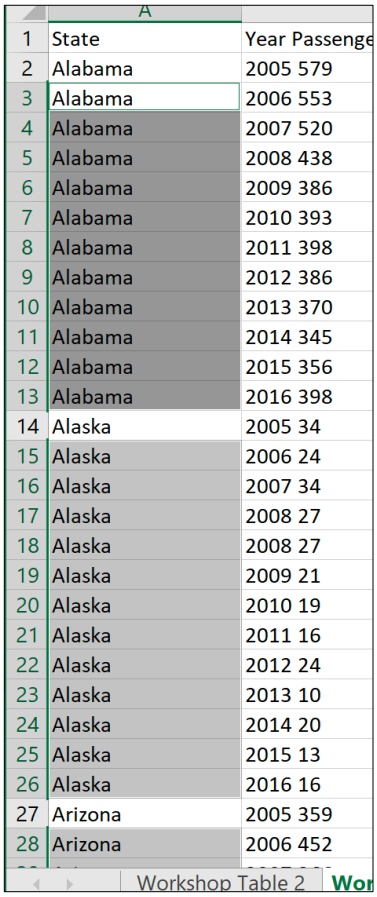
6) Make sure cell "**A3**" is still selected (don't click anything. Leave the focus on the cell under Alabama).



7) Type in "**=**" then click on the cell that contains "**Alabama**."

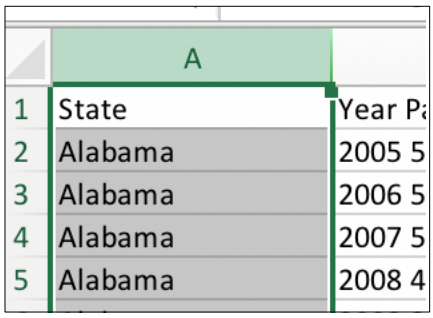


8) Next, while holding down the "**Ctrl key**" press "**Enter**". All the empty cells should now have populated with state names.



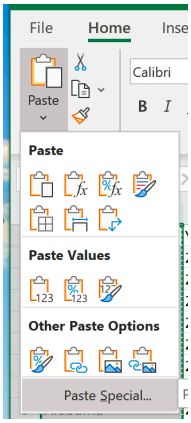
9) Next, convert the newly pasted formulas to values in this case state names.

10) To convert the values, select the whole column "**A**" that contains the state names.

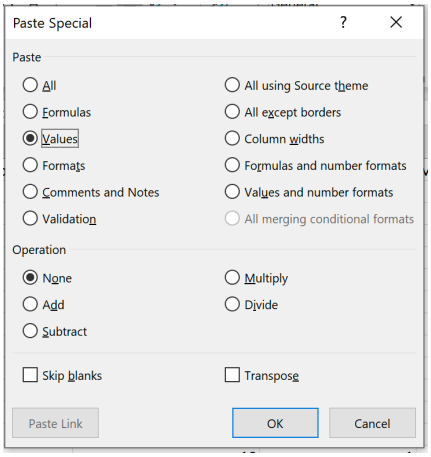


11) Copy the contents of the column by either using the "**Ctrl**" and "**C**" keys or use the copy command in the "clipboard section" of the "**Home**" Tab.

12) Select "**Paste > Paste Special...**" in the "**clipboard section**" of the "**Home**" Tab.



13) When the Paste Special dialog box opens select "**Values**" form the Paste section and "**None**" from the Operation section, then click "**OK**"



14) Press the "**Esc**" key to de-select the first column. If you select one of the cells, you just pasted, it should now contain a state name vs. a formula.

Split a field

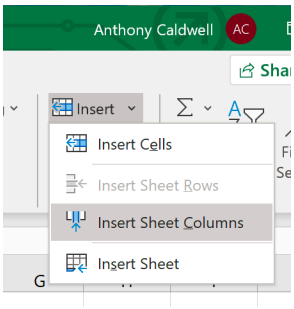
1) In the Workshop Table 1 worksheet column "**B**" has a problem. There should be two columns of data where there is only one. To correct this error, the single-column will need to be split into two.

B
Year Passenger car occupants
2005 579
2006 553
2007 520
2008 438
2009 386
2010 393
2011 398
2012 386
2013 370
2014 345
2015 356
2016 398
2005 34
2006 24
2007 34
2008 27
2008 27
2009 21
2010 19

2) First, select the column "**C**."

A	B	C	
State	Year Passenger car occupants	Pickup and SUV occupants	Larg
Alabama	2005 579	354	
Alabama	2006 553	401	
Alabama	2007 520	375	
Alabama	2008 438	298	
Alabama	2009 386	269	
Alabama	2010 393	281	
Alabama	2011 398	269	
Alabama	2012 386	260	
Alabama	2013 370	296	
Alabama	2014 345	270	
Alabama	2015 356	279	
Alabama	2016 398	356	
Alaska	2005 34	19	
Alaska	2006 24	21	
Alaska	2007 34	18	
Alaska	2008 27	15	
Alaska	2008 27	15	
Alaska	2009 21	19	
Alaska	2010 19	18	
Alaska	2011 16	31	
Alaska	2012 24	14	

3) Next form the "**Home**" Tab in the "**cells section**," select "**Insert>Insert Sheet Columns**" to insert a new empty column to the right of column "**B**."



4) Column "**C**" should now be empty.

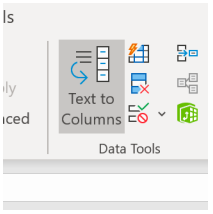
B	C	D
ar Passenger car occupants		Pickup and SUV occupants
05 579		354
06 553		401
07 520		375
08 438		298
09 386		269
10 393		281
11 398		269
12 386		260
13 370		296
14 345		270
15 356		279
16 398		356
05 34		19
06 24		21
07 34		18
08 27		15
08 27		15
09 21		19
10 19		18
11 16		31
12 24		14
13 10		18
14 20		21
15 13		23
16 16		35
05 359		278
06 452		384

le 2 Workshop Table 1

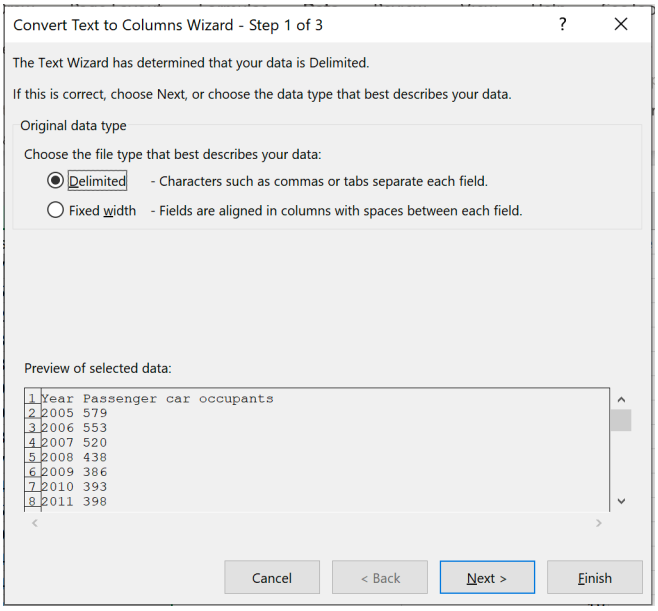
5) Select column "**B**"

B
Year Passenger car occupants
2005 579
2006 553
2007 520
2008 438
2009 386
2010 393
2011 398
2012 386
2013 370
2014 345
2015 356
2016 398
2005 34
2006 24
2007 34
2008 27

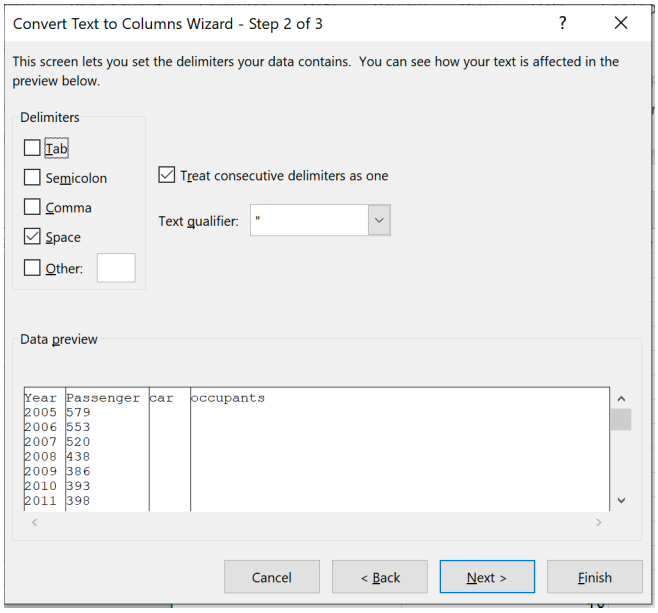
6) Click on the "**Data**" tab and then click on the "**Text to Columns**" button in the "**Data Tools section**".



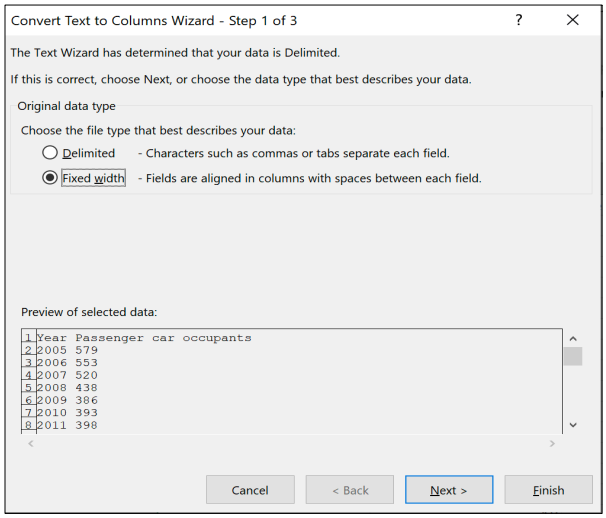
7) When the Convert Text to Columns Wizard Step 1 dialog box opens, select "**Delimited**" then press the "**Next**" button.



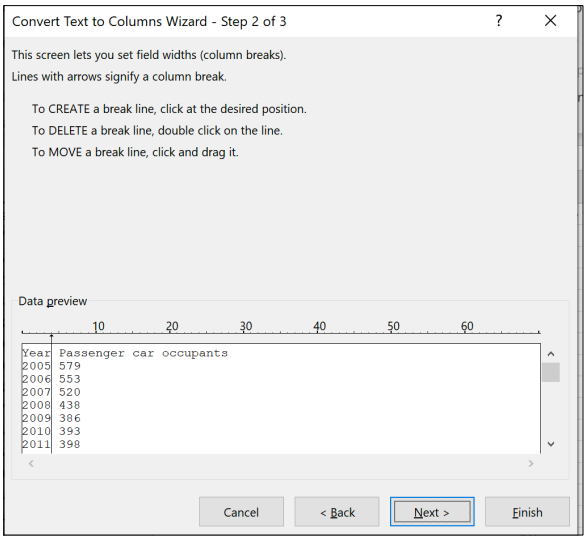
8) When the Convert Text to Columns Wizard Step 2 dialog box opens, select "**Space**." As you can see, the data is being split correctly, but the header is not because there is more than one space in the header title. Click on the "**Back**" button.



9) When the Convert Text to Columns Wizard Step 1 dialog box opens, select "**Fixed**" width and then press the "**Next**" button.



10) Now the columns and headers look correct click the "**Next**" button.

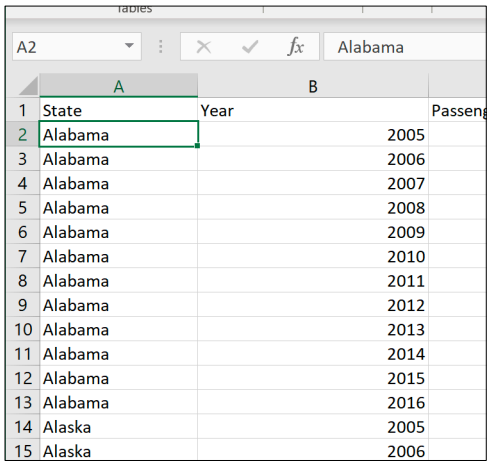


11) Now there should be two columns where there was once only one.

	B	C	D
	Year	Passenger car occupants	Pickup and SU
	2005	579	
	2006	553	
	2007	520	
	2008	438	
	2009	386	
	2010	393	
	2011	398	
	2012	386	

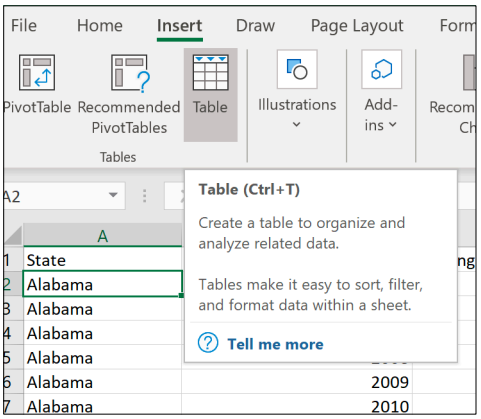
Make Tables

1) The next step is to turn our data into tables. Goto the worksheet "**Workshop Table 1**" and select the cell "**A2**".

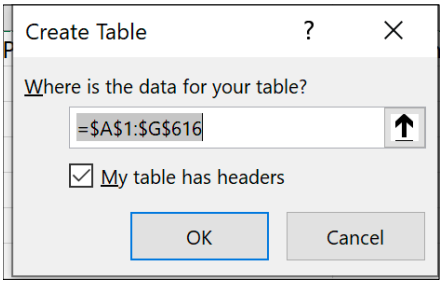


	A	B	
1	State	Year	Passeng
2	Alabama	2005	
3	Alabama	2006	
4	Alabama	2007	
5	Alabama	2008	
6	Alabama	2009	
7	Alabama	2010	
8	Alabama	2011	
9	Alabama	2012	
10	Alabama	2013	
11	Alabama	2014	
12	Alabama	2015	
13	Alabama	2016	
14	Alaska	2005	
15	Alaska	2006	

2) Click on the "**Insert**" tab then click on the "**Table**" button in the tables section.



3) A dialog box will open and ask what range of cells should be included in the table. The data should already be selected. You should see a dotted line around your data if not drag your mouse cursor over your data until it is selected. Make sure "**My table has headers**" is selected then click "**OK**."



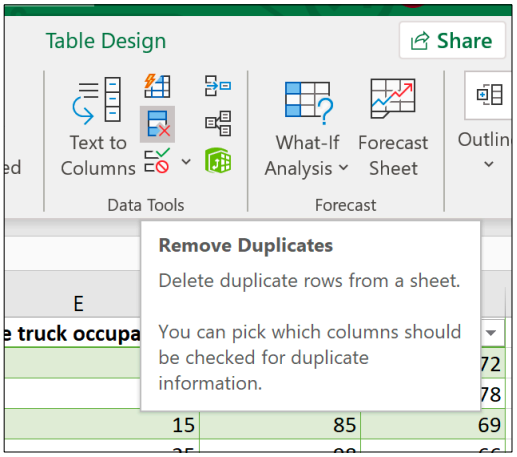
4) The cells containing your data should now be converted to a table.

