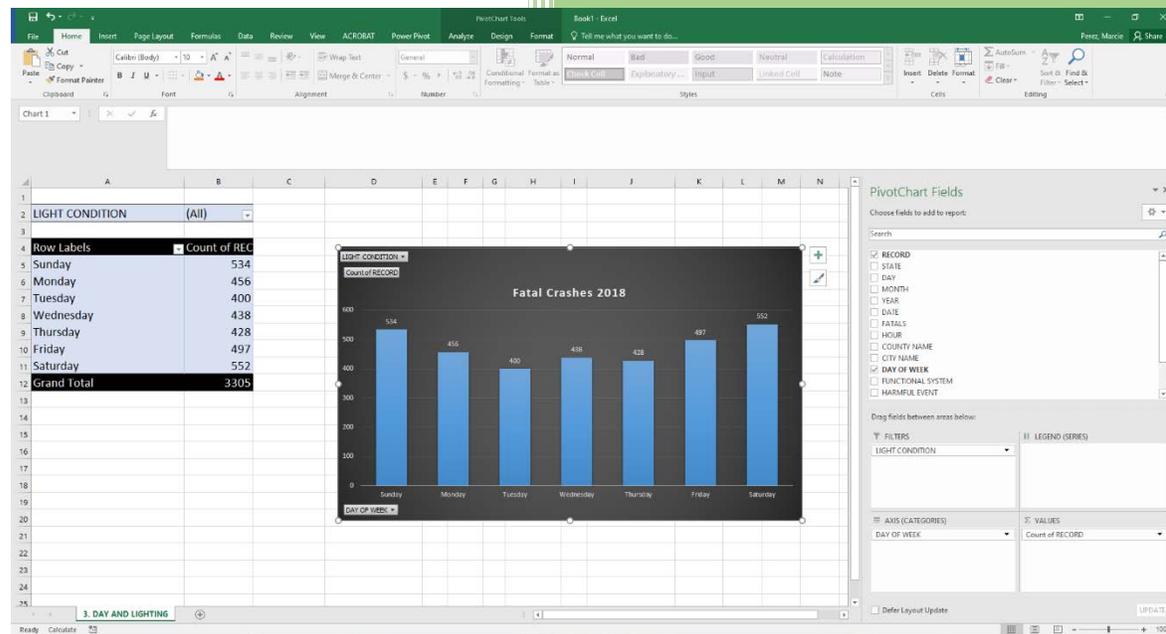


2020

PivotTable Basics



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According to Microsoft, a PivotTable “is an interactive way to quickly summarize large amounts of data” (Microsoft, 2020). A PivotTable can also allow you to take a quick look at a data set and help you make decisions on how you want to proceed. I use them in both manners. For researchers, I often use PivotTables to summarize data for use in reports and infographics, but I also use PivotTables to make decisions on how to proceed with a data set, and that has been invaluable.

The following are examples to help you learn to make basic PivotTables in Microsoft Excel. We will be working with Fatal Analysis Reporting System (FARS) data related to Texas fatal crashes in 2018 (National Highway Traffic Safety Administration, 2020). To practice along with the presentation, you will need:

- A computer with a recent version of Microsoft Excel
- A copy of the file 2018_FARS_CRASH_DATA

The Data

Open the excel file. The first sheet in the file contains the FARS data we will be using. It contains 3,305 records, and the data is displayed in 15 columns (A-O). FARS data comes in a coded format, but for this tutorial the data has been decoded. The following are a list of the variable names in the data.

- RECORD
- STATE
- DAY
- MONTH
- YEAR
- DATE
- FATALS
- HOUR
- COUNTY NAME
- CITY NAME
- DAY OF WEEK
- FUNCTIONAL SYSTEM
- HARMFUL EVENT
- MANNER OF COLLISION
- LIGHT CONDITION

PivotTable Practice

The following instructions will help you build PivotTables in the other tabs in the file.

Crashes by County PivotTable

1. Click on the second tab named **2. CRASHES BY COUNTY**. You should see a PivotTable with the count and percentage of crash for each county in Texas and an area where to build a new

PivotTable.

The screenshot shows an Excel spreadsheet with a PivotTable and a PivotTable Fields task pane. The PivotTable is located in the center of the spreadsheet and contains the following data:

Row Labels	CRASHES	PERCENT OF CRASHES
HARRIS	366	11.07%
DALLAS	286	8.65%
BEXAR	175	5.30%
TARRANT	159	4.81%
TRAVIS	152	4.59%
EL PASO	85	2.57%
SMITH	51	1.54%
ECTOR	49	1.48%
MONTGOMERY	48	1.45%
DENTON	46	1.39%
MIDLAND	45	1.36%
HIDALGO	43	1.30%
COLLIN	40	1.21%
JEFFERSON	38	1.15%
GALVESTON	38	1.15%
WILLIAMSON	36	1.09%
NUECES	35	1.06%
WEBB	33	1.00%
CAMERON	33	1.00%
BRAZORIA	31	0.94%
MCLENNAN	30	0.91%
BELL	28	0.85%
BASTROP	27	0.82%
HARRISON	27	0.82%
FORT BEND	26	0.79%
PARKER	25	0.76%
REEVES	25	0.76%
LUBBOCK	24	0.73%
KAUFMAN	23	0.70%
GREGG	23	0.70%
HAYS	22	0.67%
MCWORTHY	11	0.34%

The PivotTable Fields task pane is open on the right side of the screen. It contains a search box and a list of fields to add to the report. The fields are:

- Record
- STATE
- COUNTY
- CITY
- DAY
- MONTH
- YEAR
- DAY_WEEK
- FUNC_SYS
- HARM_EV
- MMNL_COLL
- FATALES
- LGT_CONDI

The task pane also has sections for FILTERS, COLUMNS, ROWS, and VALUES, which are currently empty.

2. Click in the box that says **PivotTable4**. On the right side of your screen, the PivotTable Fields should open.

The screenshot shows the same Excel spreadsheet as before, but with the PivotTable Fields task pane updated. The fields have been added to the report as follows:

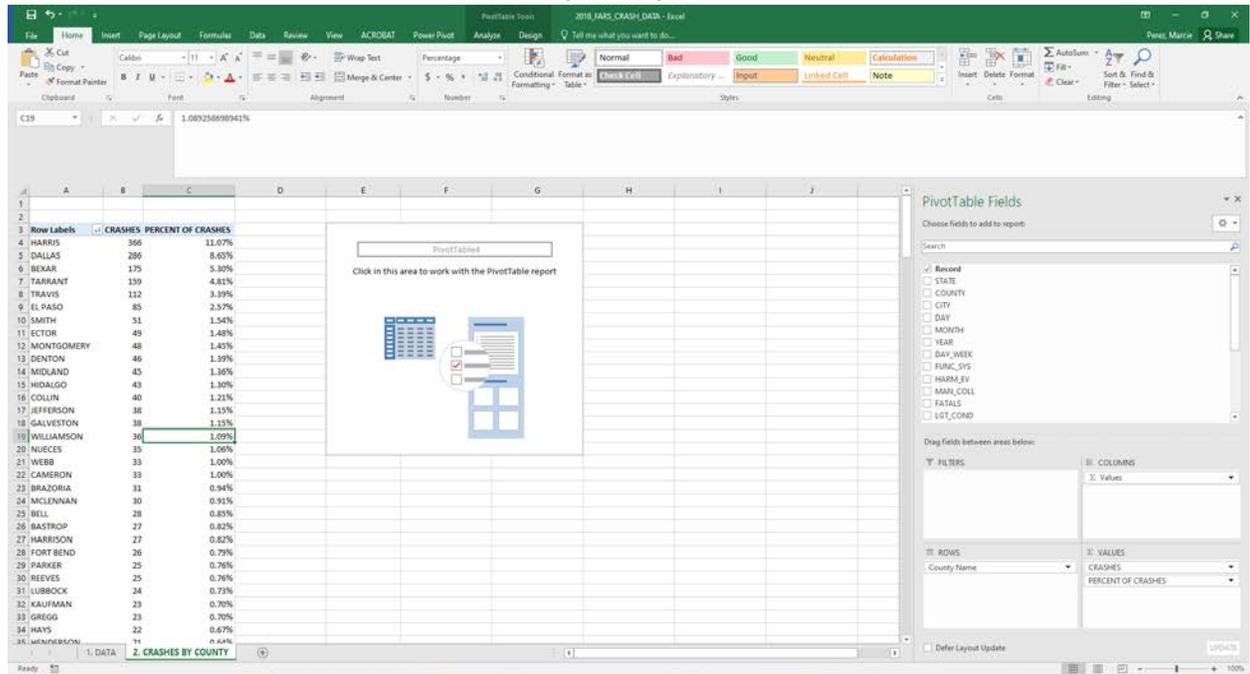
- FILTERS:** STATE, COUNTY
- ROWS:** Record
- VALUES:** CRASHES, PERCENT OF CRASHES

The PivotTable now displays the following data:

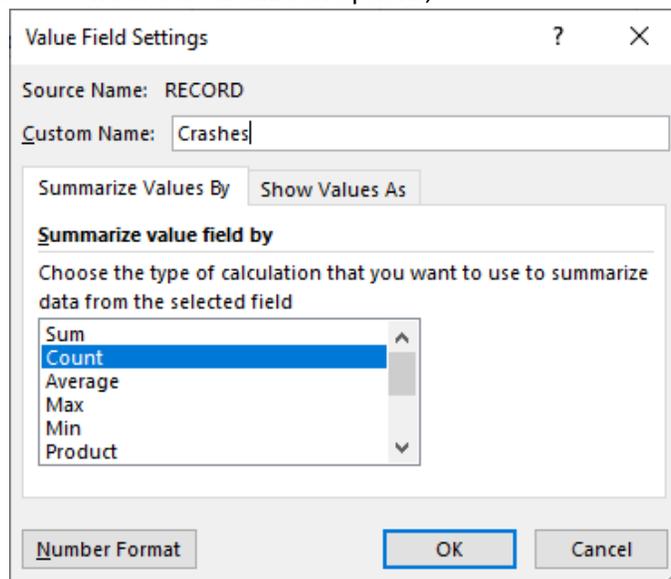
STATE	COUNTY	Record	CRASHES	PERCENT OF CRASHES
		HARRIS	366	11.07%
		DALLAS	286	8.65%
		BEXAR	175	5.30%
		TARRANT	159	4.81%
		TRAVIS	152	4.59%
		EL PASO	85	2.57%
		SMITH	51	1.54%
		ECTOR	49	1.48%
		MONTGOMERY	48	1.45%
		DENTON	46	1.39%
		MIDLAND	45	1.36%
		HIDALGO	43	1.30%
		COLLIN	40	1.21%
		JEFFERSON	38	1.15%
		GALVESTON	38	1.15%
		WILLIAMSON	36	1.09%
		NUECES	35	1.06%
		WEBB	33	1.00%
		CAMERON	33	1.00%
		BRAZORIA	31	0.94%
		MCLENNAN	30	0.91%
		BELL	28	0.85%
		BASTROP	27	0.82%
		HARRISON	27	0.82%
		FORT BEND	26	0.79%
		PARKER	25	0.76%
		REEVES	25	0.76%
		LUBBOCK	24	0.73%
		KAUFMAN	23	0.70%
		GREGG	23	0.70%
		HAYS	22	0.67%
		MCWORTHY	11	0.34%

3. Now click on the PivotTable with the list of counties, the count of fatal crashes, and the percentage of crashes by county. The PivotTable Fields boxes should now contain information.

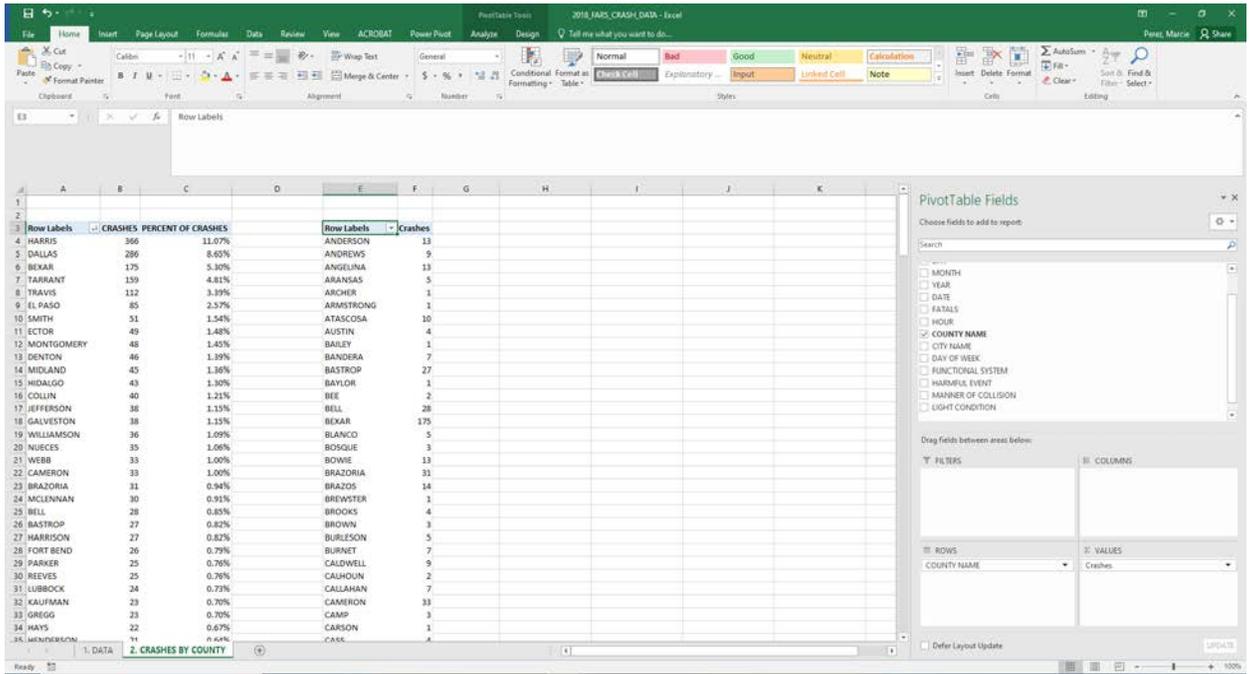
For this exercise we will recreate the Crashes by County PivotTable in PivotTable4.



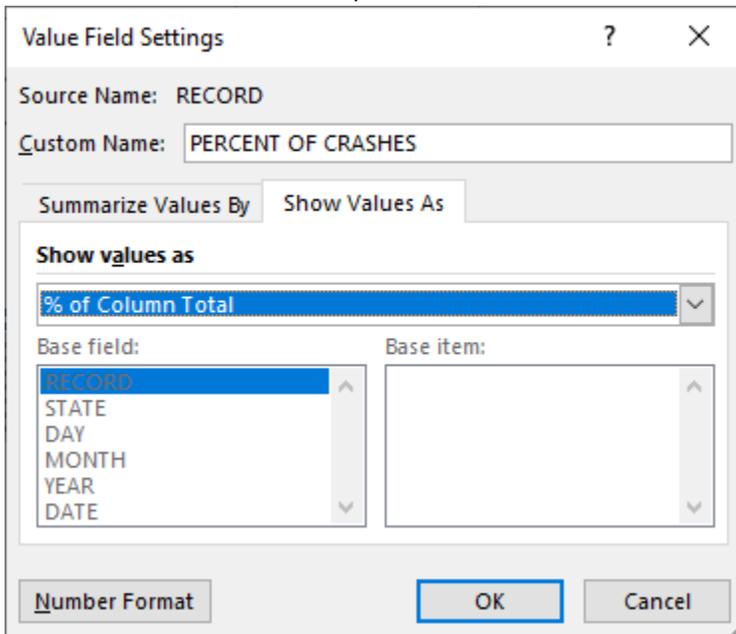
- Click on the PivotTable4 box, in the sheet.
- From the list of variables in the PivotTable Fields panel on the right, click on the County Name variable and drag it to the box labeled Rows at the bottom left corner of the PivotTable Field Box.
- Click and drag the variable RECORD to the box labeled Values at the bottom right corner of the PivotTable Fields Panel. Notice that the variable label changes to Sum of RECORD.
- Click on the Sum of RECORD. You should see a list of options pop-up.
- Click on Value Field Settings. A box with a list of mathematical options should pop-up and Sum should be highlighted.
- Click on Count from the calculation options,



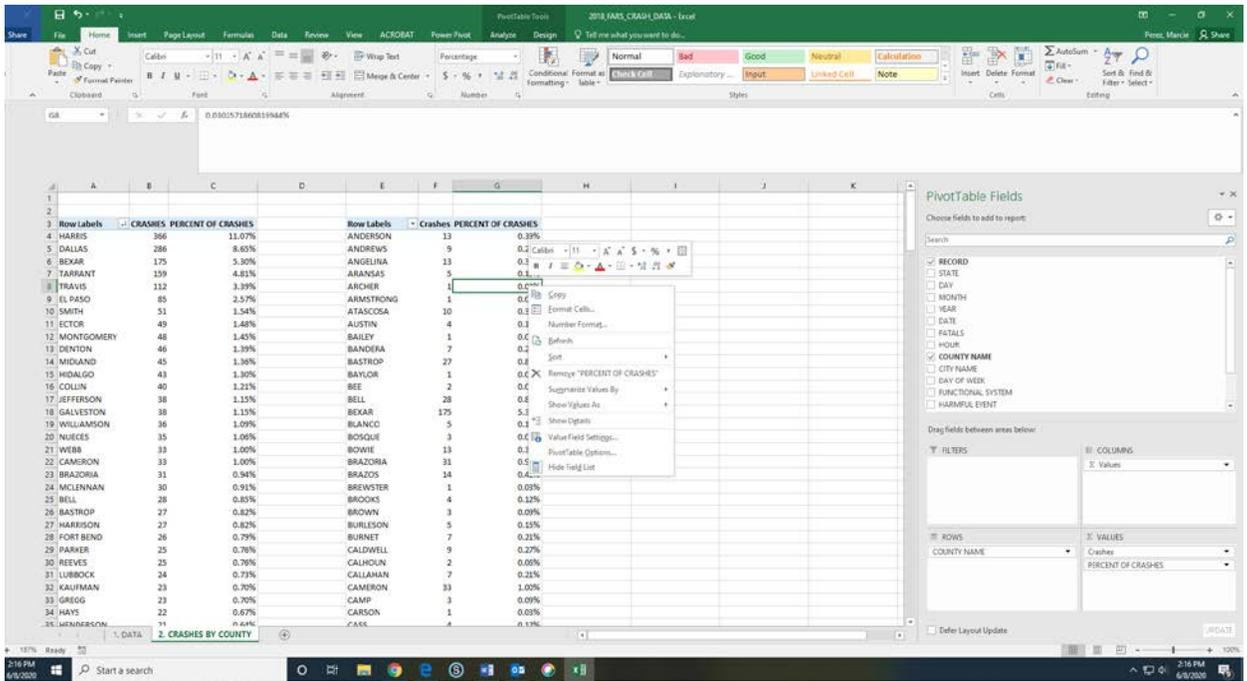
- At the top change the **Custom Name** field to say Crashes and then click **OK**. Now the PivotTable should be showing the number of records by county.