	A	B	C	D
1	State	Year	Passenger car occupants	Pickup and SUV occupants
2	Alabama	2005	579	354
3	Alabama	2006	553	401
4	Alabama	2007	520	375
5	Alabama	2008	438	298
6	Alabama	2009	386	269
7	Alabama	2010	393	281
8	Alabama	2011	398	269
9	Alabama	2012	386	260
10	Alabama	2013	370	296
11	Alabama	2014	345	270
12	Alabama	2015	356	279
13	Alabama	2016	398	356
14	Alaska	2005	34	19
15	Alaska	2006	24	21
16	Alaska	2007	34	18
17	Alaska	2008	27	15
18	Alaska	2008	27	15
19	Alaska	2009	21	19
20	Alaska	2010	19	18
21	Alaska	2011	16	31
22	Alaska	2012	24	14
23	Alaska	2013	10	18
24	Alaska	2014	20	21
25	Alaska	2015	13	23
26	Alaska	2016	16	35

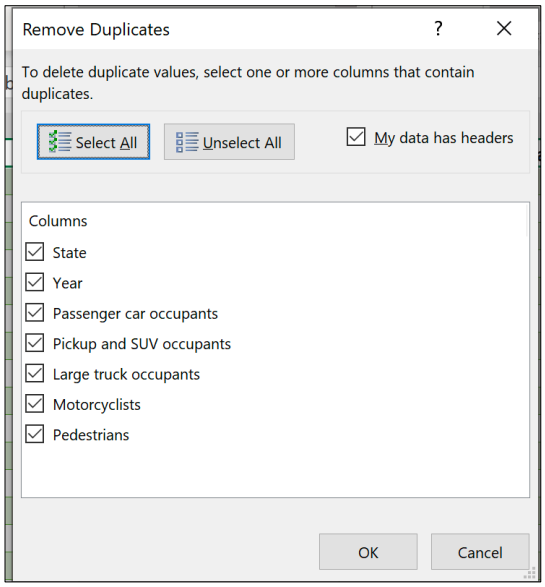
5) Next, we want to remove any duplicate records in the table. Select any cell in the table.

1	State	Year
2	Alabama	2005
3	Alabama	2006
4	Alabama	2007
5	Alabama	2008
6	Alabama	2009
7	Alabama	2010
8	Alabama	2011
9	Alabama	2012
10	Alabama	2013
11	Alabama	2014
12	Alabama	2015
13	Alabama	2016
14	Alaska	2005
15	Alaska	2006
16	Alaska	2007

6) Select the "**Data**" tab then click the "Remove Duplicates" button in the "**Data Tools section**".



7) A dialog will open asking what fields to use in the search. Leave them all selected and press the "OK" button.



8) A dialog should open, displaying the results.

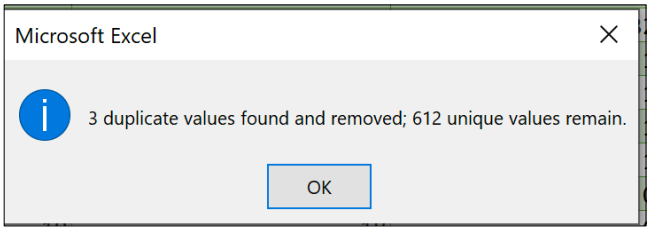
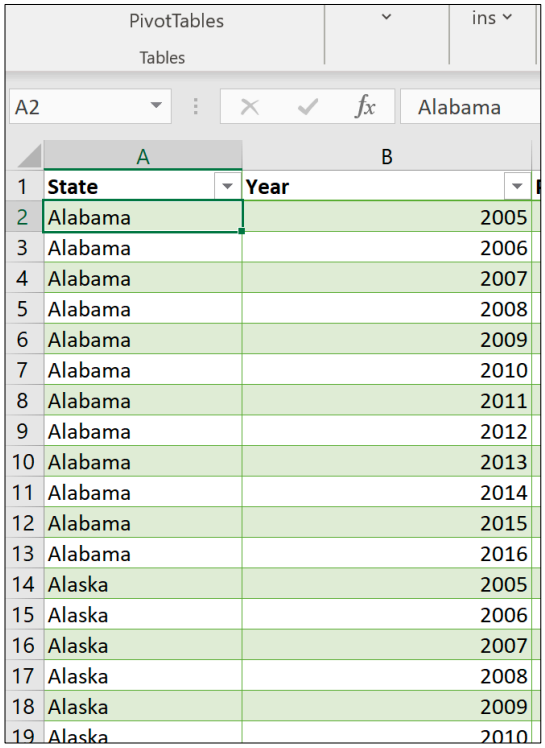


Table Join

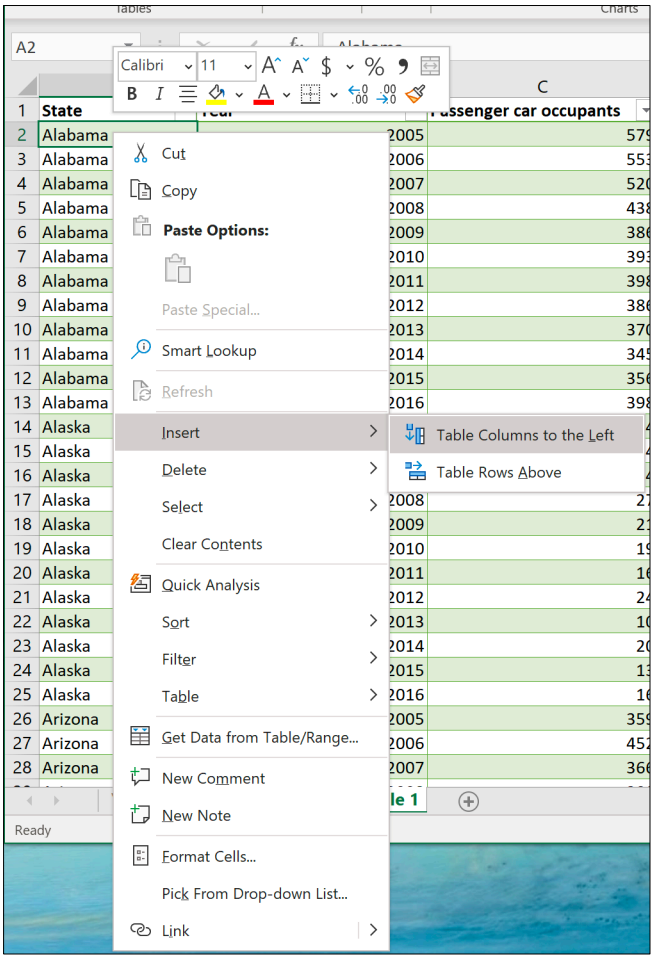
1) In this section, we will "**Join**" two tables using "**VLOOKUP**."

2) VLOOKUP relies on being able to "**connect**" the two tables by a related field. This field does not exist in either table, so we will need to make it by using a calculation that combines two other cells to create a unique value for each record (row). Go to the Workshop "Table 1 worksheet" and select Cell "**A2**".



	A	B
1	State	Year
2	Alabama	2005
3	Alabama	2006
4	Alabama	2007
5	Alabama	2008
6	Alabama	2009
7	Alabama	2010
8	Alabama	2011
9	Alabama	2012
10	Alabama	2013
11	Alabama	2014
12	Alabama	2015
13	Alabama	2016
14	Alaska	2005
15	Alaska	2006
16	Alaska	2007
17	Alaska	2008
18	Alaska	2009
19	Alaska	2010

3) Next, with cell "**A2**" selected "**Right-click**," a menu will open. Select "**Insert>Table Columns to the Left.**"

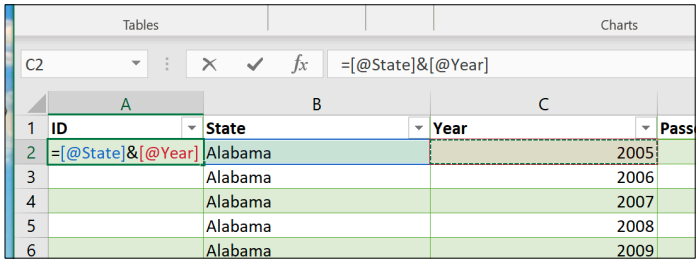


4) A new empty column should appear on the left.

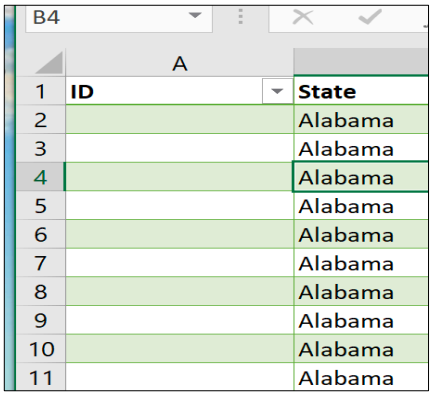
	A	B	
1	Column1	State	Year
2		Alabama	
3		Alabama	
4		Alabama	
5		Alabama	
6		Alabama	
7		Alabama	
8		Alabama	
9		Alabama	
10		Alabama	
11		Alabama	
12		Alabama	
13		Alabama	
14		Alaska	
15		Alaska	
16		Alaska	
17		Alaska	
18		Alaska	
19		Alaska	
20		Alaska	
21		Alaska	
22		Alaska	
23		Alaska	
24		Alaska	
25		Alaska	
26		Arizona	

6) To create a unique value that we can use to connect the two tables, we will combine the "**State name**" and "**Year**" cells into a new cell in the row we just created.

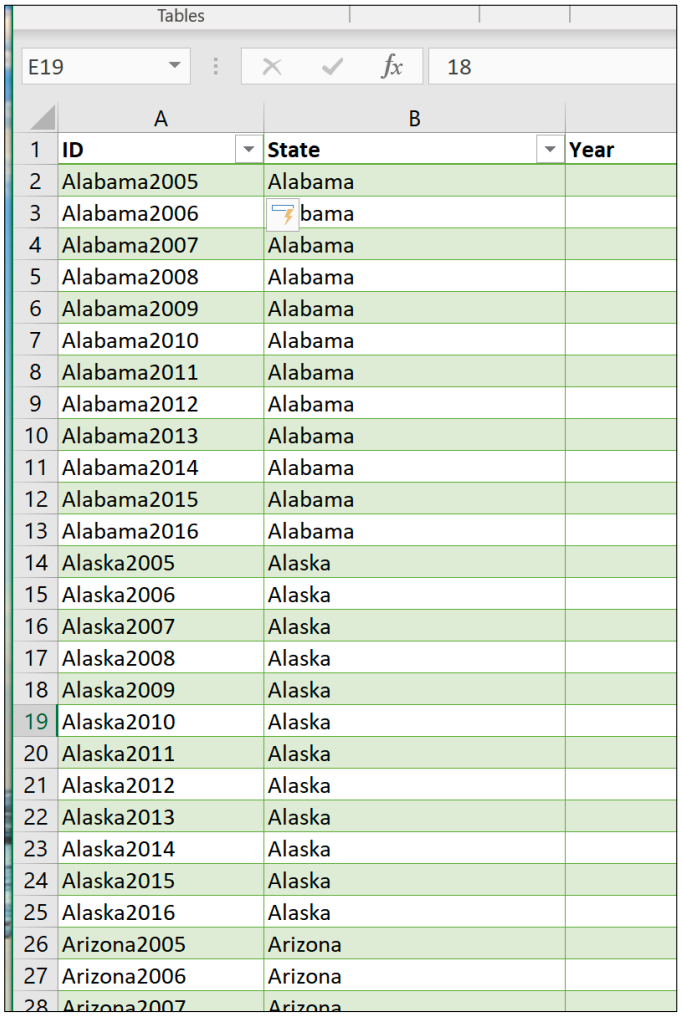
7) Select cell "**A2**" and type "**=** "then click on cell "**B1**". Next type **"&"** then click on cell "**C1**". Last, click on the "**Check**" icon next to the formula bar or press the "**Return**" key to complete the calculation.



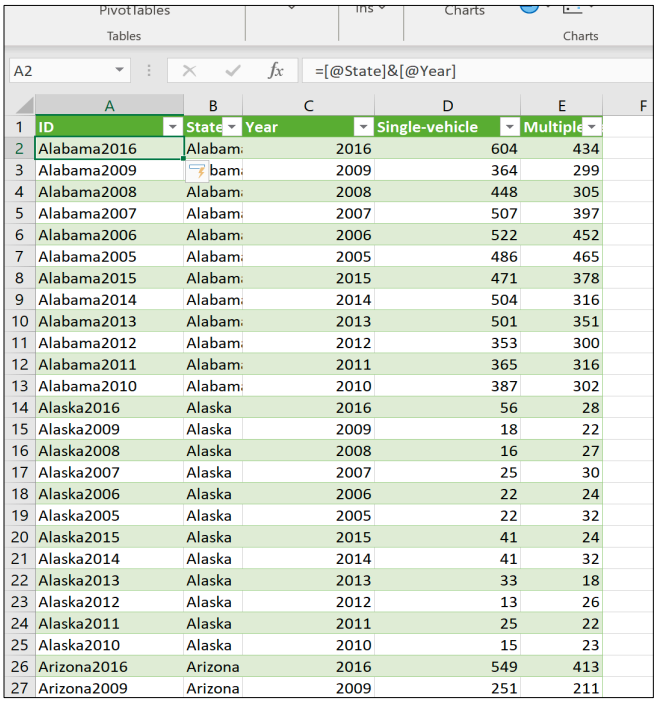
5) Rename the Column to ID



8) The table should auto-fill the new formula in column "A" and display the result.

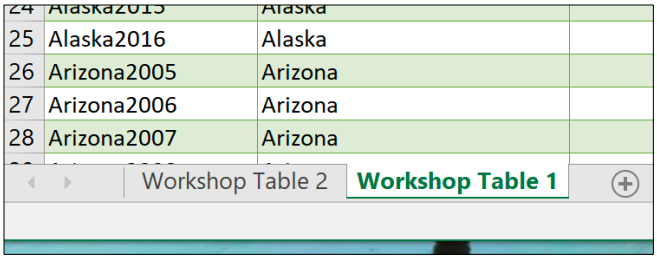


9) Next, go to the "**Workshop Table 2**" worksheet and repeat the same process. When completed, "**Workshop Table 2**" should look like this.



	A	B	C	D	E
1	ID	State	Year	Single-vehicle	Multiple
2	Alabama2016	Alabam	2016	604	434
3	Alabama2009	bam	2009	364	299
4	Alabama2008	Alabam	2008	448	305
5	Alabama2007	Alabam	2007	507	397
6	Alabama2006	Alabam	2006	522	452
7	Alabama2005	Alabam	2005	486	465
8	Alabama2015	Alabam	2015	471	378
9	Alabama2014	Alabam	2014	504	316
10	Alabama2013	Alabam	2013	501	351
11	Alabama2012	Alabam	2012	353	300
12	Alabama2011	Alabam	2011	365	316
13	Alabama2010	Alabam	2010	387	302
14	Alaska2016	Alaska	2016	56	28
15	Alaska2009	Alaska	2009	18	22
16	Alaska2008	Alaska	2008	16	27
17	Alaska2007	Alaska	2007	25	30
18	Alaska2006	Alaska	2006	22	24
19	Alaska2005	Alaska	2005	22	32
20	Alaska2015	Alaska	2015	41	24
21	Alaska2014	Alaska	2014	41	32
22	Alaska2013	Alaska	2013	33	18
23	Alaska2012	Alaska	2012	13	26
24	Alaska2011	Alaska	2011	25	22
25	Alaska2010	Alaska	2010	15	23
26	Arizona2016	Arizona	2016	549	413
27	Arizona2009	Arizona	2009	251	211

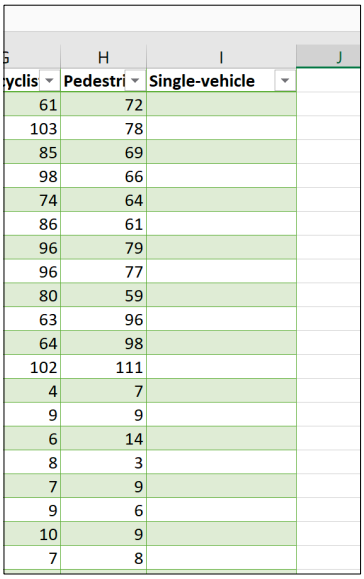
11) Return to "**Workshop Table 1.**"



25	Alaska2016	Alaska
26	Arizona2005	Arizona
27	Arizona2006	Arizona
28	Arizona2007	Arizona

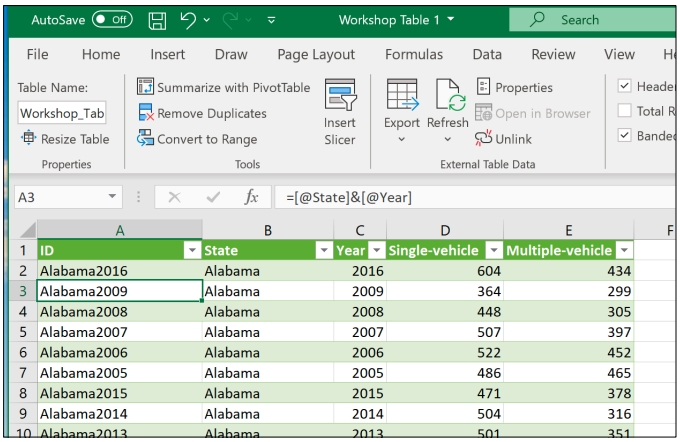
Workshop Table 2 | Workshop Table 1

12) Select cell "**I1**" and type "**Single-Vehicle,**" then press "**Return.**" A new empty table column will appear.



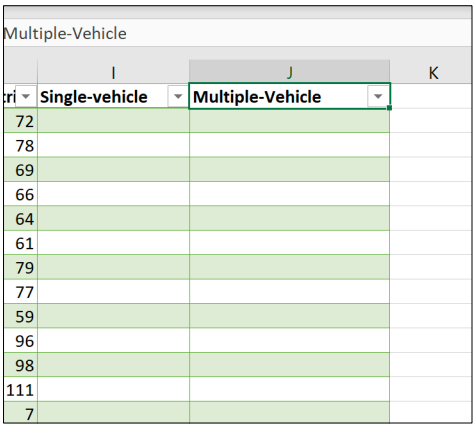
	H	I	J
	yclis	Pedestri	Single-vehicle
1	61	72	
2	103	78	
3	85	69	
4	98	66	
5	74	64	
6	86	61	
7	96	79	
8	96	77	
9	80	59	
10	63	96	
11	64	98	
12	102	111	
13	4	7	
14	9	9	
15	6	14	
16	8	3	
17	7	9	
18	9	6	
19	10	9	
20	7	8	

10) Click on the "**Table Design**" Tab and make a note of the "**table name**" and "**Column Numbers**" you want to display in the other table. You will need this information in step "**18.**" In this case, the table name is "**Workshop_Table_2__2**" (your table name may differ), and the columns are "**4**" & "**5**" we want to return to the other sheet.



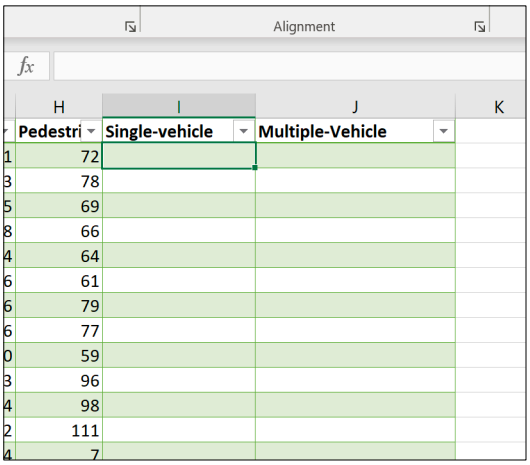
	A	B	C	D	E
1	ID	State	Year	Single-vehicle	Multiple-vehicle
2	Alabama2016	Alabama	2016	604	434
3	Alabama2009	Alabama	2009	364	299
4	Alabama2008	Alabama	2008	448	305
5	Alabama2007	Alabama	2007	507	397
6	Alabama2006	Alabama	2006	522	452
7	Alabama2005	Alabama	2005	486	465
8	Alabama2015	Alabama	2015	471	378
9	Alabama2014	Alabama	2014	504	316
10	Alabama2013	Alabama	2013	501	351

13) Repeat the process this time select cell "**J1**" and type "**Multiple-Vehicle.**" in the cell. You should now have two new empty columns on the right side of your table.



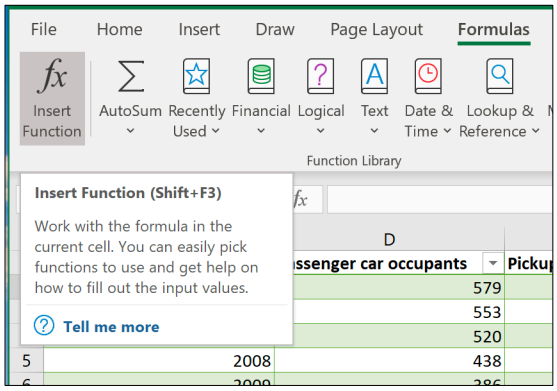
	I	J	K
	Single-vehicle	Multiple-Vehicle	
1	72		
2	78		
3	69		
4	66		
5	64		
6	61		
7	79		
8	77		
9	59		
10	96		
11	98		
12	111		
13	7		

14) Select the first empty cell under the "**Single-Vehicle**" header.

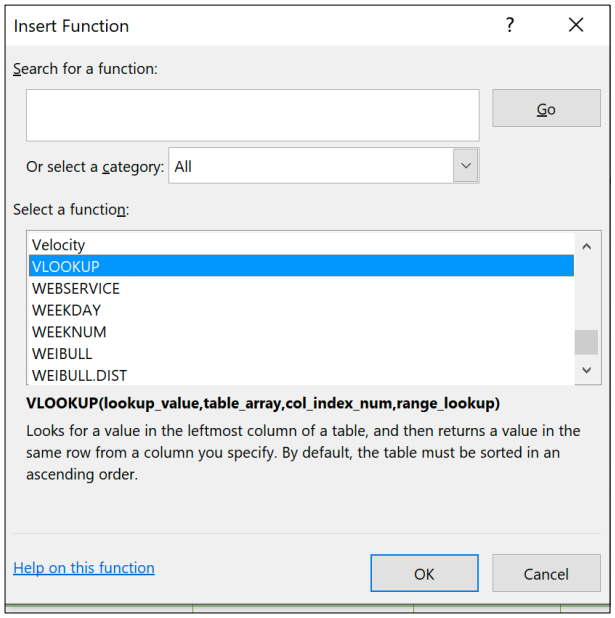


	H	I	J	K
	Pedestri	Single-vehicle	Multiple-Vehicle	
1	72			
2	78			
3	69			
4	66			
5	64			
6	61			
7	79			
8	77			
9	59			
10	96			
11	98			
12	111			
13	7			

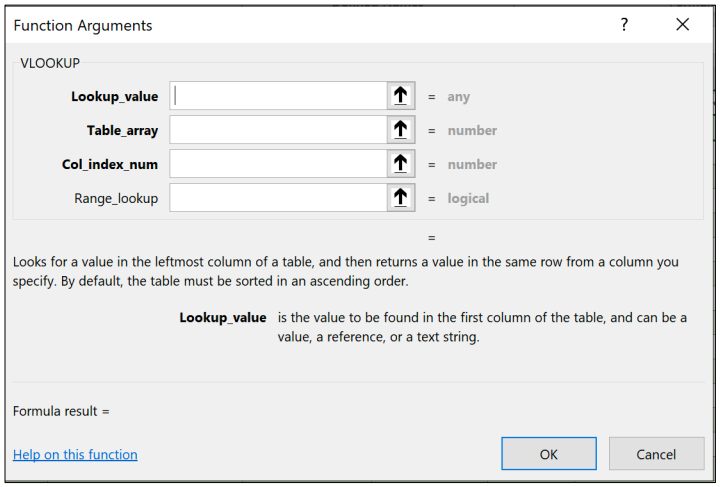
15) Click on the "**Formulas**" tab then select "**Insert Function**" from the "**Function Library**" Section.



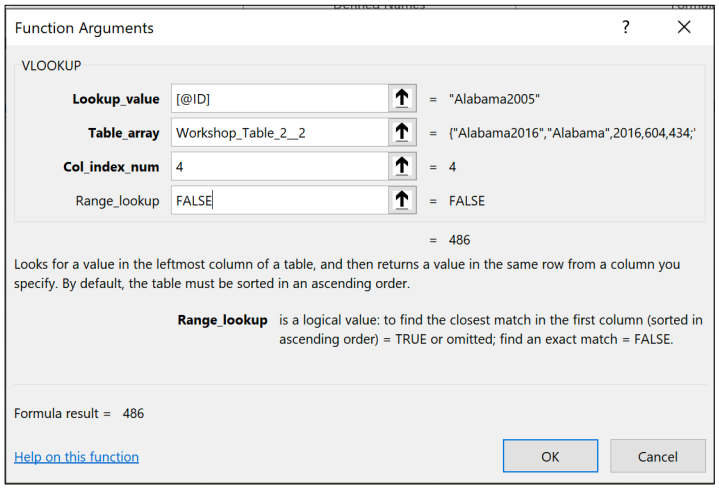
16) The "Insert Function Dialog" will open. From the "**Or select a category**" pop-down menu, select "**All**." Then scroll through the list of functions until you find "**VLOOKUP**"



17) Next The Function Arguments window will open.



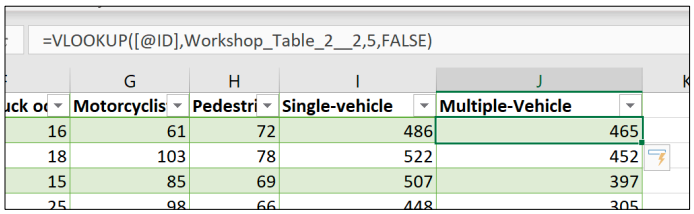
18) You will now need the values you made a note of in step "**10**". For the "**Lookup_value,**" click in Cell "**A2.**" For the "**Table_array**" type, the name of the Table on the "**Workshop Table 2**" worksheet. For the "**col_index_num,**" enter the number "**4.**" For the "**Range_lookup,**" enter "**FALSE.**" Last Click, "**OK.**"



19) Column "**I**" should now be filled with related values form "**Workshop Table 2**".

G	H	I	
Motorcyclis	Pedestri	Single-vehicle	Multiple-Ve
61	72	486	
103	78	522	
85	69	507	
98	66	448	
74	64	364	
86	61	387	
96	79	365	
96	77	353	
80	59	501	
63	96	504	
64	98	471	
102	111	604	
4	7	22	
9	9	22	
6	14	25	
8	3	16	
7	9	18	
9	6	15	
10	9	25	
7	8	13	
2	6	33	
8	14	41	
10	12	41	
5	12	56	
122	157	306	
136	167	407	

20) Next, we want to repeat the process for column "**J**," but instead of re-typing the whole formula, we can copy-paste the formula from cell "**I2**" into the cell "**J2**" and change the "**Col_index_num**" value from "**4**" to "**5**".



	G	H	I	J
ıck o	Motorcyclis	Pedestri	Single-vehicle	Multiple-Vehicle
16	61	72	486	465
18	103	78	522	452
15	85	69	507	397
25	98	66	448	305

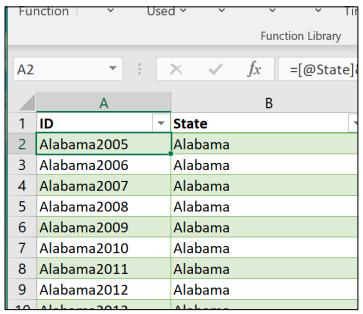
21) Column "**J**" should now be filled with related values form "**Workshop Table 2**."

	H	I	J	K	L
s	Pedestri	Single-vehicle	Multiple-Vehicle		
61	72	486	465		
103	78	522	452		
85	69	507	397		
98	66	448	305		
74	64	364	299		
86	61	387	302		
96	79	365	316		
96	77	353	300		
80	59	501	351		
63	96	504	316		
64	98	471	378		
102	111	604	434		
4	7	22	32		
9	9	22	24		
6	14	25	30		
8	3	16	27		
7	9	18	22		
9	6	15	23		
10	9	25	22		
7	8	13	26		
2	6	33	18		
8	14	41	32		
10	12	41	24		
5	12	56	28		

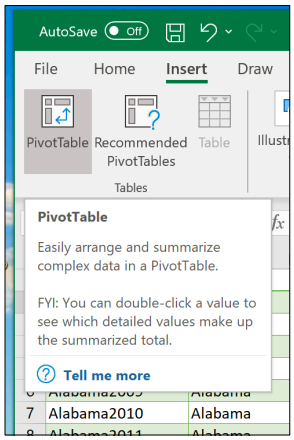
PivotTables

A pivot table is a table that summarizes data in another table and is made by applying an operation such as sorting, averaging, or summing to data in the first table, typically including grouping of the data. - *Wikipedia*

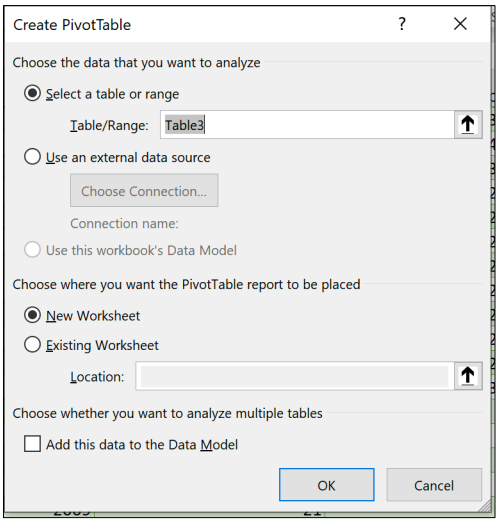
1) In "**Workshop Table 1**" select cell "**A2**".