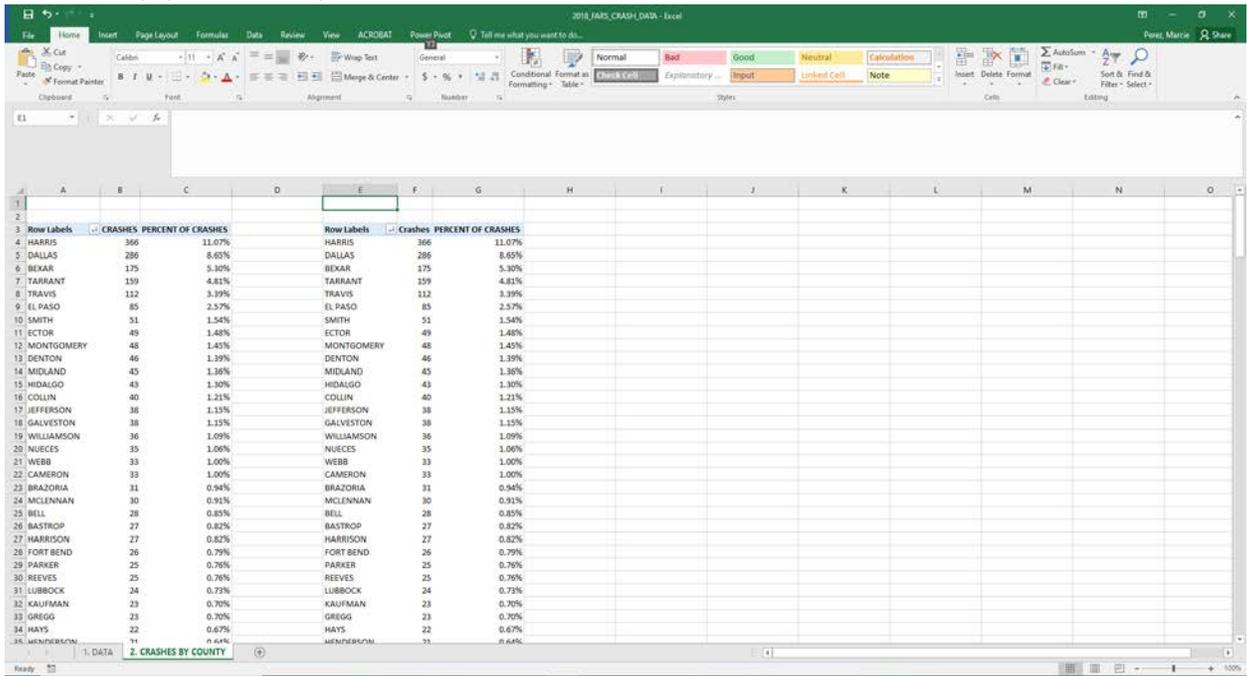
- Click and drag the **RECORD** variable to the **Values** box again.
- Open the **Value Field Settings** and change **Sum** to **Count**, as you did before.
- Click on the second tab, **Show Values As**, in the **Value Field Settings Box**.
- From the **Show Values As** dropdown box select **% of Column Total**.



- Change the **Custom Name** to Percent of Crashes and click **OK**.
- Now that you have a crash count and the percent of crashes for each county, **right** click on a percent in the column.



17. Select **Sort** for the pop-up and then **Sort Largest to Smallest**.
18. Click an empty cell in the spreadsheet. You should have two identical PivotTables.



Pivot Table Filters

1. Click on the third tab **3. DAY AND LIGHTING**. You should see a PivotTable with the days of the week in the first column, lighting conditions in the top row, and counts of the number of records

in each category.

The screenshot shows an Excel spreadsheet with a PivotTable. The PivotTable is set to show 'Count of RECORD' for various lighting conditions across different days of the week. The data is as follows:

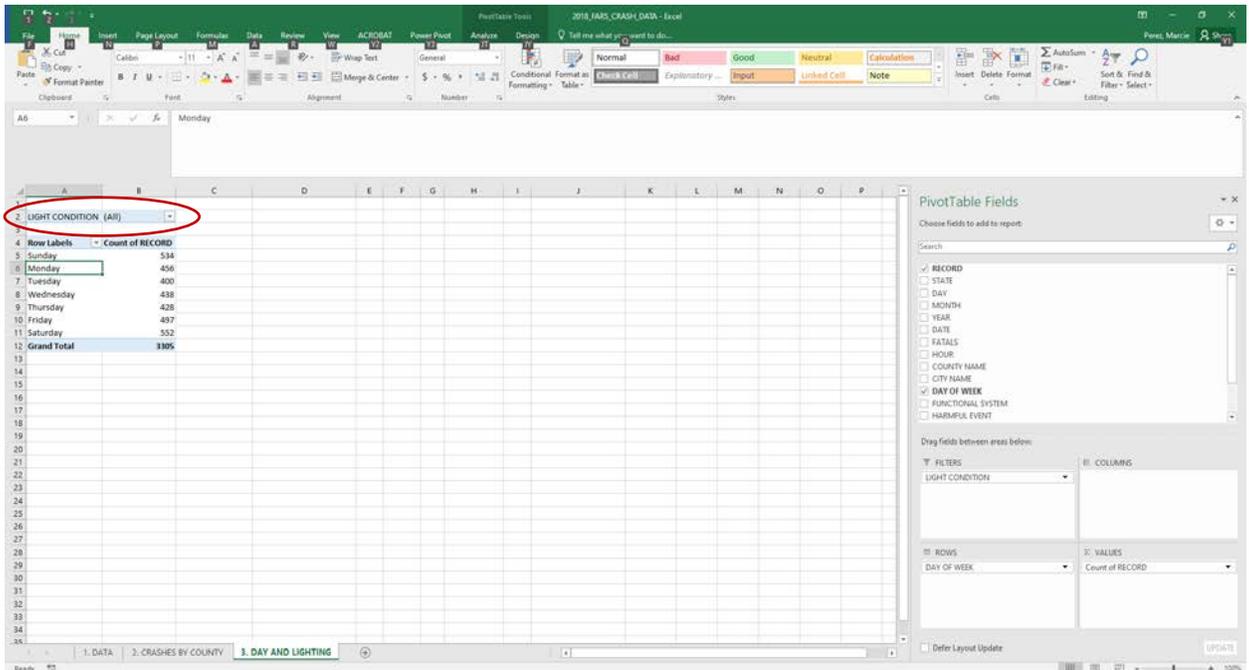
Row Labels	Dark - Lighted	Dark - Not Lighted	Dark - Unknown Lighting	Dawn	Daylight	Dusk	Not Reported	Other	Reported as Unknown	Grand Total
Sunday	138	158	6	163	6	2	534			
Monday	102	133	4	6	205	4	1	456		
Tuesday	64	110	3	15	200	7	1	400		
Wednesday	86	118	1	8	216	8	1	438		
Thursday	88	126	5	12	188	6	1	428		
Friday	122	170	3	4	190	8		497		
Saturday	132	205	4	5	197	8		552		
Grand Total	752	1060	20	56	1359	47	3	2	6	3305

- Click inside the PivotTable so you can see the PivotTable Fields. You will now change the PivotTable so that you only see one Lighting Condition at a time.