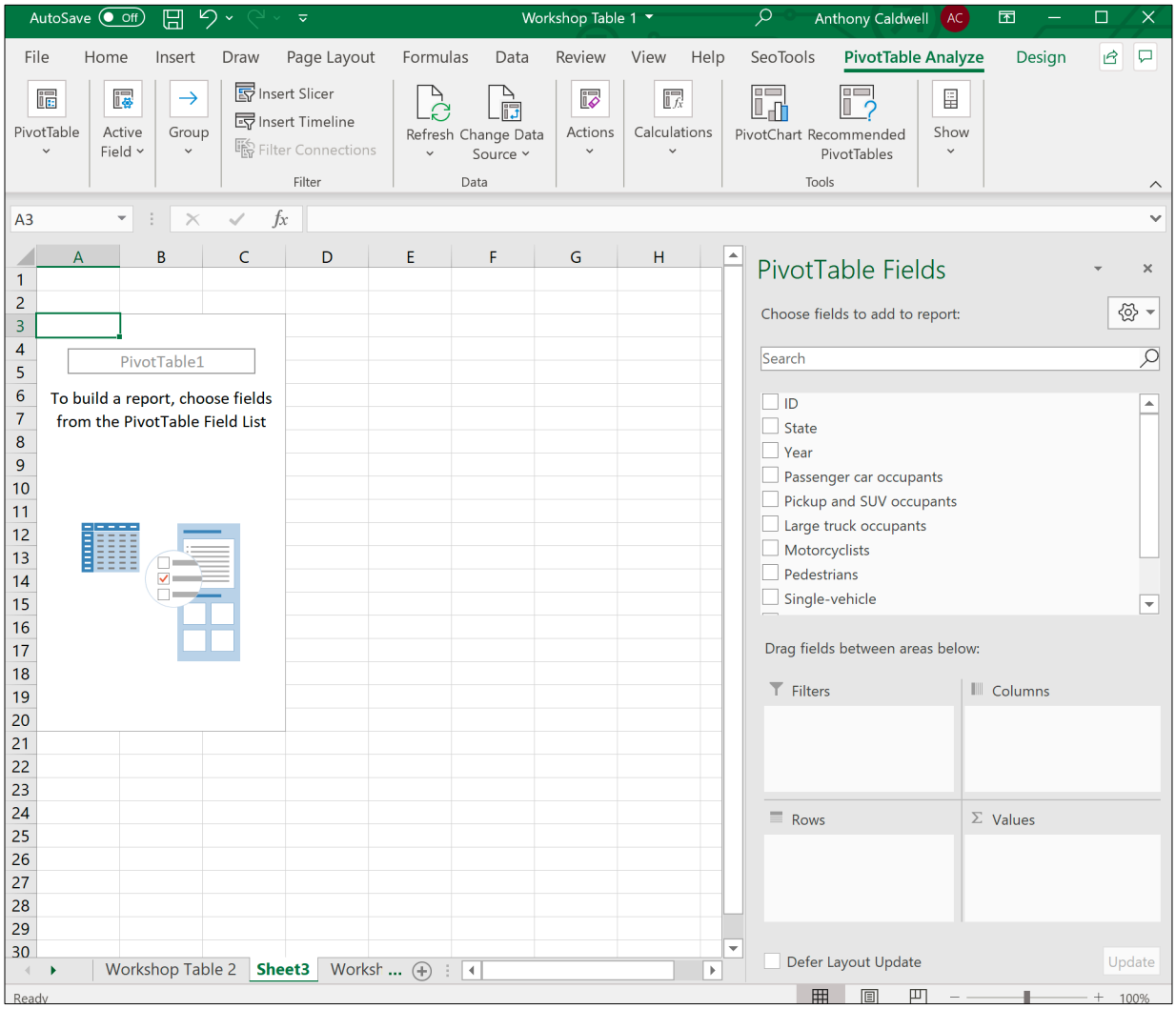
2) Select the "**Insert**" tab in the toolbar then click the "**PivotTable**" button in the "**Tables**" section.



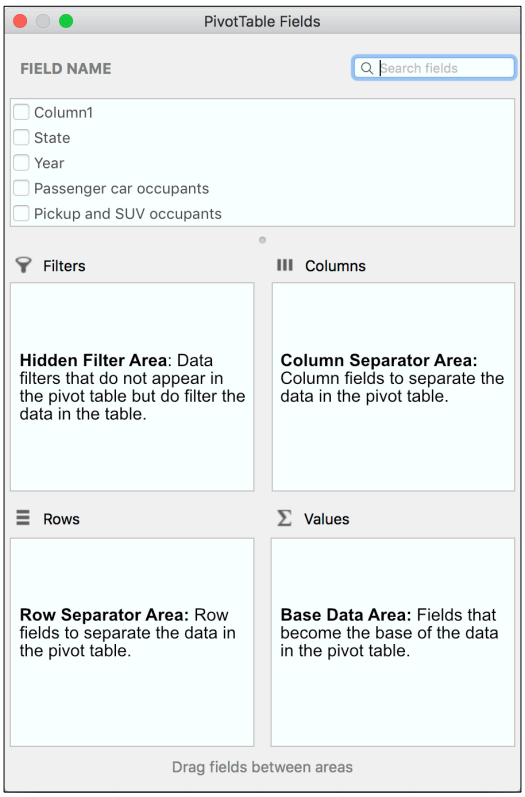
3) When the Crate PivotTable dialog box opens, make sure "**Select a table or range**" is selected, and "**Table3**." is being displayed in the edit box. (This name might differ on your computer, but will always be the name of the table you just selected.) Next, make sure the "**Choose where to place the PivotTable**" is set to "**New worksheet.**" Click the "**OK**" button.



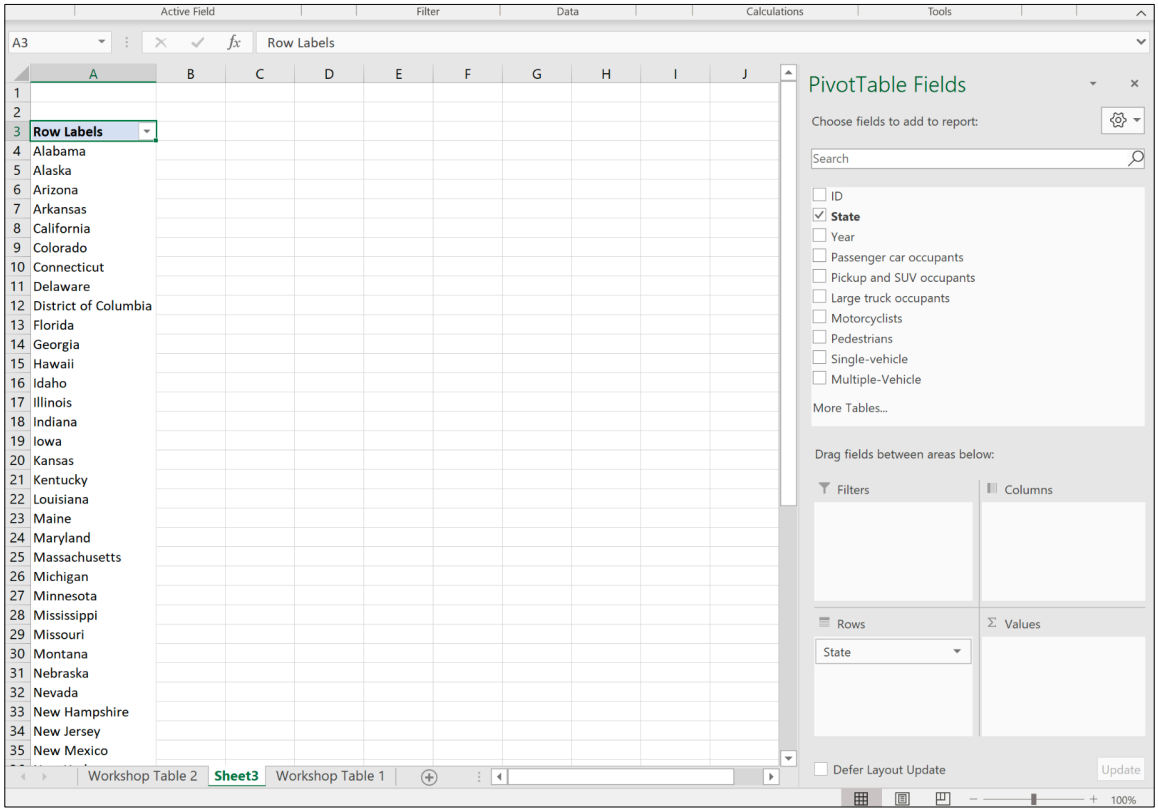
4) A new sheet will be created, and the PivotTable Fields dialog will be displayed.



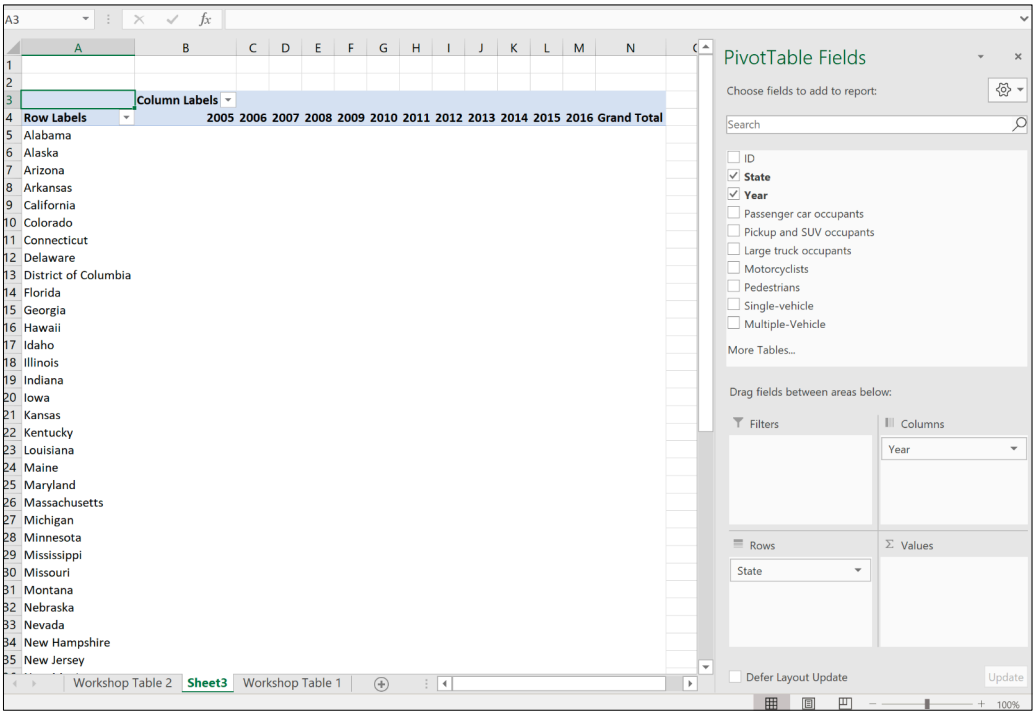
5) Below is a brief description of what the different parts of the PivotTable Fields dialog represent.



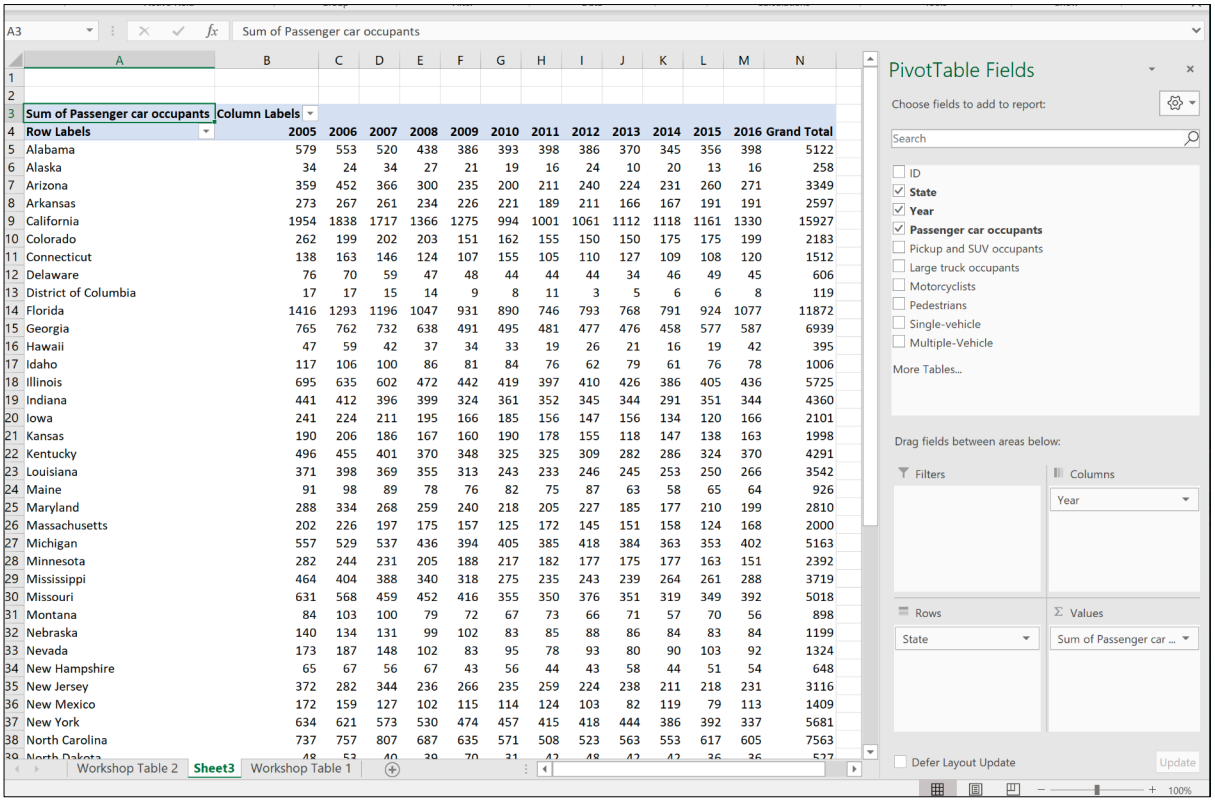
6) The easiest way to understand PivotTables is to play with the interface. Let's start by dragging the "**State**" field from the "**Field Name**" section to the "**Rows**" section. As you can see the state names fill out in the first column. You might also notice in "**Worksheet table 1**" the state names repeated once per year to create 613 rows. The PivotTable has summarized this into 51 rows, one entry for each state, plus one territory.



7) Next, drag the "**Year**" field from the "**Field Name**" section to the "**Columns**" section. Now, the years are displayed across the top of our table.

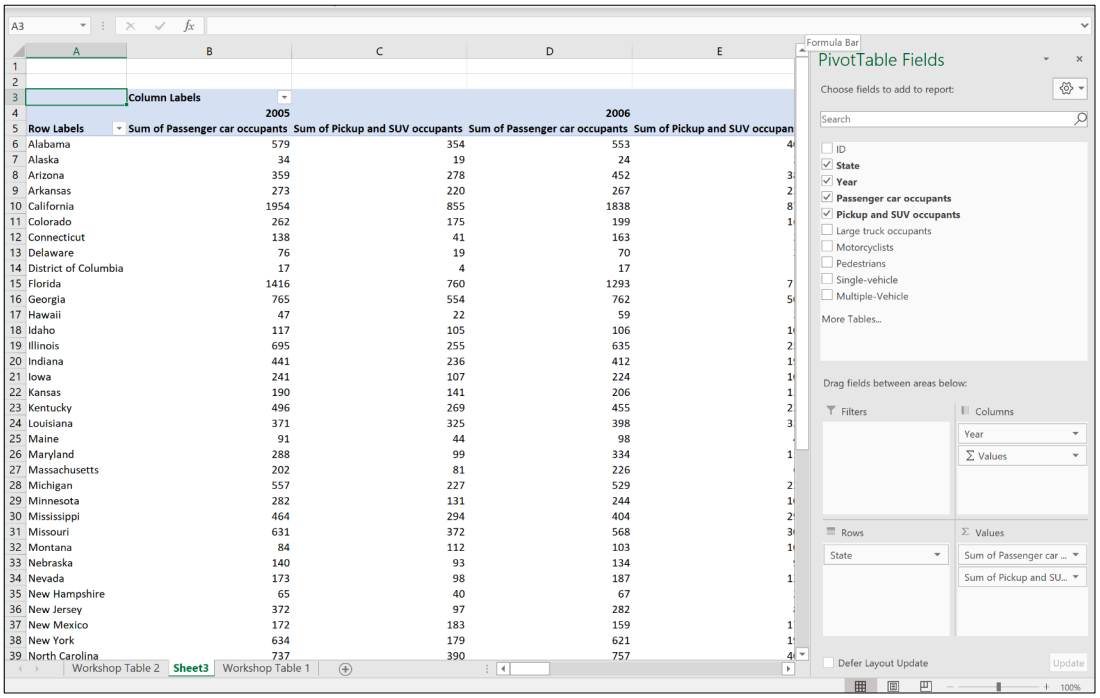


8) The next question to answer is what data do we want to see displayed for the various states and years. Drag "**Passenger car occupants**" from the "**Field Name**" section to the "**Values**" section. Passenger car occupants will now be displayed by year and state.



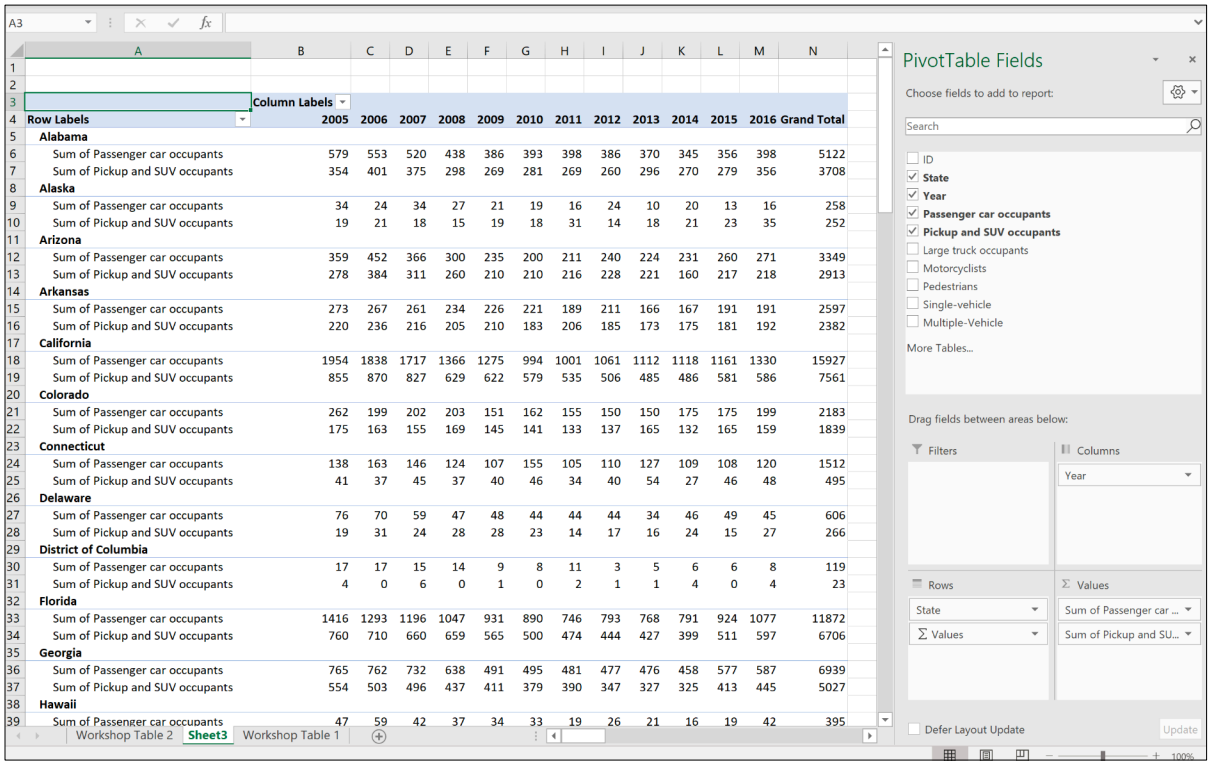
Sum of Passenger car occupants	Column Labels												
Row Labels	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Grand Total
Alabama	579	553	520	438	386	393	398	386	370	345	356	398	5122
Alaska	34	24	34	27	21	19	16	24	10	20	13	16	258
Arizona	359	452	366	300	235	200	211	240	224	231	260	271	3349
Arkansas	273	267	261	234	226	221	189	211	166	167	191	191	2597
California	1954	1838	1717	1366	1275	994	1001	1061	1112	1118	1161	1330	15927
Colorado	262	199	202	203	151	162	155	150	150	175	175	199	2183
Connecticut	138	163	146	124	107	155	105	110	127	109	108	120	1512
Delaware	76	70	59	47	48	44	44	44	34	46	49	45	606
District of Columbia	17	17	15	14	9	8	11	3	5	6	6	8	119
Florida	1416	1293	1196	1047	931	890	746	793	768	791	924	1077	11872
Georgia	765	762	732	638	491	495	481	477	476	458	577	587	6939
Hawaii	47	59	42	37	34	33	19	26	21	16	19	42	395
Idaho	117	106	100	86	81	84	76	62	79	61	76	78	1006
Illinois	695	635	602	472	442	419	397	410	426	386	405	436	5725
Indiana	441	412	396	399	324	361	352	345	344	291	351	344	4360
Iowa	241	224	211	195	166	185	156	147	156	134	120	166	2101
Kansas	190	206	186	167	160	190	178	155	118	147	138	163	1998
Kentucky	496	455	401	370	348	325	325	309	282	286	324	370	4291
Louisiana	371	398	369	355	313	243	233	246	245	253	250	266	3542
Maine	91	98	89	78	76	82	75	87	63	58	65	64	926
Maryland	288	334	268	259	240	218	205	227	185	177	210	199	2810
Massachusetts	202	226	197	175	157	125	172	145	151	158	124	168	2000
Michigan	557	529	537	436	394	405	385	418	384	363	353	402	5163
Minnesota	282	244	231	205	188	217	182	177	175	177	163	151	2392
Mississippi	464	404	388	340	318	275	235	243	239	264	261	288	3719
Missouri	631	568	459	452	416	355	350	376	351	319	349	392	5018
Montana	84	103	100	79	72	67	73	66	71	57	70	56	898
Nebraska	140	134	131	99	102	83	85	88	86	84	83	84	1199
Nevada	173	187	148	102	83	95	78	93	80	90	103	92	1324
New Hampshire	65	67	56	67	43	56	44	43	58	44	51	54	648
New Jersey	372	282	344	236	266	235	259	224	238	211	218	231	3116
New Mexico	172	159	127	102	115	114	124	103	82	119	79	113	1409
New York	634	621	573	530	474	457	415	418	444	386	392	337	5681
North Carolina	737	757	807	687	635	571	508	523	563	553	617	605	7563

9) Let's add more data. In the "**Field Name**" section, check the "**Pickup and SUV occupants**" field. The data now displays alongside the "**Passenger car occupants**" data. Although we can see all of our data, it's hard to read in this form.



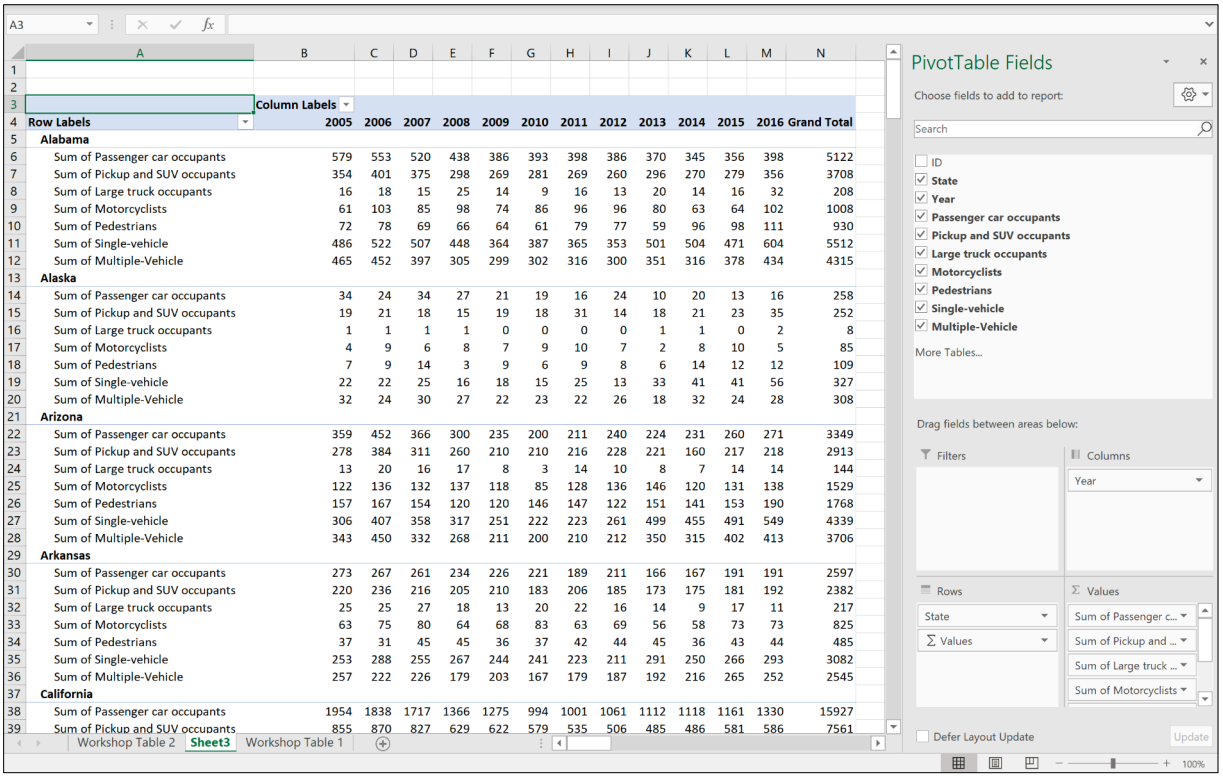
	Column Labels			
	2005		2006	
Row Labels	Sum of Passenger car occupants	Sum of Pickup and SUV occupants	Sum of Passenger car occupants	Sum of Pickup and SUV occupan
Alabama	579	354	553	4
Alaska	34	19	24	
Arizona	359	278	452	3
Arkansas	273	220	267	2
California	1954	855	1838	8
Colorado	262	175	199	1
Connecticut	138	41	163	
Delaware	76	19	70	
District of Columbia	17	4	17	
Florida	1416	760	1293	7
Georgia	765	554	762	5
Hawaii	47	22	59	
Idaho	117	105	106	1
Illinois	695	255	635	2
Indiana	441	236	412	1
Iowa	241	107	224	1
Kansas	190	141	206	1
Kentucky	496	269	455	2
Louisiana	371	325	398	3
Maine	91	44	98	
Maryland	288	99	334	1
Massachusetts	202	81	226	
Michigan	557	227	529	2
Minnesota	282	131	244	1
Mississippi	464	294	404	2
Missouri	631	372	568	3
Montana	84	112	103	1
Nebraska	140	93	134	
Nevada	173	98	187	1
New Hampshire	65	40	67	
New Jersey	372	97	282	
New Mexico	172	183	159	1
New York	634	179	621	1
North Carolina	737	390	757	4

10) Now let's try dragging "**Values**" from the "**Values**" section to the "**Rows**" section. Now, we see the data is more readable. We have changed the display to "**Pivot**" our values from columns to rows, making it more readable.