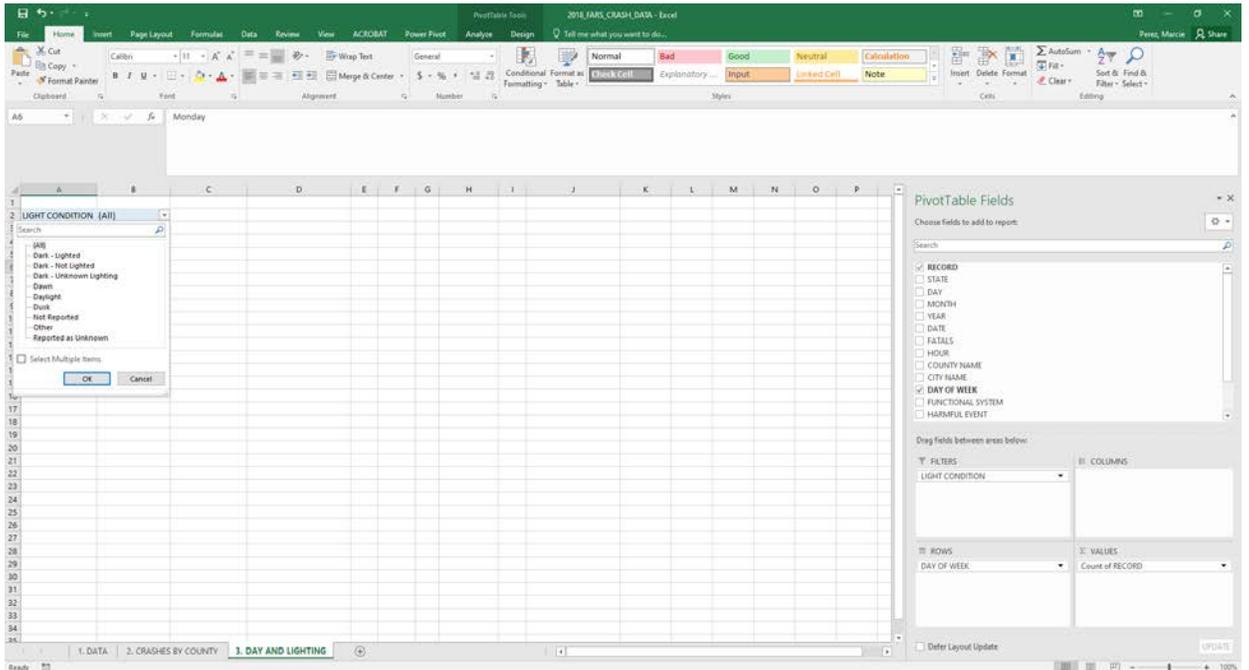
The screenshot shows the PivotTable Fields task pane. The 'Columns' section contains 'LIGHT CONDITION'. The 'Filters' section contains 'DAY OF WEEK'. The 'Values' section contains 'Count of RECORD'. The 'Rows' section is empty.

- In the PivotTable Fields Panel, you will see the LIGHT CONDITION variable in the top right box labeled Columns. Click on LIGHT CONDITION and drag it to the left to the Filters box. The PivotTable should now show only one list of values, and you will see a dropdown box above the

table (shown in the red circle).

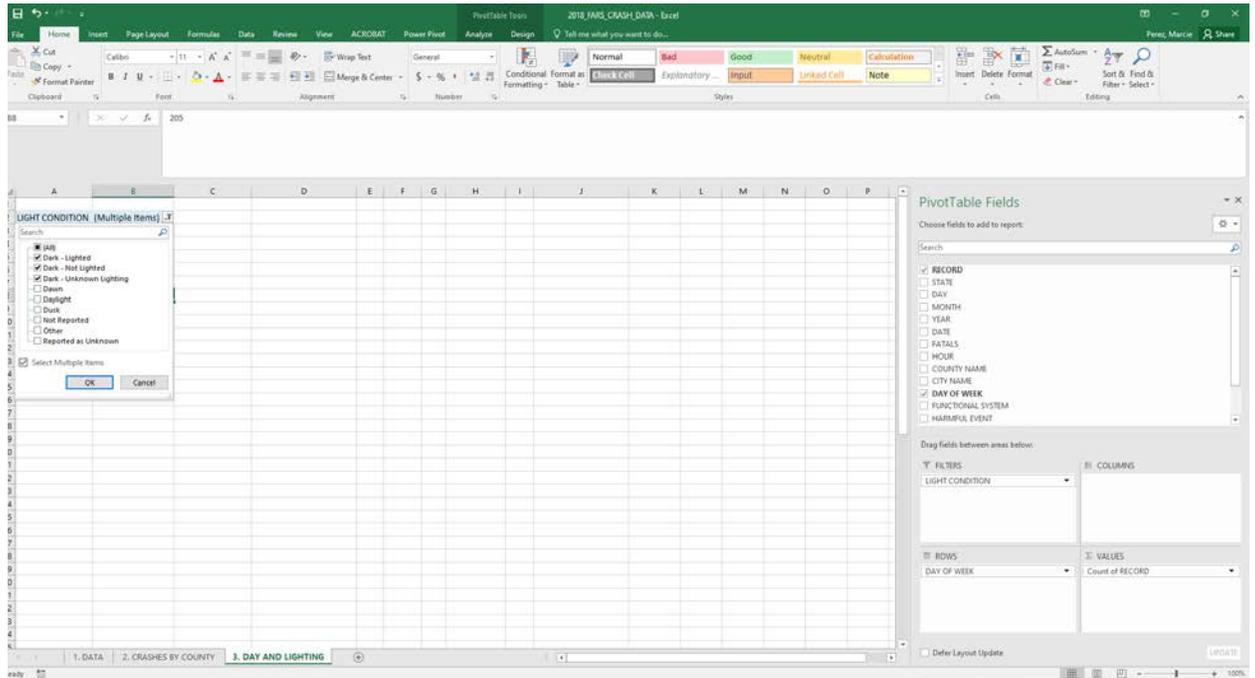


- The Light Condition Filter, above the table, shows (All). Click on the dropdown arrow and select Daylight and then click OK.