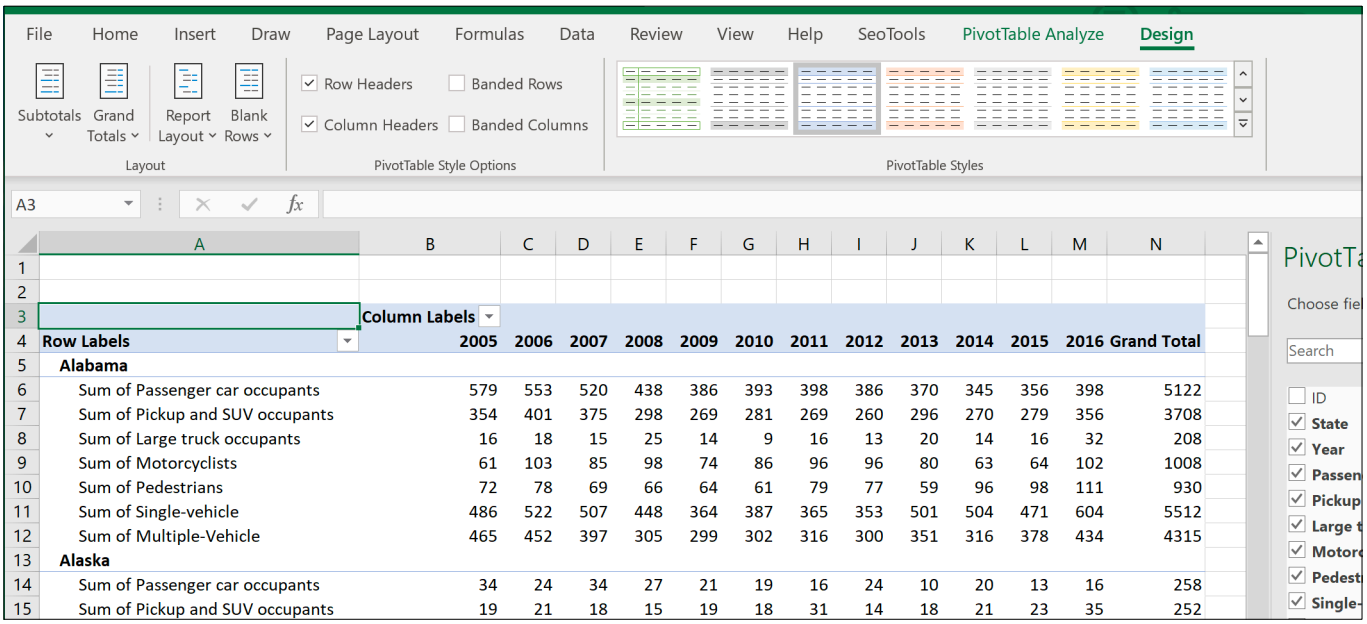
Row Labels	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Grand Total
Alabama													
Sum of Passenger car occupants	579	553	520	438	386	393	398	386	370	345	356	398	5122
Sum of Pickup and SUV occupants	354	401	375	298	269	281	269	260	296	270	279	356	3708
Alaska													
Sum of Passenger car occupants	34	24	34	27	21	19	16	24	10	20	13	16	258
Sum of Pickup and SUV occupants	19	21	18	15	19	18	31	14	18	21	23	35	252
Arizona													
Sum of Passenger car occupants	359	452	366	300	235	200	211	240	224	231	260	271	3349
Sum of Pickup and SUV occupants	278	384	311	260	210	210	216	228	221	160	217	218	2913
Arkansas													
Sum of Passenger car occupants	273	267	261	234	226	221	189	211	166	167	191	191	2597
Sum of Pickup and SUV occupants	220	236	216	205	210	183	206	185	173	175	181	192	2382
California													
Sum of Passenger car occupants	1954	1838	1717	1366	1275	994	1001	1061	1112	1118	1161	1330	15927
Sum of Pickup and SUV occupants	855	870	827	629	622	579	535	506	485	486	581	586	7561
Colorado													
Sum of Passenger car occupants	262	199	202	203	151	162	155	150	150	175	175	199	2183
Sum of Pickup and SUV occupants	175	163	155	169	145	141	133	137	165	132	165	159	1839
Connecticut													
Sum of Passenger car occupants	138	163	146	124	107	155	105	110	127	109	108	120	1512
Sum of Pickup and SUV occupants	41	37	45	37	40	46	34	40	54	27	46	48	495
Delaware													
Sum of Passenger car occupants	76	70	59	47	48	44	44	44	34	46	49	45	606
Sum of Pickup and SUV occupants	19	31	24	28	28	23	14	17	16	24	15	27	266
District of Columbia													
Sum of Passenger car occupants	17	17	15	14	9	8	11	3	5	6	6	8	119
Sum of Pickup and SUV occupants	4	0	6	0	1	0	2	1	1	4	0	4	23
Florida													
Sum of Passenger car occupants	1416	1293	1196	1047	931	890	746	793	768	791	924	1077	11872
Sum of Pickup and SUV occupants	760	710	660	659	565	500	474	444	427	399	511	597	6706
Georgia													
Sum of Passenger car occupants	765	762	732	638	491	495	481	477	476	458	577	587	6939
Sum of Pickup and SUV occupants	554	503	496	437	411	379	390	347	327	325	413	445	5027
Hawaii													
Sum of Passenger car occupants	47	59	42	37	34	33	19	26	21	16	19	42	395

11) Select the remaining fields in the "**Field Names**" section to see the rest of the data displayed in the table. By playing with the order and position of the various fields, you will be able to visualize your data in different ways.



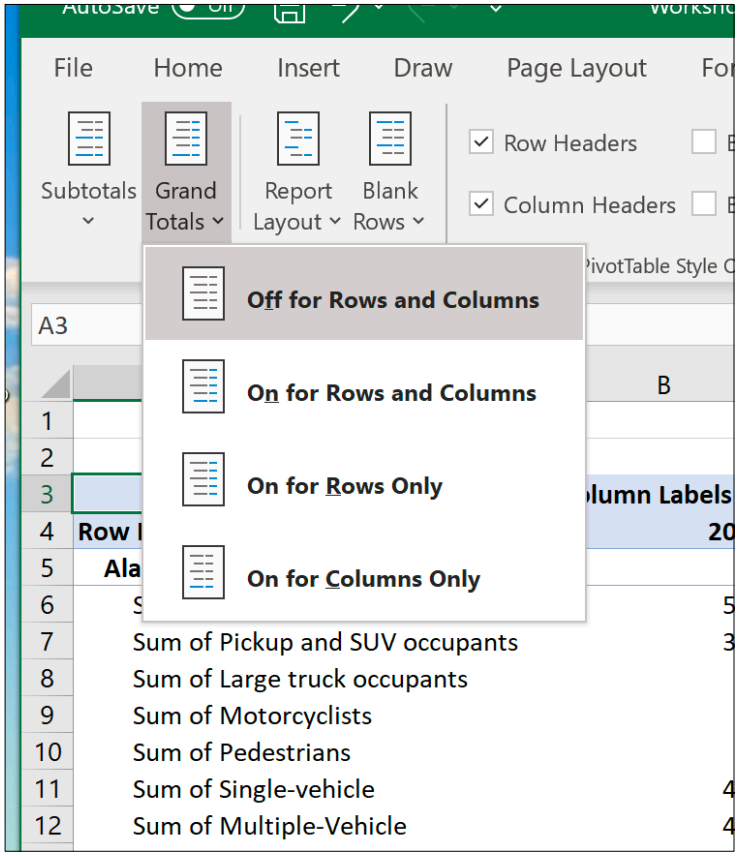
Row Labels	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Grand Total
Alabama													
Sum of Passenger car occupants	579	553	520	438	386	393	398	386	370	345	356	398	5122
Sum of Pickup and SUV occupants	354	401	375	298	269	281	269	260	296	270	279	356	3708
Sum of Large truck occupants	16	18	15	25	14	9	16	13	20	14	16	32	208
Sum of Motorcyclists	61	103	85	98	74	86	96	96	80	63	64	102	1008
Sum of Pedestrians	72	78	69	66	64	61	79	77	59	96	98	111	930
Sum of Single-vehicle	486	522	507	448	364	387	365	353	501	504	471	604	5512
Sum of Multiple-Vehicle	465	452	397	305	299	302	316	300	351	316	378	434	4315
Alaska													
Sum of Passenger car occupants	34	24	34	27	21	19	16	24	10	20	13	16	258
Sum of Pickup and SUV occupants	19	21	18	15	19	18	31	14	18	21	23	35	252
Sum of Large truck occupants	1	1	1	1	0	0	0	0	1	1	0	2	8
Sum of Motorcyclists	4	9	6	8	7	9	10	7	2	8	10	5	85
Sum of Pedestrians	7	9	14	3	9	6	9	8	6	14	12	12	109
Sum of Single-vehicle	22	22	25	16	18	15	25	13	33	41	41	56	327
Sum of Multiple-Vehicle	32	24	30	27	22	23	22	26	18	32	24	28	308
Arizona													
Sum of Passenger car occupants	359	452	366	300	235	200	211	240	224	231	260	271	3349
Sum of Pickup and SUV occupants	278	384	311	260	210	210	216	228	221	160	217	218	2913
Sum of Large truck occupants	13	20	16	17	8	3	14	10	8	7	14	14	144
Sum of Motorcyclists	122	136	132	137	118	85	128	136	146	120	131	138	1529
Sum of Pedestrians	157	167	154	120	120	146	147	122	151	141	153	190	1768
Sum of Single-vehicle	306	407	358	317	251	222	223	261	499	455	491	549	4339
Sum of Multiple-Vehicle	343	450	332	268	211	200	210	212	350	315	402	413	3706
Arkansas													
Sum of Passenger car occupants	273	267	261	234	226	221	189	211	166	167	191	191	2597
Sum of Pickup and SUV occupants	220	236	216	205	210	183	206	185	173	175	181	192	2382
Sum of Large truck occupants	25	25	27	18	13	20	22	16	14	9	17	11	217
Sum of Motorcyclists	63	75	80	64	68	83	63	69	56	58	73	73	825
Sum of Pedestrians	37	31	45	45	36	37	42	44	45	36	43	44	485
Sum of Single-vehicle	253	288	255	267	244	241	223	211	291	250	266	293	3082
Sum of Multiple-Vehicle	257	222	226	179	203	167	179	187	192	216	265	252	2545
California													
Sum of Passenger car occupants	1954	1838	1717	1366	1275	994	1001	1061	1112	1118	1161	1330	15927
Sum of Pickup and SUV occupants	855	870	827	629	622	579	535	506	485	486	581	586	7561

12) To remove the totals and subtotals form a PivotTable. Select a cell in the PivotTable click on the "**Design**" tab (this tab and the PivotTable Analyze tab are only visible when a PivotTable is selected).



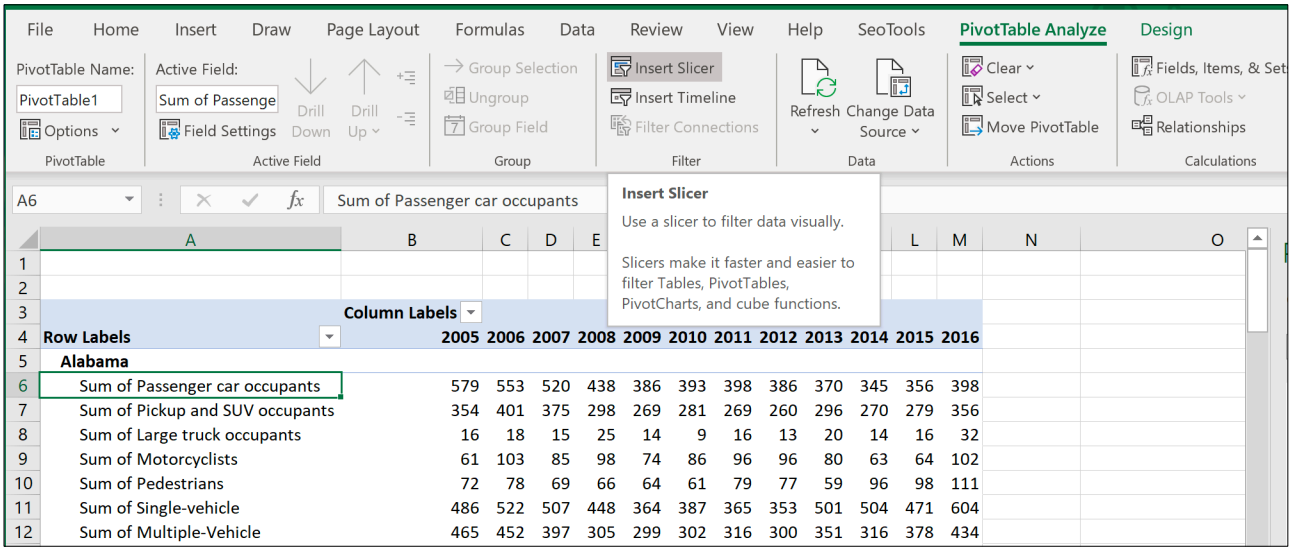
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
3		Column Labels												
4	Row Labels	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Grand Total
5	Alabama													
6	Sum of Passenger car occupants	579	553	520	438	386	393	398	386	370	345	356	398	5122
7	Sum of Pickup and SUV occupants	354	401	375	298	269	281	269	260	296	270	279	356	3708
8	Sum of Large truck occupants	16	18	15	25	14	9	16	13	20	14	16	32	208
9	Sum of Motorcyclists	61	103	85	98	74	86	96	96	80	63	64	102	1008
10	Sum of Pedestrians	72	78	69	66	64	61	79	77	59	96	98	111	930
11	Sum of Single-vehicle	486	522	507	448	364	387	365	353	501	504	471	604	5512
12	Sum of Multiple-Vehicle	465	452	397	305	299	302	316	300	351	316	378	434	4315
13	Alaska													
14	Sum of Passenger car occupants	34	24	34	27	21	19	16	24	10	20	13	16	258
15	Sum of Pickup and SUV occupants	19	21	18	15	19	18	31	14	18	21	23	35	252

13) Click on the "**Grand Totals**" button and select "**Off for Rows & Columns.**" The table will now display without totals and sub-totals.



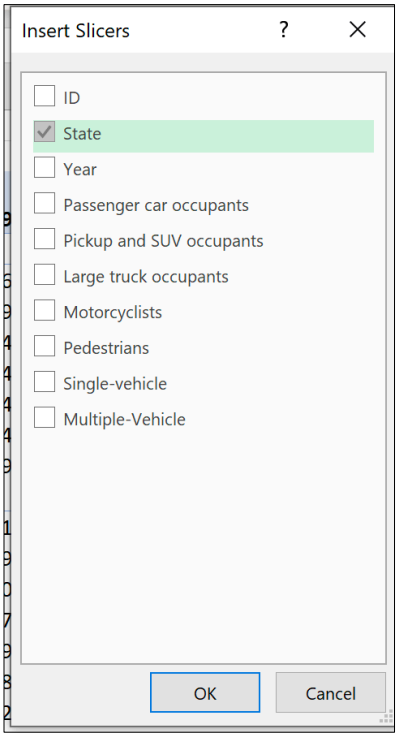
14) Slicers allow you to control how much of your data is displayed in the Pivot Table.

15) Select the Pivot Table you want to filter on then click the "**PivotTable Analyze**" tab. Next, click the "**Insert Slicer**" button.

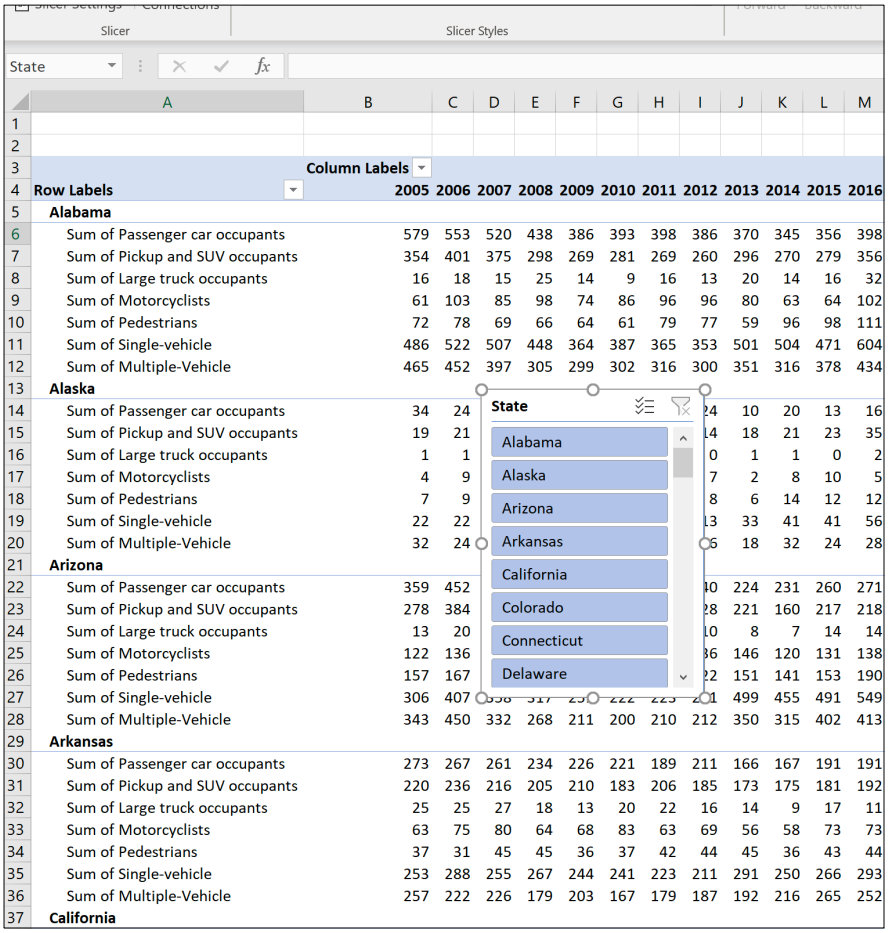


	A	B	C	D	E	L	M	N	O
1									
2									
3		Column Labels							
4	Row Labels	2005	2006	2007	2008	2015	2016		
5	Alabama								
6	Sum of Passenger car occupants	579	553	520	438	356	398		
7	Sum of Pickup and SUV occupants	354	401	375	298	279	356		
8	Sum of Large truck occupants	16	18	15	25	16	32		
9	Sum of Motorcyclists	61	103	85	98	64	102		
10	Sum of Pedestrians	72	78	69	66	98	111		
11	Sum of Single-vehicle	486	522	507	448	471	604		
12	Sum of Multiple-Vehicle	465	452	397	305	378	434		

16) The Insert Slicers dialog box will open, allowing you to select what fields to filter on. For now, leave "**State**" selected and click the "**OK**" button.



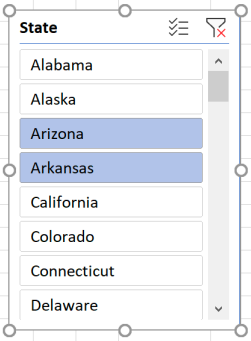
17) A floating window will open, allowing you to filter on various states by clicking the "**State name**" in the Slicer window.



	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2													
3		Column Labels											
4	Row Labels	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
5	Alabama												
6	Sum of Passenger car occupants	579	553	520	438	386	393	398	386	370	345	356	398
7	Sum of Pickup and SUV occupants	354	401	375	298	269	281	269	260	296	270	279	356
8	Sum of Large truck occupants	16	18	15	25	14	9	16	13	20	14	16	32
9	Sum of Motorcyclists	61	103	85	98	74	86	96	96	80	63	64	102
10	Sum of Pedestrians	72	78	69	66	64	61	79	77	59	96	98	111
11	Sum of Single-vehicle	486	522	507	448	364	387	365	353	501	504	471	604
12	Sum of Multiple-Vehicle	465	452	397	305	299	302	316	300	351	316	378	434
13	Alaska												
14	Sum of Passenger car occupants	34	24							10	20	13	16
15	Sum of Pickup and SUV occupants	19	21							18	21	23	35
16	Sum of Large truck occupants	1	1							1	1	0	2
17	Sum of Motorcyclists	4	9							2	8	10	5
18	Sum of Pedestrians	7	9							6	14	12	12
19	Sum of Single-vehicle	22	22							33	41	41	56
20	Sum of Multiple-Vehicle	32	24							18	32	24	28
21	Arizona												
22	Sum of Passenger car occupants	359	452							224	231	260	271
23	Sum of Pickup and SUV occupants	278	384							221	160	217	218
24	Sum of Large truck occupants	13	20							8	7	14	14
25	Sum of Motorcyclists	122	136							146	120	131	138
26	Sum of Pedestrians	157	167							151	141	153	190
27	Sum of Single-vehicle	306	407							499	455	491	549
28	Sum of Multiple-Vehicle	343	450	332	268	211	200	210	212	350	315	402	413
29	Arkansas												
30	Sum of Passenger car occupants	273	267	261	234	226	221	189	211	166	167	191	191
31	Sum of Pickup and SUV occupants	220	236	216	205	210	183	206	185	173	175	181	192
32	Sum of Large truck occupants	25	25	27	18	13	20	22	16	14	9	17	11
33	Sum of Motorcyclists	63	75	80	64	68	83	63	69	56	58	73	73
34	Sum of Pedestrians	37	31	45	45	36	37	42	44	45	36	43	44
35	Sum of Single-vehicle	253	288	255	267	244	241	223	211	291	250	266	293
36	Sum of Multiple-Vehicle	257	222	226	179	203	167	179	187	192	216	265	252
37	California												

18) Clicking on the state names in the Slicer window "**filters**" your table to only the values you selected in this case "**State names**."

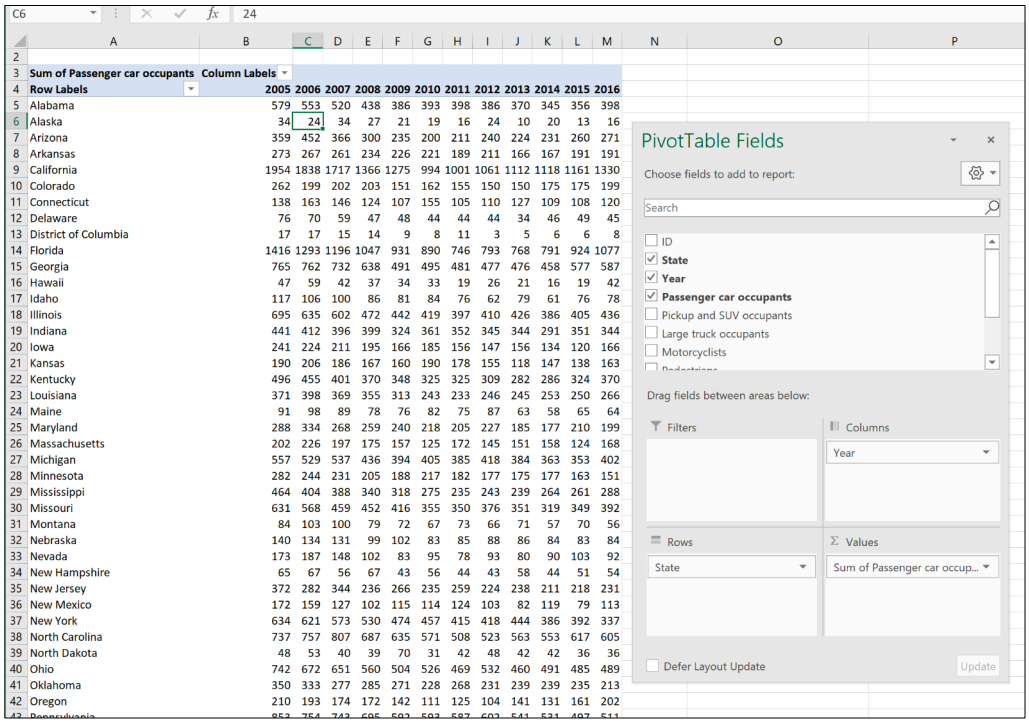
Row Labels	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Arizona												
Sum of Passenger car occupants	359	452	366	300	235	200	211	240	224	231	260	271
Sum of Pickup and SUV occupants	278	384	311	260	210	210	216	228	221	160	217	218
Sum of Large truck occupants	13	20	16	17	8	3	14	10	8	7	14	14
Sum of Motorcyclists	122	136	132	137	118	85	128	136	146	120	131	138
Sum of Pedestrians	157	167	154	120	120	146	147	122	151	141	153	190
Sum of Single-vehicle	306	407	358	317	251	222	223	261	499	455	491	549
Sum of Multiple-Vehicle	343	450	332	268	211	200	210	212	350	315	402	413
Arkansas												
Sum of Passenger car occupants	273	267	261	234	226	221	189	211	166	167	191	191
Sum of Pickup and SUV occupants	220	236	216	205	210	183	206	185	173	175	181	192
Sum of Large truck occupants	25	25	27	18	13	20	22	16	14	9	17	11
Sum of Motorcyclists	63	75	80	64	68	83	63	69	56	58	73	73
Sum of Pedestrians	37	31	45	45	36	37	42	44	45	36	43	44
Sum of Single-vehicle	253	288	255	267	244	241	223	211	291	250	266	293
Sum of Multiple-Vehicle	257	222	226	179	203	167	179	187	192	216	265	252



Conditional Formatting

1) What if we wanted to see in a graphic illustrating how different states compare in how many people were in a car when an accident occurred year over year? We could use Conditional Formatting to help us.

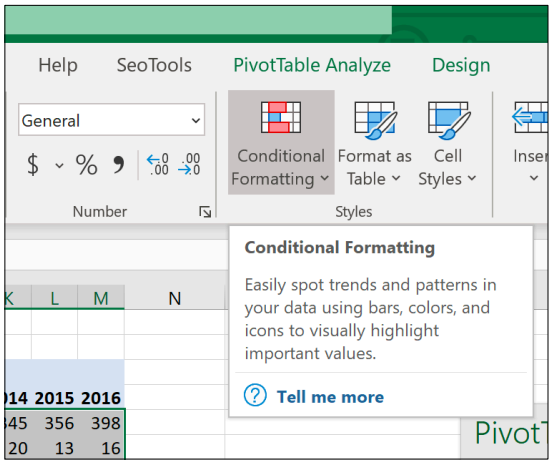
2) First, adjust your PivotTable to show "**Year**" in the Columns, "**State**" in the Rows, and remove all of the other categories except "**Passenger car occupants**" in the Values section by deselecting them in the fields list.



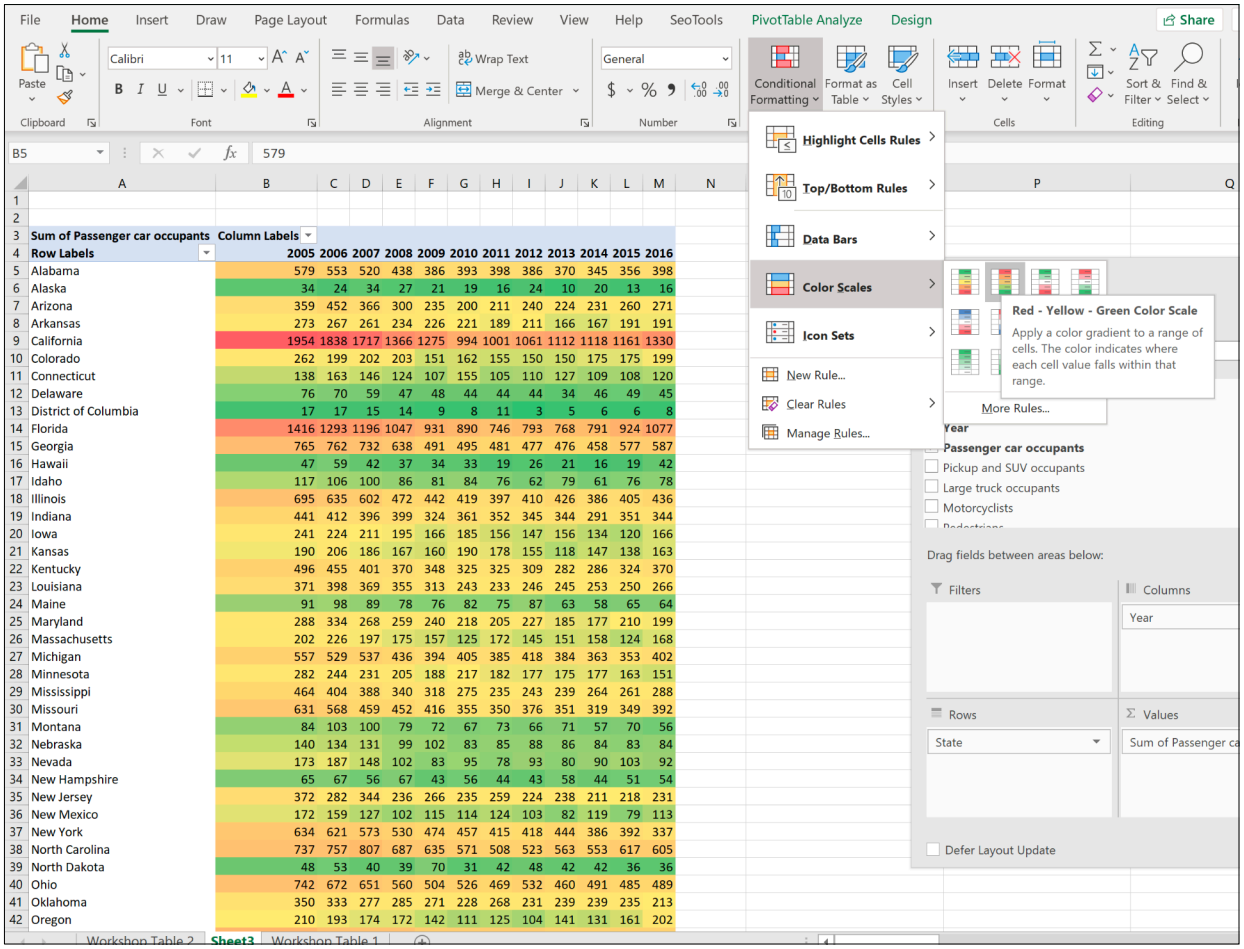
3) Using your mouse, select the range of values you want to format. Select only the "**Passenger car occupants**" data and nothing else.