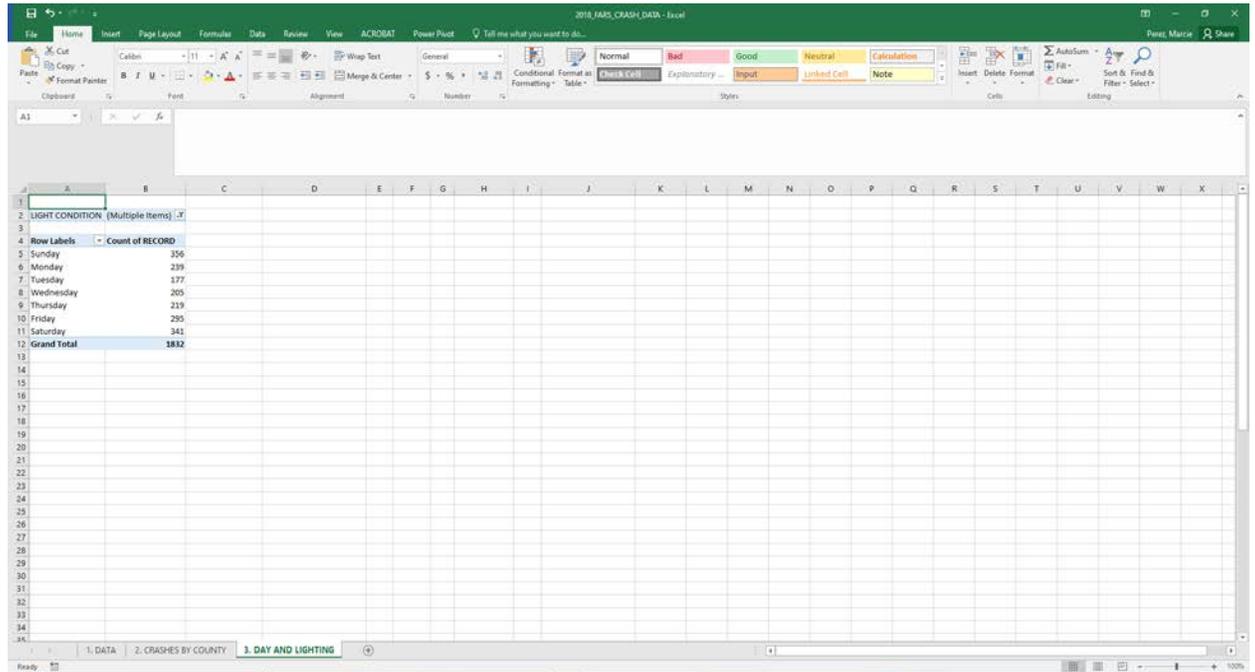


- We see that Wednesday has the most number of fatal crashes. Now we want to change the PivotTable to show the number of crashes by day for dark conditions.
- When you click again on the Light Condition Dropdown arrow, you see three different dark lighting conditions. Below the list of lighting conditions there is a Select Multiple Items check box. Check the box.

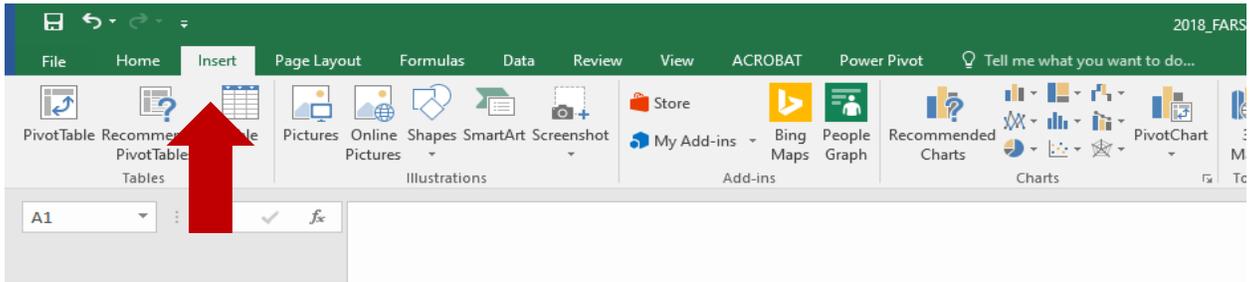
- Select the three different dark lighting conditions: **Dark – Lighted**, **Dark - Not Lighted**, and **Dark - Unknown Lighting**. Uncheck the **Daylight** condition and click **OK**.



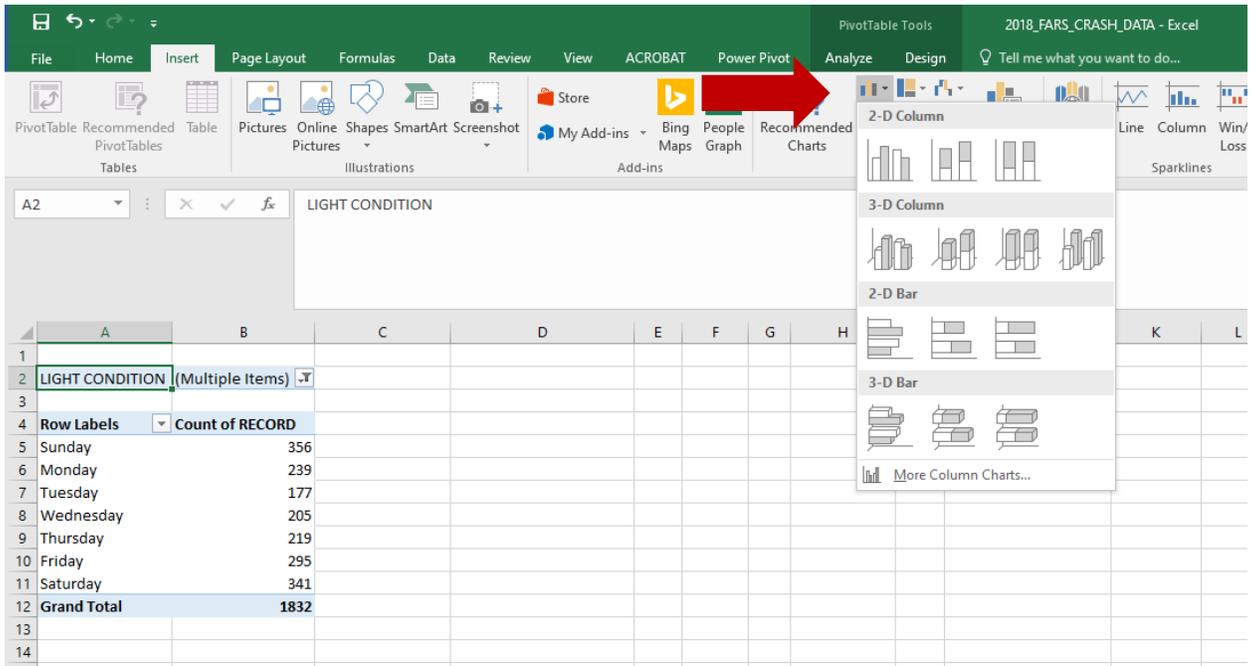
- Now you can see that Sunday has the highest number of fatal crashes in dark conditions.