Sum of Passenger car occupants	Column Labels											
Row Labels	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Alabama	579	553	520	438	386	393	398	386	370	345	356	398
Alaska	34	24	34	27	21	19	16	24	10	20	13	16
Arizona	359	452	366	300	235	200	211	240	224	231	260	271
Arkansas	273	267	261	234	226	221	189	211	166	167	191	191
California	1954	1838	1717	1366	1275	994	1001	1061	1112	1118	1161	1330
Colorado	262	199	202	203	151	162	155	150	150	175	175	199
Connecticut	138	163	146	124	107	155	105	110	127	109	108	120
Delaware	76	70	59	47	48	44	44	44	34	46	49	45
District of Columbia	17	17	15	14	9	8	11	3	5	6	6	8
Florida	1416	1293	1196	1047	931	890	746	793	768	791	924	1077
Georgia	765	762	732	638	491	495	481	477	476	458	577	587
Hawaii	47	59	42	37	34	33	19	26	21	16	19	42
Idaho	117	106	100	86	81	84	76	62	79	61	76	78
Illinois	695	635	602	472	442	419	397	410	426	386	405	436
Indiana	441	412	396	399	324	361	352	345	344	291	351	344
Iowa	241	224	211	195	166	185	156	147	156	134	120	166
Kansas	190	206	186	167	160	190	178	155	118	147	138	163
Kentucky	496	455	401	370	348	325	325	309	282	286	324	370
Louisiana	371	398	369	355	313	243	233	246	245	253	250	266
Maine	91	98	89	78	76	82	75	87	63	58	65	64
Maryland	288	334	268	259	240	218	205	227	185	177	210	199
Massachusetts	202	226	197	175	157	125	172	145	151	158	124	168
Michigan	557	529	537	436	394	405	385	418	384	363	353	402
Minnesota	282	244	231	205	188	217	182	177	175	177	163	151
Mississippi	464	404	388	340	318	275	235	243	239	264	261	288
Missouri	631	568	459	452	416	355	350	376	351	319	349	392
Montana	84	103	100	79	72	67	73	66	71	57	70	56
Nebraska	140	134	131	99	102	83	85	88	86	84	83	84
Nevada	173	187	148	102	83	95	78	93	80	90	103	92
New Hampshire	65	67	56	67	43	56	44	43	58	44	51	54
New Jersey	372	282	344	236	266	235	259	224	238	211	218	231
New Mexico	172	159	127	102	115	114	124	103	82	119	79	113
New York	634	621	573	530	474	457	415	418	444	386	392	337
North Carolina	737	757	807	687	635	571	508	523	563	553	617	605
North Dakota	48	53	40	39	70	31	42	48	42	42	36	36
Ohio	742	672	651	560	504	526	469	532	460	491	485	489
Oklahoma	350	333	277	285	271	228	268	231	239	239	235	213
Oregon	210	193	174	172	142	111	125	104	141	131	161	202

4) Select the "**Home**" tab then click on the "**Conditional Formatting**" button in the "**Styles Section**".



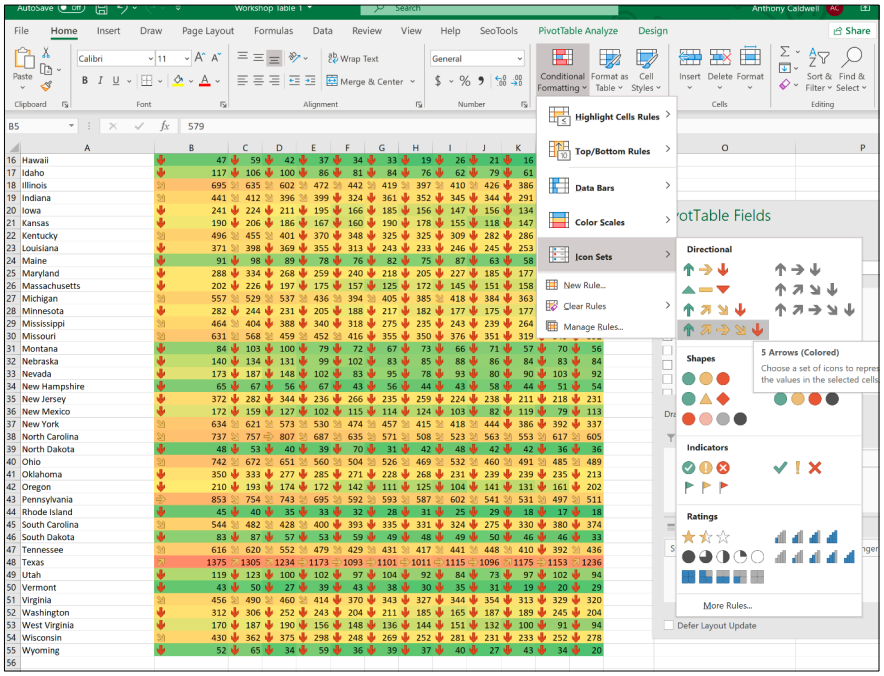
5) Next, a pop-up list will appear, displaying several options. As you drag over each option, you will be able to preview how the formatting will appear. Select the "**Color Scales>Red-Yellow-Green Color Scale.**" option.



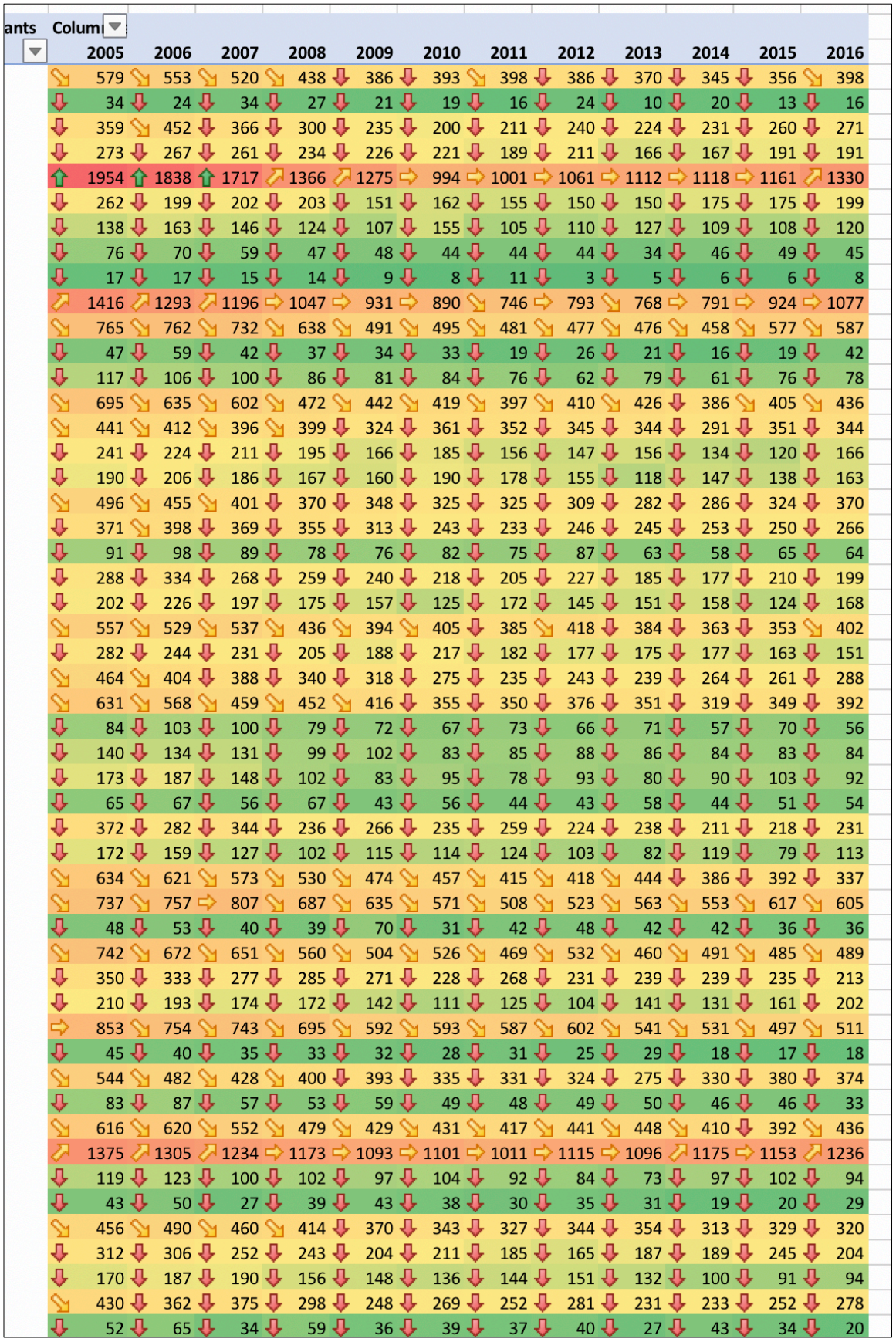
6) The cells of our PivotTable should now be colored based on their values. Red for high values and green for low values.

Sum of Passenger car occupants	Column Labels											
Row Labels	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Alabama	579	553	520	438	386	393	398	386	370	345	356	398
Alaska	34	24	34	27	21	19	16	24	10	20	13	16
Arizona	359	452	366	300	235	200	211	240	224	231	260	271
Arkansas	273	267	261	234	226	221	189	211	166	167	191	191
California	1954	1838	1717	1366	1275	994	1001	1061	1112	1118	1161	1330
Colorado	262	199	202	203	151	162	155	150	150	175	175	199
Connecticut	138	163	146	124	107	155	105	110	127	109	108	120
Delaware	76	70	59	47	48	44	44	44	34	46	49	45
District of Columbia	17	17	15	14	9	8	11	3	5	6	6	8
Florida	1416	1293	1196	1047	931	890	746	793	768	791	924	1077
Georgia	765	762	732	638	491	495	481	477	476	458	577	587
Hawaii	47	59	42	37	34	33	19	26	21	16	19	42
Idaho	117	106	100	86	81	84	76	62	79	61	76	78
Illinois	695	635	602	472	442	419	397	410	426	386	405	436
Indiana	441	412	396	399	324	361	352	345	344	291	351	344
Iowa	241	224	211	195	166	185	156	147	156	134	120	166
Kansas	190	206	186	167	160	190	178	155	118	147	138	163
Kentucky	496	455	401	370	348	325	325	309	282	286	324	370
Louisiana	371	398	369	355	313	243	233	246	245	253	250	266
Maine	91	98	89	78	76	82	75	87	63	58	65	64
Maryland	288	334	268	259	240	218	205	227	185	177	210	199
Massachusetts	202	226	197	175	157	125	172	145	151	158	124	168
Michigan	557	529	537	436	394	405	385	418	384	363	353	402
Minnesota	282	244	231	205	188	217	182	177	175	177	163	151
Mississippi	464	404	388	340	318	275	235	243	239	264	261	288
Missouri	631	568	459	452	416	355	350	376	351	319	349	392
Montana	84	103	100	79	72	67	73	66	71	57	70	56
Nebraska	140	134	131	99	102	83	85	88	86	84	83	84
Nevada	173	187	148	102	83	95	78	93	80	90	103	92
New Hampshire	65	67	56	67	43	56	44	43	58	44	51	54
New Jersey	372	282	344	236	266	235	259	224	238	211	218	231
New Mexico	172	159	127	102	115	114	124	103	82	119	79	113
New York	634	621	573	530	474	457	415	418	444	386	392	337
North Carolina	737	757	807	687	635	571	508	523	563	553	617	605
North Dakota	48	53	40	39	70	31	42	48	42	42	36	36
Ohio	742	672	651	560	504	526	469	532	460	491	485	489
Oklahoma	350	333	277	285	271	228	268	231	239	239	235	213

7) You can combine several "**Conditional Formatting**" rules to make more complex graphics. Let's add an arrow to each cell to illustrate the numeric trend. Repeat steps **3, 4, and 5**. When the pop-up list of formatting options appears select "**Icon Sets>5 Arrows (colored)**"



8) Our PivotTable now illustrates a heat table and trend arrows.



ants	Colum											
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	579	553	520	438	386	393	398	386	370	345	356	398
	34	24	34	27	21	19	16	24	10	20	13	16
	359	452	366	300	235	200	211	240	224	231	260	271
	273	267	261	234	226	221	189	211	166	167	191	191
	1954	1838	1717	1366	1275	994	1001	1061	1112	1118	1161	1330
	262	199	202	203	151	162	155	150	150	175	175	199
	138	163	146	124	107	155	105	110	127	109	108	120
	76	70	59	47	48	44	44	44	34	46	49	45
	17	17	15	14	9	8	11	3	5	6	6	8
	1416	1293	1196	1047	931	890	746	793	768	791	924	1077
	765	762	732	638	491	495	481	477	476	458	577	587
	47	59	42	37	34	33	19	26	21	16	19	42
	117	106	100	86	81	84	76	62	79	61	76	78
	695	635	602	472	442	419	397	410	426	386	405	436
	441	412	396	399	324	361	352	345	344	291	351	344
	241	224	211	195	166	185	156	147	156	134	120	166
	190	206	186	167	160	190	178	155	118	147	138	163
	496	455	401	370	348	325	325	309	282	286	324	370
	371	398	369	355	313	243	233	246	245	253	250	266
	91	98	89	78	76	82	75	87	63	58	65	64
	288	334	268	259	240	218	205	227	185	177	210	199
	202	226	197	175	157	125	172	145	151	158	124	168
	557	529	537	436	394	405	385	418	384	363	353	402
	282	244	231	205	188	217	182	177	175	177	163	151
	464	404	388	340	318	275	235	243	239	264	261	288
	631	568	459	452	416	355	350	376	351	319	349	392
	84	103	100	79	72	67	73	66	71	57	70	56
	140	134	131	99	102	83	85	88	86	84	83	84
	173	187	148	102	83	95	78	93	80	90	103	92
	65	67	56	67	43	56	44	43	58	44	51	54
	372	282	344	236	266	235	259	224	238	211	218	231
	172	159	127	102	115	114	124	103	82	119	79	113
	634	621	573	530	474	457	415	418	444	386	392	337
	737	757	807	687	635	571	508	523	563	553	617	605
	48	53	40	39	70	31	42	48	42	42	36	36
	742	672	651	560	504	526	469	532	460	491	485	489
	350	333	277	285	271	228	268	231	239	239	235	213
	210	193	174	172	142	111	125	104	141	131	161	202
	853	754	743	695	592	593	587	602	541	531	497	511
	45	40	35	33	32	28	31	25	29	18	17	18
	544	482	428	400	393	335	331	324	275	330	380	374
	83	87	57	53	59	49	48	49	50	46	46	33
	616	620	552	479	429	431	417	441	448	410	392	436
	1375	1305	1234	1173	1093	1101	1011	1115	1096	1175	1153	1236
	119	123	100	102	97	104	92	84	73	97	102	94
	43	50	27	39	43	38	30	35	31	19	20	29
	456	490	460	414	370	343	327	344	354	313	329	320
	312	306	252	243	204	211	185	165	187	189	245	204
	170	187	190	156	148	136	144	151	132	100	91	94
	430	362	375	298	248	269	252	281	231	233	252	278
	52	65	34	59	36	39	37	40	27	43	34	20