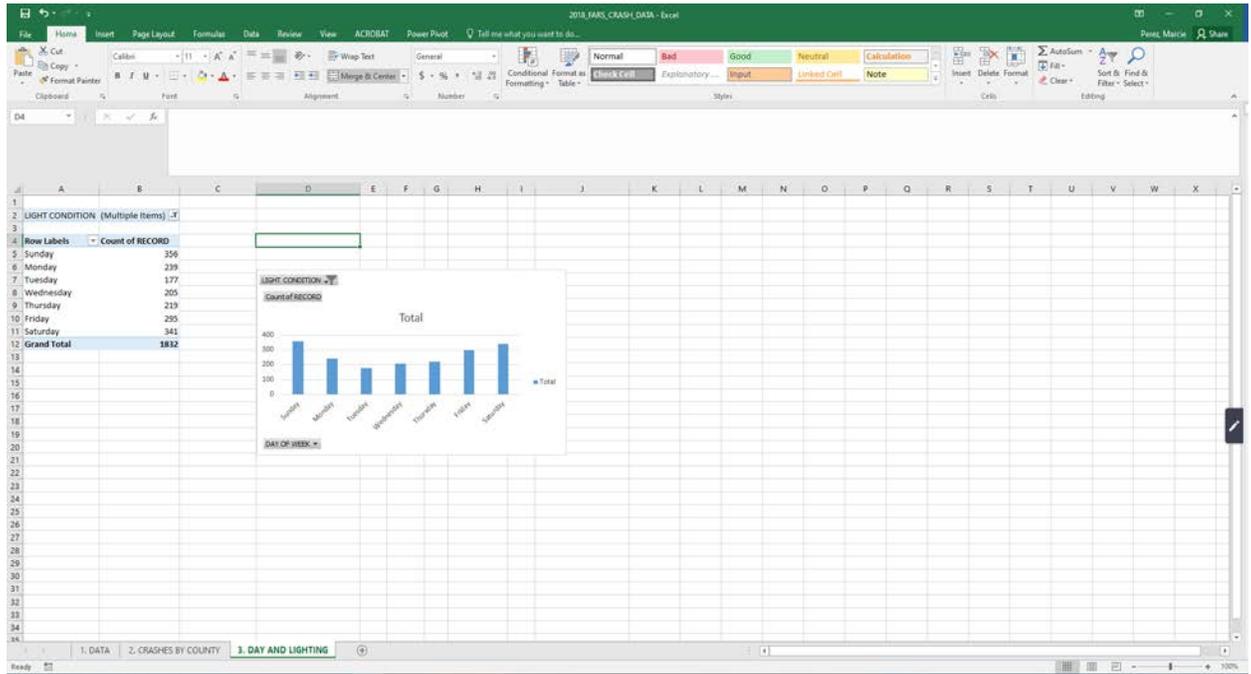
9. Now we can make a visualization of this data. Select the Insert Table from the top menu ribbon bar.



10. Select the first 2D bar chart from the ribbon bar.



11. A chart illustrating the data should pop-up and if you change the filters on the chart or the PivotTable the data will change.



Create a New PivotTable

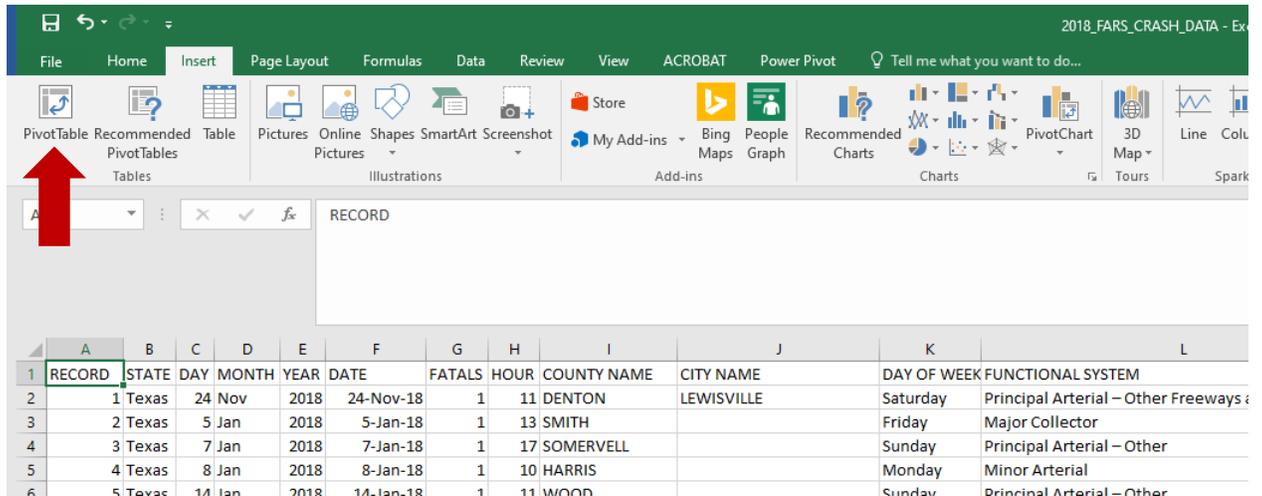
1. Click on the first tab **1. DATA**.
2. Click in **Cell 1A**. It contains the word "RECORD".

The screenshot shows the 'DATA' tab in an Excel spreadsheet. The table contains the following data:

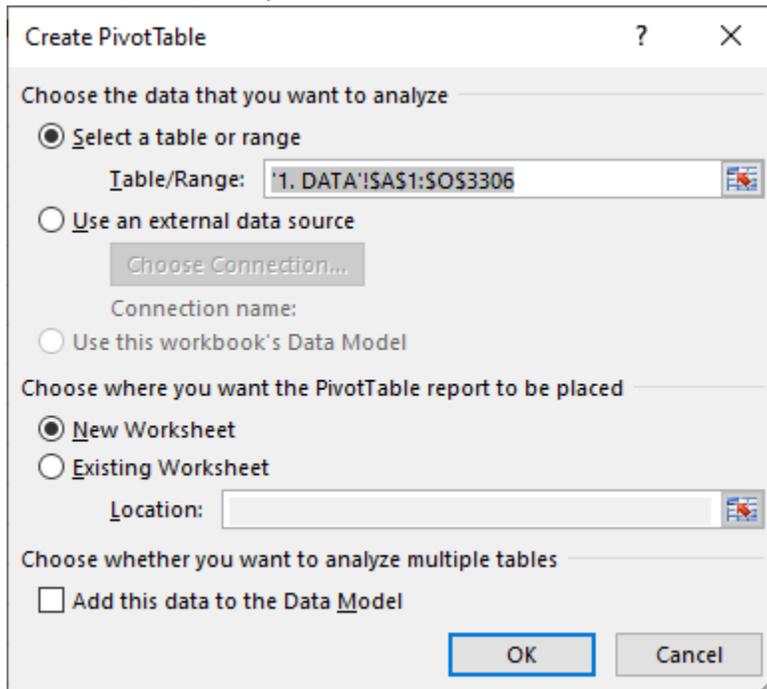
RECORD	STATE	DAY	MONTH	YEAR	DATE	FATALS	HOUR	COUNTY NAME	CITY NAME	DAY OF WEEK	FUNCTIONAL SYSTEM	HARMFUL EVENT	MANNER OF COLLISION	LIGHT CONDITION
1	Texas	24	Nov	2018	24-Nov-18	1	11	DENTON	LEWISVILLE	Saturday	Principal Arterial - Other Freeways and Expressways	Motor Vehicle In-Transport	Angle	Daylight
2	Texas	5	Jan	2018	5-Jan-18	1	13	SMITH		Friday	Major Collector	Motor Vehicle In-Transport	Angle	Daylight
3	Texas	7	Jan	2018	7-Jan-18	1	17	SOMERVELL		Sunday	Principal Arterial - Other	Motor Vehicle In-Transport	Angle	Daylight
4	Texas	8	Jan	2018	8-Jan-18	1	10	HARRIS		Monday	Minor Arterial	Motor Vehicle In-Transport	Angle	Daylight
5	Texas	14	Jan	2018	14-Jan-18	1	11	WOOD		Sunday	Principal Arterial - Other	Motor Vehicle In-Transport	Angle	Daylight
6	Texas	15	Jan	2018	15-Jan-18	1	16	HAYS		Monday	Minor Arterial	Motor Vehicle In-Transport	Angle	Daylight
7	Texas	16	Jan	2018	16-Jan-18	1	17	MONTGOMERY		Tuesday	Principal Arterial - Other	Motor Vehicle In-Transport	Angle	Daylight
8	Texas	19	Jan	2018	19-Jan-18	1	12	BRAZORIA		Friday	Major Collector	Motor Vehicle In-Transport	Angle	Daylight
9	Texas	23	Jan	2018	23-Jan-18	1	10	LA SALLE		Tuesday	Minor Arterial	Motor Vehicle In-Transport	Angle	Daylight
10	Texas	24	Jan	2018	24-Jan-18	1	12	ECTOR		Wednesday	Minor Arterial	Motor Vehicle In-Transport	Angle	Daylight
11	Texas	24	Jan	2018	24-Jan-18	1	14	POTTER		Wednesday	Minor Arterial	Motor Vehicle In-Transport	Angle	Daylight
12	Texas	1	Feb	2018	1-Feb-18	1	17	HIDALGO		Thursday	Principal Arterial - Other	Motor Vehicle In-Transport	Angle	Daylight
13	Texas	2	Feb	2018	2-Feb-18	1	9	POLK		Friday	Principal Arterial - Other	Motor Vehicle In-Transport	Angle	Daylight
14	Texas	20	Feb	2018	20-Feb-18	1	12	KARNES		Tuesday	Minor Arterial	Motor Vehicle In-Transport	Angle	Daylight
15	Texas	20	Feb	2018	20-Feb-18	1	14	TRAVIS		Tuesday	Principal Arterial - Other	Motor Vehicle In-Transport	Angle	Daylight
16	Texas	11	Feb	2018	11-Feb-18	1	14	SMITH		Sunday	Major Collector	Motor Vehicle In-Transport	Angle	Daylight
17	Texas	13	Feb	2018	13-Feb-18	1	8	KAUFMAN		Tuesday	Minor Arterial	Motor Vehicle In-Transport	Angle	Daylight
18	Texas	17	Feb	2018	17-Feb-18	1	8	KAUFMAN		Saturday	Minor Arterial	Motor Vehicle In-Transport	Angle	Daylight
19	Texas	21	Feb	2018	21-Feb-18	1	15	KENDALL		Wednesday	Interstate	Motor Vehicle In-Transport	Angle	Daylight
20	Texas	22	Feb	2018	22-Feb-18	1	15	MORRIS		Thursday	Minor Arterial	Motor Vehicle In-Transport	Angle	Daylight
21	Texas	22	Feb	2018	22-Feb-18	1	17	VAN ZANDT		Thursday	Major Collector	Motor Vehicle In-Transport	Angle	Daylight
22	Texas	26	Feb	2018	26-Feb-18	1	15	JASPER		Wednesday	Principal Arterial - Other	Motor Vehicle In-Transport	Angle	Daylight
23	Texas	26	Feb	2018	26-Feb-18	1	10	PARKER		Monday	Major Collector	Motor Vehicle In-Transport	Angle	Daylight
24	Texas	17	Feb	2018	17-Feb-18	1	9	TRAVIS		Saturday	Principal Arterial - Other	Motor Vehicle In-Transport	Angle	Daylight
25	Texas	22	Feb	2018	22-Feb-18	1	14	TRAVIS		Thursday	Principal Arterial - Other	Motor Vehicle In-Transport	Angle	Daylight
26	Texas	7	Mar	2018	7-Mar-18	1	10	JEFFERSON		Wednesday	Minor Arterial	Motor Vehicle In-Transport	Angle	Daylight
27	Texas	10	Mar	2018	10-Mar-18	1	18	CARSON		Saturday	Principal Arterial - Other	Motor Vehicle In-Transport	Angle	Daylight
28	Texas	14	Mar	2018	14-Mar-18	1	10	BRAZORIA		Wednesday	Minor Arterial	Motor Vehicle In-Transport	Angle	Daylight
29	Texas	12	Mar	2018	12-Mar-18	1	8	MEDINA		Monday	Major Collector	Motor Vehicle In-Transport	Angle	Daylight
30	Texas	15	Mar	2018	15-Mar-18	1	11	PANOLA		Thursday	Minor Arterial	Motor Vehicle In-Transport	Angle	Daylight
31	Texas	13	Mar	2018	13-Mar-18	1	17	FORT BEND		Tuesday	Local	Motor Vehicle In-Transport	Angle	Daylight
32	Texas	18	Mar	2018	18-Mar-18	1	16	SMITH		Sunday	Principal Arterial - Other	Motor Vehicle In-Transport	Angle	Daylight
33	Texas	29	Mar	2018	29-Mar-18	1	15	UPSHER		Thursday	Principal Arterial - Other	Motor Vehicle In-Transport	Angle	Daylight
34	Texas	31	Mar	2018	31-Mar-18	1	16	BEEVES		Thursday	Principal Arterial - Other	Motor Vehicle In-Transport	Angle	Daylight

3. Click **Insert** on the top ribbon bar.

- From the **Insert Ribbon Bar** select the icon for PivotTable.



- You will see a pop-up window with the location of the data to be used in the PivotTable ('1. DATA!\$A\$1:\$O\$3306) and the location where the PivotTable will go (New Worksheet). Click **OK**.



- A new worksheet will open with a **PivotTable** box. Now you can drag the variables into the locations you want.

Things to Remember

- If you change your data be sure to **Refresh** the PivotTable.
- Check your calculations. Do you want count or sum the data?
- Check your percentages. Do you want the percent by column or row?
- If you share your PivotTables, be sure to add a detailed description of what the PivotTable shows and always keep a copy of the original file.

References

Microsoft. (2020). *Support*. Retrieved from Microsoft: <https://support.microsoft.com/en-us/office/overview-of-pivottables-and-pivotcharts-527c8fa3-02c0-445a-a2db-7794676bce96?ui=en-us&rs=en-us&ad=us>

National Highway Traffic Safety Administration. (2020). *Fatality Analysis Reporting System*. Retrieved from <https://www.nhtsa.gov/crash-data-systems/fatality-analysis-reporting-system>